Line Intensities of the Phosphine Dyad at 10 μm

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ABSTRACT

Over 1000 measured line intensities of phosphine (PH_3) are reported for the 830 to 1310 cm^{-1} region that contains the two lowest fundamentals in Coriolis interaction. These measurements are fitted to 1.5% for ν_2 at 992.13 cm^{-1} and 2.1% for ν_4 at 1118.31 cm^{-1}, respectively, using five intensity parameters that include three Herman-Wallis type terms. In addition some 60 intensities of the $2\nu_2$-ν_2 hot band are modeled. The corresponding assignments and line positions of the dyad from previous work [L. Fusina and G. Di Lonardo, *J. Mol. Struct.* **517-518**, 67-78 (2000)] are combined with the present intensity study to provide an improved PH_3 database for planetary studies. The total integrated intensity for the dyad is 156.(4) $cm^{-2}atm^{-1}$ at 296 K.

Key words: Line intensities, PH_3 , infrared fundamentals, dyad

I. INTRODUCTION

Line parameters of phosphine (PH_3) are needed for planetary studies because this species is observed in both Jupiter and Saturn (1). Line positions and energy levels of PH_3 have been extensively measured and analyzed for both the ground and fundamental bands (2-18), but measurements of absolute intensity are rather scant (3,19,20). This study has therefore been undertaken to provide a new PH_3 compilation at 10 μm for databases such as HITRAN and GEISA (21,22).

The line positions of the two lowest fundamentals of PH_3, ν_2 at 992.13 cm^{-1} and ν_4 at 1118.31 cm^{-1}, were previously considered in numerous investigations: laser Stark (4-7), infrared-radiofrequency two-photon (8), double resonance (9), infrared-infrared double resonance (10). More recently, Papousek et al. (11) used a diode laser to measure A_1-A_2 splittings in the $v_2 = 1$ and $v_4 = 1$ vibrational states of PH_3, and far-infrared measurements were performed by Burenin et al. (12) and later by Jackson et al. (13) in the $v_2 = 1$ state. In 1981, Tarrago et al. (14) analyzed spectra recorded at 0.05 cm^{-1} to obtain a line-by-line simulation of the 10-μm region taking into account the strong Coriolis-type interaction between the upper vibrational states v_2=1 and v_4=1. Later Ainetschian et al. (15) measured a number of transitions of ν_2 and ν_4 at very high resolution and accuracy and reproduced their observations within a standard deviation of 1.2 MHz using a set of 42 adjusted constants.

The most recent line positions study of the 10-μm region was undertaken by Fusina and Di Lonardo (16) who recorded spectra of phosphine between 750 and 1400 cm^{-1} at a resolution of 0.004 cm^{-1}. They assigned 2500 ν_2 and ν_4 rovibrational transitions including some 500 "perturbation-allowed" transitions with $\Delta(K-l)$=3, 6 and 9. They also assigned rotational transitions in the vibrationally excited states in

a previously-recorded far-IR spectrum (17). All their experimental data (i.e 2490 IR transitions and 246 far-IR transitions) up to J = K = 24 together with those measured with high accuracy in the previous literature were simultaneously fitted to a set of 46 parameters within the experimental accuracy. As shown in Table 1, the 37 microwave and millimeter-wave transitions were fitted to a rms value of 0.9 MHz representing three times the experimental accuracy. The rovibrational Hamiltonian used by Fusina and Di Lonardo included the Coriolis-type interaction between ν_2 and ν_4, as well as several essential resonance terms. Finally the ground state parameters were also improved by a simultaneous fit of 3060 ground state combination differences from ν_2 and ν_4, 65 microwave and sub-millimeterwave lines from the previous literature and 200 far-IR transitions in the ground vibrational state.

In contrast to the extensive number of studies involving line positions, relatively little was done for line intensities of PH_3 in the dyad region. An integrated absorption was measured at low resolution by McKean and Schatz in 1956 (19). Tarrago et al. (14) estimated the ratio of the dipole moment derivatives for the dyad by using relative intensities retrieved during the analysis of the positions. These values were then normalized to the low resolution integrated absorption (19) in order to provide a compilation for planetary applications. The only previous dyad line intensities were the 57 transitions measured with a diode laser spectrometer to ± 8-10% by Kshirsagar et al. in 1991 (20). Using the eigenvectors from an earlier analysis of the ν_2 and ν_4 positions by Fusina and Di Lonardo (16), these authors determined the ν_2 and ν_4 dipole moment derivatives and their relative signs; their values were lower than the normalized values obtained by Tarrago et al. (14). The only other consideration of the dyad intensities was a computation of the electric

dipole moment derivatives by Chong et al. (23) and two ab initio calculations (24, 25). Recently, an ab initio force field calculation was obtained in order to determine a potential energy surface for PH_3 (26). The computed and experimental frequencies for the fundamentals were different by a few wavenumbers.

Despite the availability of new information, the line parameters of the 10 μm phosphine have not been updated in the public databases (21,22) for almost two decades. To remedy to this situation, we retrieved over 1000 line intensities in the dyad region from spectra recorded at 0.002 cm^{-1} resolution with a Bruker Fourier transform spectrometer located at the Pacific Northwest National Laboratory. Using the line assignments published by Fusina and Di Lonardo (16), we obtained the eigenvectors by fitting the line positions and performed a least-squares fitting of the line intensities in order to create a new compilation in the 10 μm region of phosphine. Then, using the upper state parameters for the excited vibrational state $v_2 = 2$ determined in the 5 μm region (3), we also preformed an intensity analysis of the strongest hot band $2\nu_2$-ν_2. The following sections present the experimental details, the line intensity analysis and the resulting line-by-line database now available for planetary applications.

II. EXPERIMENTAL DETAILS

The Doppler width (full width at half height) of phosphine ranges from 0.0027 cm^{-1} at 1300 cm^{-1} to 0.0018 cm^{-1} at 860 cm^{-1}. Therefore, for this investigation, we elected to record spectra at a resolution of 0.0020 cm^{-1} (full width at half height) using the Bruker IFS 120 HR Michelson Fourier transform interferometer at the PNNL facilities. At this resolution it was necessary to use a combination of digital

and optical filters to minimize the size of the interferogram data files and to produce accurate and reproducible single channel spectra. Boxcar apodization was applied in the data reduction. The interferometer has a focal length of 41.9 cm and incorporates two apertures, one before the KBr beamsplitter and one after it in order to reduce off-axis rays and other spurious effects that might be introduced by using only one aperture. For this spectral region, a heated SiC source and a photoconductive HgCdTe detector were used. The interferometer was evacuated to a pressure of less than 30 microns. A sample spectrum from 1110 to 1210 cm^{-1} is shown in Fig. 1.

The phosphine was obtained from Matheson Gas and Equipment and was reported to be 99.999 % pure. The sample was subjected to several freeze-pump-thaw cycles to ensure the stated purity. The temperature-controlled sample cell for these experiments was made of gold-plated electropolished stainless steel and had an optical path of 9.906 (±0.008) cm and a diameter of 5.0 cm. It was fitted with a stainless steel valve and wedged KBr windows that were sealed with Viton O-rings. All O-rings were lubricated with a small amount of perfluorinated grease. The cell was fixed in place, and the temperature was stabilized to better than 0.1 K. The temperature was monitored by a RTD thermocouple attached to the outside of the cell. The sample was introduced from a transfer manifold, and the pressure was measured with one of three MKS Baratron capacitance manometers (1, 10 and 1000 Torr) that were reported by the manufacturer to be accurate to 0.01 % of full scale. The spectra were recorded in three spectral segments I. 860-980 cm^{-1} II. 900-1310 cm^{-1} III. 1240-1400 cm^{-1}. The corresponding gas sample conditions are shown in Table 2. An additional spectrum of N_2O obtained with the same optical arrangement was used to calibrate line positions (with Maki and Wells (26) as standards) and to

validate the assumed instrumental line shape (sinc + aperture correction).

All of the spectra were ratioed against an empty cell, single channel background spectrum taken at a resolution of 0.032 cm^{-1} with an extra factor of 16 for the zero fill to ensure that the background did not add any noise. The interferometer carriage was scanned at a velocity of 40000 zero crossings a second, and a time interval of 177 seconds was required for one complete scan. The 256 inteferograms were co-added in order to obtain adequate signal to noise (~ 400 :1 rms near 1100 cm^{-1}). The spectrum at each pressure was divided up into 4 runs of 64 co-adds, each recorded over a period of 189 minutes. The total integrated absorptions in the first and last co-adds of one set were compared, and a 1% deterioration was observed for the phosphine concentration. Outgassing and/or air leakage was found to be about +0.010 Torr over the 12 hours required to obtain one spectrum.

The measurements were retrieved from the laboratory spectra using curve-fitting techniques (28) illustrated in Fig. 2. For this, each unapodized spectrum was measured individually by computing a synthetic spectrum and adjusting the assumed values of the position and intensities to reduce the differences between the observed and computed spectral digits. The upper panel shows the calculated minus observed spectral digits after the fitting has been performed. The initial input linelist for the retrievals was created by peak finding. We measured the highest pressure spectrum in each region and adjusted the value of the self-broadened line widths, in addition to the positions and intensities. Additional retrievals with the pent-ultimate high density spectrum indicated that the precisions of the self-broadened widths were 15% or better. The self-broadened widths ranged from 0.144 $cm^{-1}atm^{-1}$ at low J to 0.039 $cm^{-1}atm^{-1}$ at high J. This indicated that for pressures less than 1. Torr the Lorentz width (HWHM) would be less than 0.00013 cm^{-1} and an estimate of the

self-broadening coefficient to 15% was generally sufficient to obtain reliable intensities.

In our data, all the transitions with K"=3 are split into A_1 and A_2 components of similar intensities, and we attempted to retrieve intensities of both of the components separately. For the (R)P transitions with K" = 6, we observed split components for J" $\geq$ 10 and for the (R)R transitions, the splitting start to be observed at J > 7. For a handful of these pairs, we did not obtain satisfactory retrievals by assuming Voigt line profiles, and we interpreted this to be caused by line mixing between the split components. However the available gas pressures were generally too low to measure the line mixing parameters accurately.

The resulting retrievals from the high density spectrum became the input list for the lower pressure spectra, and self-broadened widths were then held fixed. Retrievals from different spectra were combined to obtain the line position and intensity for each discernible feature in the spectrum. The experimental values were matched to initial predictions with assignments and lower state energies so that the measured intensity from each individual spectrum could be normalized to its corresponding value at 296 K before the average was computed. In Table 3, we list a sample of individual retrievals in $cm^{-2}atm^{-1}$ at 296 K and the averaged values (in bold). Usually, an individual measurement was based on five different spectra. As seen here, the individual measurements for positions and intensity displayed good internal consistency from run-to run. Because the spectra were recorded in three segments, care was taken to check that these data were consistent. For example, in Table 3, the first three transitions were measured in both in spectral segments I and II (listed in Table 2), and there are no systematic differences. The precisions of the intensities were thought to be 2% or better with an absolute accuracy of 3%. The

precisions of the positions can be judged from the rms of the individual observations. The absolute accuracies are difficult to ascribe without knowing the self-broadened pressure shifts, but the present data are at too low a pressure to permit accurate self-broadened shifts to be obtained. Nevertheless, our positions overall agreed with observed values reported by Fusina and DiLonardo (16) to better than 0.0001 cm^{-1}. Therefore we elected not to improve the energy level analysis in order to model the line intensities.

III. INTENSITY ANALYSIS

The intensity of a line absorption (29) :

$$I_{A''}^{B'} = \frac{8\pi^3}{3hc} \cdot \frac{£T_0}{TQ_T} \cdot g_{A''} \cdot \nu_{B'\leftarrow A''} \cdot \left[1 - \exp(-\frac{hc\nu_{B'\leftarrow A''}}{kT})\right]$$

$$.\exp[-hcE_{A''}/kT]. \left|< B' \| \mu_Z^t \| A'' >\right|^2 \qquad (1)$$

where |A''> and |B'> are the eigenvectors related, respectively to the lower and upper vibration-rotational states of the transition. They can be described as linear combinations of the zero-order basis set wavefunctions |v, l, J, K>. In Eq. (1), £ = 2.68675×10^{19} molecules cm^{-3} is the Loschmidt number at T_0 = 273.15 K ; T = 296 K ; Q_T = 1626.070 is the total partition function at 296 K calculated by Tarrago et al. (14) ; $\nu_{B'\leftarrow A''}$ is the wavenumber of the transition, $g_{A''}$ is the total degeneracy of the lower state energy level and $E_{A''}$ is the lower state energy.

The first step for fitting the intensity measurements is to obtain eigenvectors describing the lower and upper states of the transition. To avoid problems connected with phase conventions and matrix elements definitions, we refitted the line

positions and assignments of the ν_2/ν_4 transitions kindly sent by Fusina and Di Lonardo (16). The lower state energy levels were calculated using the ground state parameters from Table 1 of Ref. (16) and included as a constraint in our fit. We decided to limit our calculation to J = K = 22 because line intensities corresponding to higher J values were too weak to be measured with good accuracy from our data. The set of programs for both the energy and intensity fitting was written by G. Tarrago and has been used in a series of papers related to C_{3v} symmetric top molecules including PH_3 (3,14). The root-mean-square deviations of our energy fit (0.00039 cm^{-1} for 2208 lines going up to J = 22 using 44 parameters) is similar to the one obtained by Fusina and Di Lonardo of 0.00037 cm^{-1} for the IR transitions in ν_2 and ν_4. Our refitted parameters, defined by the notation of Table 4, are shown in Table 5 in order to indicate how the eigenvectors were computed. Having obtained the eigenvectors for the dyad, we then used five intensity parameters, defined in Table 6, to fit 979 intensity measurements to 1.9%. The values of the intensity parameters obtained in the our fit are listed in the first column of Table 7. The detailed rms (root-mean-square) deviations for the line intensities fits of ν_2 and ν_4 are given in the second column of Table 7 along with the number of lines used in the fit. Two parameters are needed to fit the ν_2 band within 1.5% (the terms d_0 and d_{01}, the first term of the dipole moment transition derivative expansion in ν_2 and its J dependance) and three parameters are needed to fit the ν_4 line intensities within 2.1% (the terms d_1, d_{11} and d_{12}, the leading term of the dipole moment transition expansion of ν_4, its J dependance and its K dependance respectively), according to the notations of Table 6. Without the Herman-Wallis terms, the rms deviations become 9% in ν_2 and 11% in ν_4, respectively. The vibrational transition dipole

moment, directly related to $|d_0|/\sqrt{2}$ for ν_2 is $<|\mu_v|> = 0.08251(5)$ Debye and for ν_4 (related to $|d_1|$) $<|\mu_v|> = 0.08626(5)$ Debye.

For completeness, the line positions of the strongest hot band $2\nu_2$-ν_2 were computed using the pentad parameters from Tarrago et al. (3) for the upper states. Some 62 transitions were identified, and the corresponding intensities were modeled to 4.6 % using two parameters, d_0 and d_{01} which are also shown in the second column of Table 7. The value of the vibrational transition dipole moment for the hot band is $<|\mu_v|>$ equals 0.1177(4) Debye. We searched the spectrum for more hot bands and did see very weak features that coincided with predicted transitions of bands such as $\nu_2+\nu_4-\nu_2$. However, only a small number of observed intensities was accurately measured, and we elected not to pursue the analysis of these other hot bands.

In the third column of Table 7, we show the vibrational bandstrengths for the ν_2 and ν_4 band, S^2_v and S^4_v obtained from the expression given for S_v in Ref. (29) using the value of the rotational partition function Q_r = 1597.135 and for the vibrational partition function Q_v = 1.018117 at 296 K. When compared to the total integrated bandstrength ΣS_i, we see that the strong Coriolis interaction coupling between the fundamentals causes a transfer of intensity from ν_4 to ν_2, but that the total integrated intensity $S_v(\text{int}) = S_2+S_4 = 156.(4)$ $cm^{-2}atm^{-1}$ at 296 K is close to the total vibrational bandstrength $\Sigma S_v = 154.89\ (12)$ $cm^{-2}atm^{-1}$ at 296 K. The vibrational bandstrength S_v and the integrated bandstrength ΣS_i are also calculated for the hot band $2\nu_2$-ν_2.

As pointed out by previous authors, the intensity distribution within the ν_4 band is rather peculiar because of the x,y Coriolis interaction. The RP subbranches

are of the same intensity as the PP subbranches, as it can be seen in our intensity fit, whereas the PR subbranches are very weak and therefore can not generally be seen in the present optical. Many perturbation-allowed transitions with $\Delta(K-l) = \pm 3, \pm 6$ and ± 9 were also observed. We include many of them to fit the line positions, but we are able to use only a restricted number of them (17) in our intensity fits as they appear only in higher optical densities. However, some of them are as intense as the allowed transitions, as in the case of the SR (3,1) transition at 1161.504 cm^{-1} seen in Fig. 2. Because of the strong rovibrational interactions between the upper state energy levels J'=4 K'=2 and K'=3, both E energy levels are strongly mixed (the coefficients of the eigenvectors are -0.62 and 0.74), and a strong perturbation-allowed transition results. In the case of this transition (and for a few more perturbation-allowed transitions), we are able to fit the intensity to within a few percent, thus demonstrating the quality of our model. For example, in Table 8 we present a set of vibrationally-mixed transitions whose levels are so greatly perturbed that we are unable to identify with certainty the vibrational upper state or the upper state K. The columns are the observed line position in cm^{-1} and its experimental uncertainty, the number of spectra used in the retrievals, the observed intensity in cm^{-2} atm^{-1} $x10^{-3}$ at 296 K and its experimental uncertainty in percent, followed by the upper state J and symmetry S', the lower state J, K and symmetry S". The last two columns show, respectively, the observed - calculated line position in cm^{-1} and the ratio of the calculated to observed intensities. Although these data have not been included in the intensity fit, they are nevertheless well reproduced by the calculation.

The transition moments are compared in Table 9 with the values obtained by the previous authors. The present values are lower than those deduced by Tarrago et al.

(14) for ν_2 and ν_4 using the overall band strength (S_2+S_4= 184 cm^{-2} atm^{-1} at 300 K) measured at low resolution by McKean and Schatz (19) and from the relative intensity ratio between the two dipole moment derivatives of ν_2 and ν_4 :

$$\rho = [d\mu_z/dq_2]/[d\mu_{x(y)}/dq_{4a(b)}] = \varepsilon \times 1.35 \ (5) \qquad (2)$$

In Eq. (2) the sign of the relative ratio ($\varepsilon = \pm 1$) is correlated with the relative signs of the first order coriolis interaction c^1_{11} as defined in Ref. (14). In fact, both the absolute and relative signs of transition dipole moments $< v'' \mid \mu_\alpha \mid v' >$ corresponding to a pair of interacting states can be unambigously determined through the contributions of the cross terms in the line intensities expression (see Eq. 1). In the absence of line intensity measurements, Tarrago et al. (14) were thus unable to determine the relative sign of the ν_2 and ν_4 transitions dipole moments. The transition dipole moments we obtained are in reasonable agreement with those obtained by Kshirsagar et al. (19) from the measurements of 57 line intensities. In Fig. 3 we show the ratio (Kshirsagar et al. / present) of 51 observed intensities, and it is seen that their values are lower by some 15% for ν_2 but in good agreement for ν_4. The overall mean of 0.88 ± 10% is not far from the intensity accuracy ascribed by Kshirsagar et al. for their diode laser measurements. Compared to the computed values of the transition dipole moments (23), our values are in good agreement for ν_4 but are higher for ν_2 because these authors relied on the Kshirsagar et al. intensities.

Finally, Tables 10 and 11 show a comparison between measured and calculated intensities for the dyad ν_2/ν_4 and for the strongest hot band $2\nu_2$-ν_2, respectively. For the dyad, we use the energy and intensity parameters from Tables

5 and 7. For the hot band, we use the upper state energy parameters from Tarrago et al. (3) and the intensity parameters determined in the present study. For each line, they include the line assignments (lower and upper levels), the observed wavenumbers, the difference between the observed and calculated frequencies (in 10^{-4} cm^{-1}), the measured intensities (S_0), the calculated intensities (S_C), the difference between measured and calculated intensity in percent (S_O-S_C/S_O), the ratio between calculated and measured intensity, the number of scans used for the intensity measurement and the estimated measurement uncertainty in percent.

IV. LINE-BY-LINE PREDICTION

The present line intensity analysis combined with the assignments and line positions of Fusina and Di Lonardo (16) provides the basis for a new prediction of PH_3 at 10 μm. For 4440 transitions up to J = 22, the ν_2 line positions range from 770.878 to 1183.405 cm^{-1}, and the ν_4 values cover the region from 866.468 to 1372.496 cm^{-1}. The line intensities vary from $2.x10^{-24}$ to $3.x10^{-20}$ cm^{-1}/(molecule · cm^{-2}) at 296 K. Default constants of 0.1 and 0.08 cm^{-1} atm^{-1} are assumed, respectively, for the self- and air- broadened widths because the published measurements are limited (See Ref. 30 and the references therein). The temperature dependence of the widths is set at 0.75, and the pressure-induced shifts are zero. This prediction of the ν_2/ν_4 and hot bands $2\nu_2$-ν_2 will be submitted to the HITRAN (21) and GEISA (22) databases, and is also available with one of us (I.K). These new data correct a long standing deficiency in line parameters for the dyad region phosphine.

V. CONCLUSION

The present analysis has provided extensive measurements of absolute line intensities in the dyad region of phosphine and verified the prior analysis of the line positions by Fusina and Di Lonardo. The measured intensities have been reproduced within experimental uncertainties and a reliable database of PH_3 line parameters has been generated for the dyad at 10 μm. Investigations of self-broadening coefficients, including line mixing between the A+,A- components of the K = 3,6,9 transitions, should be pursued in the future. In the course of the present study, we became aware of some discrepancies occurring in the various databases concerning the ground state of PH_3. We are pursing new intensities measurements in the far-infrared region of phosphine in order to provide a better prediction of the line positions and intensities.

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REFERENCES

1. T. Encrenaz, The Chemical Atmospheric Composition of the Giant Planets, *Earth, Moon, and Planets* **67**, 77-87 (1995).

2. G. Tarrago and M. D. Nhu, *J. Mol. Spectrosc.* **111**, 425-439 (1985).

3. G. Tarrago, N. Lacome, A. Lévy, G. Guelachvili, B. Bézard, and P. Drossart, *J. Mol. Spectrosc.* **154**, 30-42 (1992).

4. F. Shimizu, *J. Phys. Soc. Jpn* **38**, 293-293 (1975).

5. G. Di Lonardo and A. Trombetti, *Chem. Phys. Lett.* **76**, 307-310 (1980).

6. M. Carlotti, G. Di Lonardo, and A. Trombetti, *J. Chem. Phys.* **78**, 1670-1672 (1983).

7. K. Takagi, K. Itoh, E. Miura, and S. Tanimura, *J. Opt. Soc. Am. B* **4**, 1145-1157 (1987).

8. S. Tanimura and K. Takagi, *J. Mol. Spectrosc.* **104**, 414-416 (1984).

9. Y. T. Chen and T. Oka, *J. Mol. Spectrosc.* **133**, 148-156 (1989).

10. K. Takagi, *Chem. Phys. Lett.* **112**, 302-305 (1984).

11. D. Papousek, H. Birk, U. Magg, and H. Jones, *J. Mol. Spectrosc.* **135**, 105-118 (1989).

12. A. V. Burenin, L. Fusina, and M. Carlotti, *J. Mol. Spectrosc.* **160**, 97-104 (1993).

13. M. Jackson, G. R. Sudhakaran, and E. Gansen, *J. Mol. Spectrosc.* **181**, 446-451 (1997).

14. G. Tarrago, M. Dang-Nhu, and A. Goldman, *J. Mol. Spectrosc.* **88**, 311-322 (1981).

15. A. Ainetschian, U. Häring, G. Spiegl, and W. A. Kreiner, *J. Mol. Spectrosc.*

181, 99-107 (1996).

16. L. Fusina and G. Di Lonardo, *J. Mol. Struct.* **517-518**, 67-78 (2000).

17. L. Fusina and M. Carlotti, *J. Mol. Spectrosc.* **130**, 371-381 (1988).

18. P. K. L. Yin, and K. N. Rao, *J. Mol. Spectrosc.* **51**, 199-207 (1974).

19. D. C. McKean and P. N. Schatz, *J. Chem. Phys.* **24**, 316-325 (1956).

20. R. J. Kshirsagar, K. Singh, R. D'Cunha, V. A . Job, D. Papousek, J. F. Ogilvie, and L. Fusina, *J. Mol. Spectrosc.* **149**, 152-159 (1991).

21. L. S. Rothman, C. P. Rinsland, A. Goldman, S. T. Massie, D. P. Edwards, J.-M. Flaud, A. Perrin, C. Camy-Peyret, V. Dana, J. Y-. Mandin, J. Schroeder, A. McCann, R. R. Gamache, R. B. Wattson, K. Yoshino, K. V. Chance, K. W. Jucks, L. R. Brown, V. Nemtchinov, and P. Varanasi, *J. Quant. Spectrosc. Radiat. Transfer* **60**, 665-710 (1998) and references therein.

22. N. Jacquinet-Husson, E. Arie, A. Barbe, L. R. Brown, C. Camy-Peyret, J. P. Champion, A. Chedin, A. Chursin, C. Clerbaux, G. Duxbury, J.-M. Flaud, N. Fourrie, A. Fayt, G. Graner, R. R. Gamache, A. Goldman, G. Guelachvili, J. M. Hartmann, J. C. Hillico, G. Lefevre, V. Naumenko, A. Nikitin, A. Perrin, D. Reuter, L. Rosenmann, L. S. Rothman, N. A. Scott, J. Selby, L. N. Sinitsa, J. M. Sirota, A. Smith, K. Smith,V. G. Tyuterev, R. H. Tipping, S. Urban, P. Varanasi, and M. Weber, The 1997 spectroscopic GEISA databank, *J. Quant. Spectrosc. Radiat. Transfer*. **62**, 205-254 (1999).

23. D. P. Chong and D. Papousek, *J. Mol. Spectrosc.* **155**, 167-176 (1992).

24. J. Breidung and W. Thiel, *J. Phys. Chem.* **92**, 5597-5602 (1988).

25.W. Schneider, W. Thiel, and A. Komornicki, *J. Phys. Chem.* **92**, 5611-5619 (1988).

26. D. Wang, Q. Shi, and Q.S. Zhu, *J. Chem. Phys.* **112**, 9624-9631 (2000).

27. A. G. Maki, and J. S. Wells, Wavenumber Calibration Tables from Heterodyne Frequency Measurements, NIST Special Publication 821 U.S. Government Printing Office (1991).

28. L. R. Brown, J. S. Margolis, R. H. Norton, and B. A. Stedry, *Appl. Spectrosc.* **37**, 287-292 (1983).

29. G. Tarrago, O. N. Ulenikov, and G. Poussigue, *J. Phys.* **45**, 1429-1447 (1984).

30. Nguyen-Van-Thanh, I. Rossi and M. Sergent-Rozey, *J. Mol. Spectrosc.* **135**, 410-414 (1989).

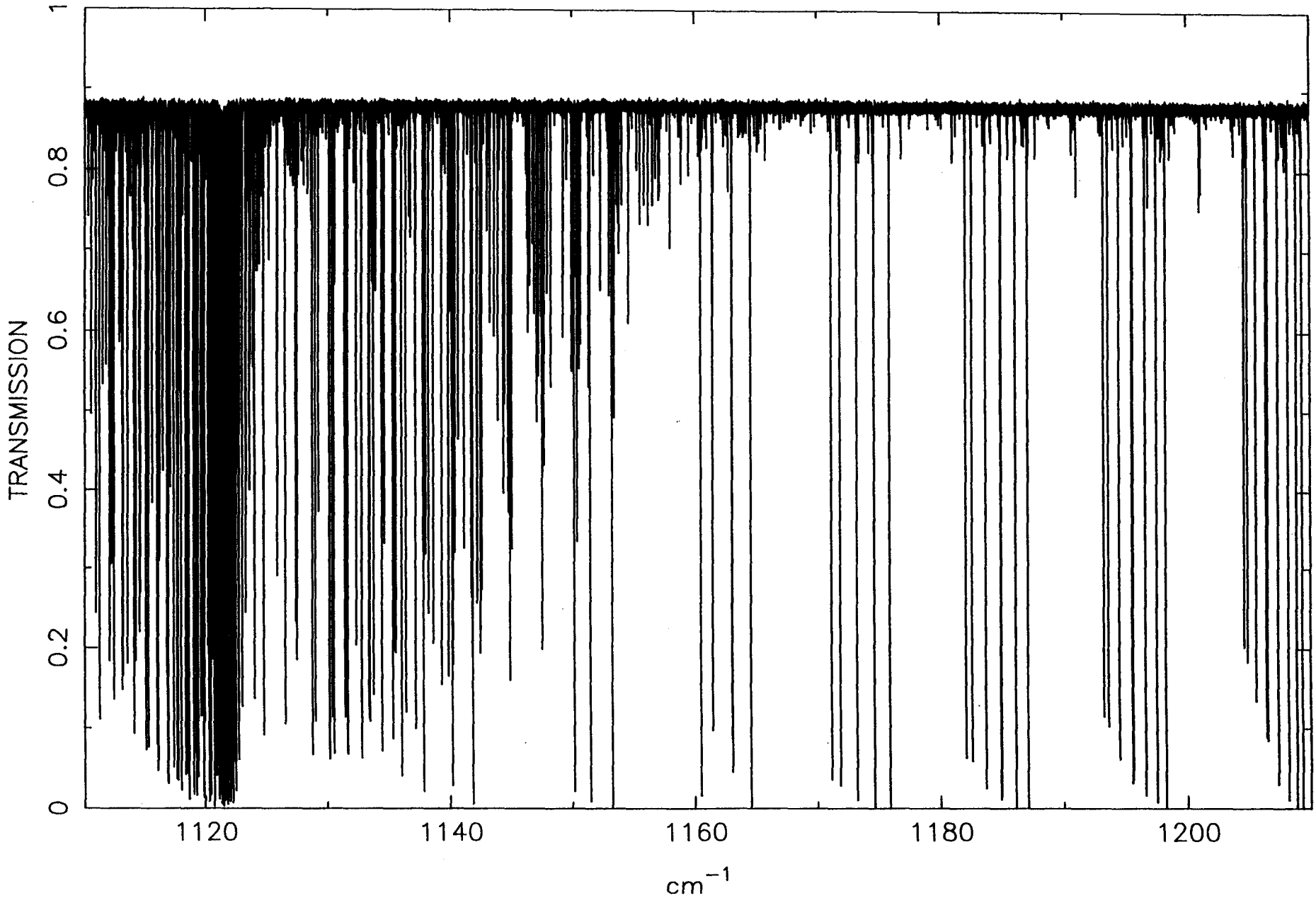
Figure Captions

1. Laboratory spectrum of phosphine from 1110 to 1210 cm^{-1}. The spectrum was recorded at 0.002 cm^{-1} resolution with the FTS at the PNNL facilities. The optical path is 9.91 cm, and the pressure is 5.08 Torr of PH_3 at 298.1 K.

2. Retrieval of positions and intensities using non-least least squares curve-fitting at 1161 cm^{-1}. The lower panel shows the observed and synthetic spectra overlaid, and the upper panel plots the differences between the two spectra in percent. The optical path is 9.91 cm, and the pressure is 0.743 Torr of PH_3 at 298.2 K.

3. Ratio of PH_3 line intensities: the Kshirsagar et al. (20) / present. Fifty-one observed intensities from two studies are compared. Below 1050 cm^{-1}, the values of Ref. 20 are lower by 15%in the ν_2 region and in better agreement for ν_4 transitions.

4. Comparison of observed and calculated spectrum near 1121.5 cm^{-1}. The path is .0991 m, and the PH_3 pressure is 0.344 Torr at 298. 2 K.



run: ph3c.t1 date: 11- -00 resolution: 0.001109 linefile: NONE

molecule: PH3 pres: 5.077 torr gas temp: 298.1 °K path: 0.099 M

linda 16-Oct-2001 08:31

Fig. 1

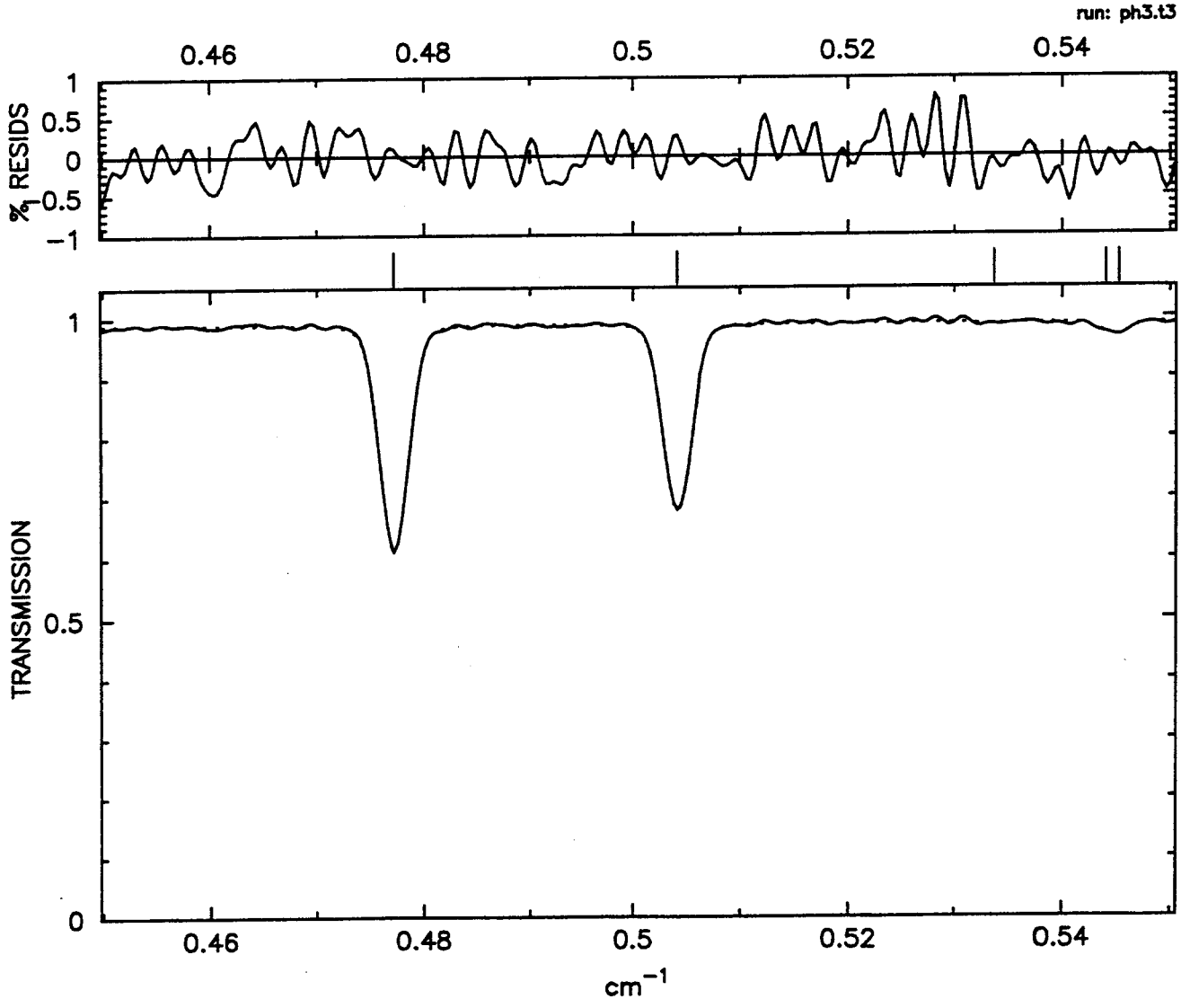

run: ph3.t3
0.46
0.48
0.5
0.52
0.54
1
0.5
0
−0.5
−1
% RESIDS
1
0.5
0
TRANSMISSION
0.46
0.48
0.5
0.52
0.54
cm^{-1}

Fig 2

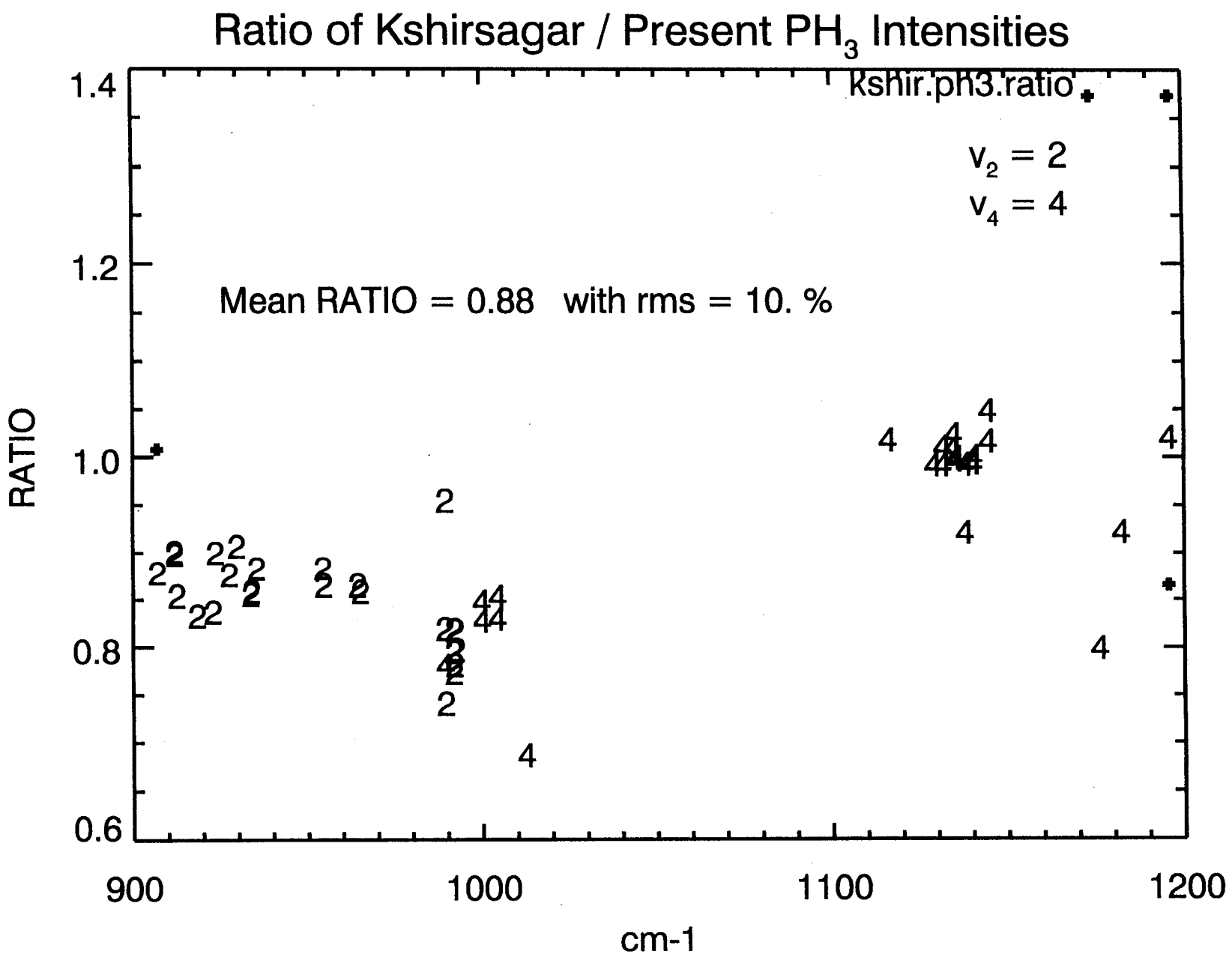
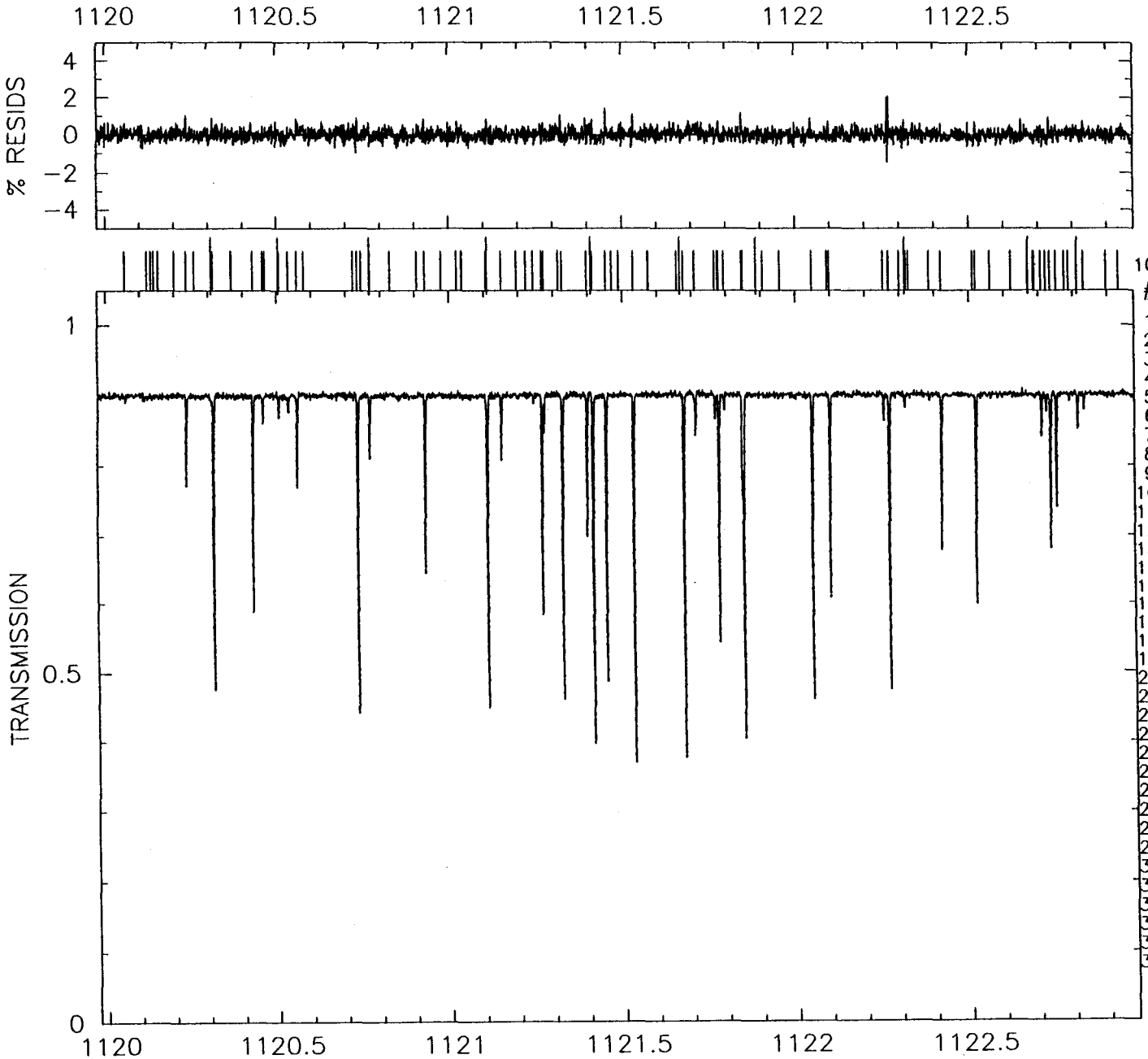

Ratio of Kshirsagar / Present PH3 Intensities
kshir.ph3.ratio
v2 = 2
v4 = 4
Mean RATIO = 0.88 with rms = 10. %
RATIO
1.4
1.2
1.0
0.8
0.6
900
1000
1100
1200
cm-1

Fig. 3

HITE=0.9000 SLOPE= 0.000079 NL= 103 NOT FITTED YET RMS(best)= 0.062250 DIV ANG= 1.900



run: ph3.t2	date:
linefile:	hi.edit
apod.	0
res	0.001109 cm^{-1}
molecule	PH3
pres	0.344 torr
foreign molecule	
pres	0.000 torr
path	0.10 M
gas temp	298.2°K

103 LINES

#	fr	str	wid	Y/P	nar
1	1120.056920	7.519E−03	0.1024		
2	1120.121450	7.126E−04	0.1124		
3	1120.133350	6.179E−04	0.1044		
4	1120.141630	2.944E−04	0.0985		
5	1120.154330	8.338E−04	0.0925		
6	1120.155500	8.697E−04	0.1044		
7	1120.201430	1.561E−04	0.0925		
8	1120.235800	1.062E−01	0.1124		
9	1120.259950	8.348E−04	0.0925		
10	1120.309270	4.221E−03	0.0965		
11	1120.309280	4.221E−03	0.0965		
12	1120.309410	7.248E−04	0.1124		
13	1120.315100	4.412E−01	0.1024		
14	1120.367170	8.958E−04	0.0965		
15	1120.369490	8.958E−04	0.0965		
16	1120.429900	2.920E−01	0.1183		
17	1120.459400	1.421E−02	0.1004		
18	1120.459800	1.421E−02	0.1004		
19	1120.466860	3.018E−04	0.0985		
20	1120.506340	2.546E−02	0.1064		
21	1120.509500	1.245E−04	0.1084		
22	1120.533800	2.003E−02	0.1024		
23	1120.559100	1.083E−01	0.1124		
24	1120.579210	8.390E−04	0.0925		
25	1120.721900	4.007E−03	0.1004		
26	1120.734100	4.852E−01	0.0945		
27	1120.745390	7.989E−04	0.1104		
28	1120.745390	9.795E−04	0.1004		
29	1120.768900	7.235E−02	0.1104		
30	1120.769550	1.667E−04	0.0925		
31	1120.770620	1.667E−04	0.0925		
32	1120.828570	7.749E−04	0.0925		
33	1120.907420	2.000E−03	0.0945		
34	1120.930190	2.340E−01	0.1164		
35	1120.978040	7.877E−05	0.0905		

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Fig. 4

Tables

Table 1 : Ground state and dyad fit from Fusina and Di Lonardo (16).

Table 2 : Gas sample pressures

Table 3 : Sample measured positions and intensities of PH_3 †

Table 4 : Upper State Energy Matrix for the ν_2/ν_4 System of PH_3.

Table 5 : Fitted energy parameters from present study.

Table 6 : M-Reduced Dipole Moment Matrix[a] for the ν_2/ν_4 system of PH_3.

Table 7 Fitted intensity parameters from the present study, statistics for fitted intensities, vibrational and integrated bandstrengths for the PH_3 dyad ν_2/ν_4 and for the $2\nu_2$-ν_2 hot band.

Table 8 : Vibrationally-mixed transitions in the PH_3 dyad.

Table 9 : Comparison of transition moments for the PH_3 dyad.

Table 10: Comparison of observed and calculated intensities of the dyad.

Table 11: Comparison of observed and calculated intensities of the hot band $2\nu_2$-ν_2.

Table 1 Ground state and dyad fit from Fusina and Di Lonardo (16)

State	#Lines Fitted	Region	rms
Ground	65	MW/sub.mill	0.099 Mhz
	200	Far-IR	0.000045 cm^{-1}
	3060	GSCD (ν_2,ν_4)	0.00024 cm^{-1}
	J' up to 23, 19 parameters to describe GS.		
(ν_2,ν_4)	2490	IR transitions	0.00037 cm^{-1}
	246	Far-IR ($\nu_4-\nu_2$)	0.00023 cm^{-1}
	37	MW/sub.mill. ($\nu_2-\nu_2$),($\nu_4-\nu_4$)	0.9 MHz
	J' up to 24, 46 parameters to describe $v_2 = 1$ and $v_4 = 1$		

GSCD = ground state combination differences

Table 2 Gas sample pressures †

	Pressure (Torr)
I	860- 980 cm^{-1}
	1.05
	2.23
	4.89
II	900-1310 cm^{-1}
	0.119
	0.154
	0.344
	0.743
	1.81
	5.08
III	1240-1400 cm^{-1}
	1.15
	2.01
	4.66

† Path: 9.906 ± 0.008 cm.
Temperature: 298. K.
760 Torr = 1 atm = 101.3 kPa.

Table 3 Sample measured positions and intensities of PH_3

Position	Diff	Inten	%Dif	Pres.
944.401118	-0.00001	0.2921	-0.1	0.743
944.401121	0.00000	0.2941	2.1	2.238
944.401122	0.00000	0.2859	-0.8	1.809
944.401132	0.00001	0.2847	-1.2	1.053
944.401123	**0.00001**	**0.2881**	**1.3**	
948.850713	-0.00004	0.03864	-2.0	5.077
948.850724	-0.00003	0.03889	-1.4	4.891
948.850732	-0.00002	0.03956	0.3	0.743
948.850747	0.00000	0.03985	1.0	0.344
948.850757	0.00001	0.04077	3.4	2.238
948.850760	0.00001	0.03943	0.0	1.809
948.850811	0.00006	0.03945	-1.4	1.053
948.850749	**0.00003**	**0.03944**	**1.7**	
976.157766	-0.00004	0.01830	0.2	0.743
976.157789	-0.00002	0.01847	1.2	4.891
976.157791	-0.00002	0.01842	0.9	2.238
976.157814	0.00000	0.01796	-1.6	5.077
976.157847	0.00004	0.01810	-0.8	1.809
976.157851	0.00004	0.01827	0.1	1.053
976.157810	**0.00003**	**0.1825**	**1.0**	
1198.275772	-0.00016	1.316	0.1	0.344
1198.275784	-0.00015	1.302	-1.0	0.743
1198.275785	-0.00015	1.308	-0.5	0.154
1198.276387	0.00046	1.334	1.4	0.119
1198.275932	**0.00026**	**1.315**	**0.9**	
1323.308578	-0.00004	0.00754	2.3	4.657
1323.308627	0.00001	0.00734	-0.4	2.011
1323.308645	0.00003	0.00723	-1.9	1.149
1323.308617	**0.00003**	**0.00737**	**1.7**	

†Individual retrievals with averaged values (in bold).
The units are: Position and Diff in cm^{-1}; Intensity in $cm^{-2} \cdot atm^{-1}$ at 296 K and Pressure in Torr at 298.1 K.

Table 4 : Upper State Energy Matrix for the ν_2/ν_4 System of PH_3.

Diagonal[a]

$$\langle v, l_4 ; J,K \mid v, l_4 ; J,K\rangle = \nu_v + B_v J(J+1) + (C_v - B_v)K^2 - D_v^J J^2(J+1)^2 - D_v^{JK} J(J+1)K^2$$
$$D_v^K K^4 + H_v^J J^3(J+1)^3 + H_v^{JK} J^2(J+1)^2K^2 + H_v^{KJ} J(J+1)K^4 + H_v^K K^6 + L_v^J [J(J+1)]^4$$
$$+ L_v^{JJK} [J(J+1)]^3 K^2 + L_v^{JK} [J(J+1)]^2 K^4 + L_v^{KKJ} [J(J+1)] K^6 + L_v^K K^8 - 2(C\zeta_4)_v Kl_4$$
$$+ \eta_v^J J(J+1) Kl_4 + \eta_v^K K^3 l_4 + \tau^J J^2(J+1)^2 Kl_4$$

essential resonnances[b]

$$\langle v, l_4 ; J,K \mid v, l_4 ; J,K\pm3\rangle = F_3^{\pm}(J,K) [q_{3v} (2K\pm3) + d_3 l_4]$$
$$\langle 1, \pm1; J,K \mid 1, l_4 = \mp1, J, K\pm1\rangle = (2K\pm1) F_1^{\pm}(J,K) [q_1 + q_{1J} J(J+1) + q_{1K} (2K\pm1)^2]$$
$$\langle 1, l_4 = \mp1; J,K \mid 1, \pm1 ; J, K\pm2\rangle = F_2^{\pm}(J,K) [q_2 + q_{2J} J(J+1) + q_{2K} (2K\pm2)^2]$$
$$\langle 1, \pm1; J,K \mid 1, l_4 = \mp1; J, K\pm4\rangle = F_4^{\pm}(J,K) f_4$$

Coriolis-type coupling[b]

$$\langle v_2=0, v_4=1, l_4 = \mp1; J,K \mid v_2=1, v_4=0, l_4 = 0; J,K\pm1\rangle = \sqrt{2}\, F_1^{\pm}(J,K) [C_{11}^{(1)} +$$
$$C_{11}^{(3a)} J(J+1) \mp C_{11}^{(2)} (2K\pm1) + C_{11}^{(3b)} (2K\pm1)^2 \mp C_{11}^{(4a)} (2K\pm1) J(J+1) \mp C_{11}^{(4b)} (2K\pm1)^3]$$
$$\langle v_2=0, v_4=1, l_4 = \pm1; J,K \mid v_2=1, v_4=0, l_4 = 0; J,K\pm2\rangle = \sqrt{2}\, F_2^{\pm}(J,K) [\mp C_{21}^{(2)} \mp C_{21}^{(4a)} J(J+1) +$$
$$C_{21}^{(3)} (2K \mp 2) \mp C_{21}^{(4b)} (2K \mp 2)^2]$$

$$F_1^{\pm}(J,K) = [J(J+1)-K(K\pm1)]^{1/2} ; F_2^{\pm}(J,K) = F_1^{\pm}(J,K) F_1^{\pm}(J,K\pm1) ; \ldots$$

---

[a] The elements are given according to the phase conventions of Ref. (29). The quantum number M is omitted throughout the Table.

[b] The set (v_2, v_4) equal to (1,0) and (0,1) for the upper states of v_2 and v_4 respectively.

Table 5.a. : Fitted upper state energy parameters from present study for the $v_4 = 1$ state.

ν_0	1118.30700(4)
B_v	4.457236(8)
C_v	3.89552(1)
$D_J \times 10^3$	0.1389(2)
$D_{JK} \times 10^3$	-0.1825(2)
$D_K \times 10^3$	0.1443(2)
$H_J \times 10^7$	0.1114(3)
$H_{JK} \times 10^7$	-0.326(2)
$H_{KJ} \times 10^7$	0.351(4)
$H_K \times 10^8$	-0.15(2)
$L_J \times 10^{11}$	0.[b]
$L_{JJK} \times 10^{11}$	0.[b]
$L_{JK} \times 10^{11}$	0.[b]
$L_{KKJ} \times 10^{11}$	0.[b]
$L_K \times 10^{11}$	-0.52(2)
$(C\zeta)$	-1.747401(5)
$\eta_v^J \times 10^3$	-0.2763(3)
$\eta_v^K \times 10^4$	0.[b]
$\tau_v^J \times 10^8$	0.[b]
$q_{3v} \times 10^4$	-0.277(2)
$q_{3vJ} \times 10^9$	3.7(2)
$q_{3vK} \times 10^9$	-1.26(6)
$d_3 \times 10^3$	0.223(3)
$q_1 \times 10^2$	-0.48(3)
$q_2 \times 10^2$	-0.49[c]
$q_{2J} \times 10^5$	0.12(1)
$q_{1J} \times 10^5$	-0.20(1)
$q_{1K} \times 10^5$	0.285(4)
$f_4 \times 10^5$	0.249(6)

[a]The quoted uncertainties are under parenthesis and correspond to 1σ.
[b]Constrained to zero.
[c]Constrained value to the best fit like in Ref. (16), see text in that reference.

Table 5.b. : Fitted Coriolis-type terms for the ν_2/ν_4 Interacting System from the present study.

$c_{11}^{(1)}$	2.49832(3)
$c_{11}^{(2)} \times 10^1$	-0.1245(4)
$c_{21}^{(2)} \times 10^1$	0.358(4)
$c_{11}^{(3a)} \times 10^3$	-0.368(6)
$c_{11}^{(3b)} \times 10^4$	0.75(1)
$c_{21}^{(4a)} \times 10^6$	-1.35(5)
$c_{21}^{(4b)} \times 10^5$	0.30(2)
$c_{11}^{(4a)} \times 10^6$	-2.51(3)
$c_{11}^{(4b)} \times 10^6$	0.77(2)
$c_{21}^{(3)} \times 10^5$	0.[b]

[a]The quoted uncertainties are under parenthesis and correspond to 1σ

[b]Constrained to zero.

Table 5.c. : Fitted upper state energy parameters from present study for the $v_2 = 1$ state.

ν	992.13490(7)
B_v	4.469124(2)
C_v	3.94407(1)
$D_J \times 10^3$	0.1297(5)
$D_{JK} \times 10^3$	-0.1764(6)
$D_K \times 10^3$	0.1536(3)
$H_J \times 10^8$	0.995(7)
$H_{JK} \times 10^7$	0.[b]
$H_{KJ} \times 10^8$	-2.95(5)
$H_K \times 10^8$	2.93(4)
$L_{JK} \times 10^{11}$	1.27(6)
$L_J \times 10^{11}$	0.[b]
$L_{KKJ} \times 10^{11}$	-2.6(1)
$L_K \times 10^{11}$	0.97(5)
$q_{3v} \times 10^4$	-0.270(2)
$q_{3vJ}\ 10^9$	0.[b]
$q_{3vK}\ 10^9$	0.[b]

[a]The quoted uncertainties are under parenthesis and correspond to 1σ.
[b]Constrained to zero.

Table 6 : M-Reduced Dipole Moment Matrix[a] for the ν_2/ν_4 system of PH_3.

For ν_2 :

$$< v_2 = 0, v_4 = 0; J, K \| \mu_Z^T \| v_2 = 1, v_4 = 0 ; J, K >= 1/\sqrt{2}\ [d_0^{v,i}]KF_{00}(J,K)$$

$$< v_2 = 0, v_4 = 0; J, K \| \mu_Z^T \| v_2 = 1, v_4 = 0 ; J', K >=$$
$$1/\sqrt{2}\ [d_0^{v,i} + d_{01}^{v,i} m + d_{03}^{v,i} m^2]F_{10}(m,K)$$

For ν_4 :

$$< v_2 = 0, v_4 = 0; J, K \| \mu_Z^T \| v_2 = 0, v_4 = 1\ \ell_4 = \pm 1 ; J, K \pm 1 > =$$
$$\pm \frac{1}{2} [d_1^{v,i} \pm d_{12}^{v,i} (2K \pm 1)] F_{01}^{\pm}(J,K)$$

$$< v_2 = 0, v_4 = 0; J, K \| \mu_Z^T \| v_2 = 0, v_4 = 1\ \ell_4 = \pm 1 ; J', K \pm 1 >$$
$$= \pm \frac{1}{2} [d_1^{v,i} + d_{11}^{v,i} m \pm d_{12}^{v,i} (2K \pm 1)] F_{11}^{\pm}(m,K)$$

[a] $\langle\| \mu_Z^t \|\rangle$ is defined according to the notation of Ref. (29). The first subscripts 0 and 1 in the intensity coefficients are related to a non degenerate upper state ($v_2 = 1$) and to a degenerate one ($v_4 = 1$), respectively. m = J+1 and -J for J' = J+1 (R branch) and J-1 (P branch), respectively ; F functions are expressed in terms of m (depending on J) and K, the rotational quantum numbers from Ref. (29).

Table 7 Fitted intensity parameters from the present study, statistics for fitted intensities, vibrational and integrated bandstrengths for the PH_3 dyad ν_2/ν_4 and for the $2\nu_2-\nu_2$ hot band.

State	Transitions moments[a]	# lines	% rms	bandstrengths and integrated strengths[b] S_ν^0	ΣS_i
ν_2	d_0 0.11669(7) $d_{01} \times 10^3$ 0.654(7)	399	1.5	69.39 (2)	77. (4)
ν_4	d_1 -0.08626(5) $d_{11} \times 10^3$ -0.270 (6) $d_{12} \times 10^3$ -0.274 (4)	580	2.1	85.5 (1)	78.1 (2) .52 (3)
Dyad	Present	979	1.9	154.89 (12)	156. (4)
	McKean / Schatz (19)			184.	
Hot Band $2\nu_2-\nu_2$	$d_0^{\nu_2}$ 0.1664(6) $d_{01}^{\nu_2} \times 10^2$ 0.55(1)				
	Present	62	4.6	1.126(4)	1.01(5)

[a] d_0, d_{01}, d_1, ... are related to transitions from ground state and $d_0^{\nu_2}$, $d_{01}^{\nu_2}$ are related to transitions from the $\nu_2 = 1$ state. The signs of intensity parameters are correlated to those of the energy parameters. The quoted errors represent one standard deviation.

[b] Band strengths are in $cm^{-2} \cdot atm^{-1}$ at 296 K. S_ν^0 is the vibrational bandstrenght and ΣS_i is the sum of calculated intensities (see text) with the following partition function (14) :
Q_R = rotational partition function = 1597.135
Q_v = vibrational partition function = 1.018117.
The estimated uncertainty on the total integrated bandstrength is 5%.

Table 8 Vibrationally-mixed transitions in the PH_3 dyad

Observed Position	unc	#sp	Obs. Int.	% unc	J'	C'	J" K" C"	Obs-cal Position	Ratio† Ical/Iob
1011.13357	(02)	2	3.20	3.7	16	A	17 3 A	-0.0014	1.005
1011.55569	(19)	2	3.90	7.5	16	E	17 1 E	-0.0003	0.923
1011.60119	(07)	2	3.31	1.8	16	E	17 2 E	-0.0006	1.060
1016.29777	(02)	3	7.35	1.4	15	E	16 1 E	-0.0002	0.972
1016.36808	(04)	3	7.23	2.5	15	E	16 2 E	-0.0003	0.957
1021.04952	(25)	2	2.60	3.2	14	E	15 8 E	-0.0001	0.960
1021.17887	(03)	3	13.8	2.1	14	E	15 1 E	-0.0001	0.970
1021.91930	(01)	2	3.68	2.9	14	E	15 8 E	0.0001	1.034
1026.21034	(02)	3	25.1	1.2	13	E	14 1 E	-0.0000	0.953
1031.40556	(05)	4	41.5	3.7	12	E	13 1 E	0.0001	0.973
1032.65671	(00)	3	8.48	1.5	12	E	13 7 E	-0.0000	0.972
1033.15409	(02)	3	8.57	1.7	12	E	13 7 E	-0.0001	0.946
1122.72231	(20)	5	17.9	2.7	14	E	14 2 E	-0.0000	1.000
1122.78924	(07)	4	6.09	1.5	16	A	16 3 A-	-0.0003	1.069
1122.81299	(03)	4	40.0	1.6	12	E	12 1 E	0.0001	1.044
1123.31046	(09)	5	41.4	1.2	12	E	12 1 E	-0.0001	1.093
1123.59214	(02)	3	10.5	1.5	14	E	14 2 E	0.0001	1.161
1146.04865	(21)	2	1.84	7.7	12	E	12 1 E	-0.0002	1.008
1147.49860	(04)	3	23.8	2.2	12	E	12 7 E	0.0001	0.958
1147.99602	(02)	3	20.8	1.7	12	E	12 7 E	-0.0001	1.027
1153.20770	(04)	3	7.20	3.0	14	E	14 8 E	0.0002	0.989
1154.07760	(05)	3	11.0	2.6	14	E	14 8 E	0.0002	0.930
1158.91402	(15)	3	1.64	1.9	16	A	16 9 A-	-0.0003	0.896
1252.02281	(03)	4	17.7	1.8	12	E	11 1 E	-0.0000	0.996
1253.65946	(04)	4	40.0	1.7	12	E	11 7 E	-0.0000	1.009
1254.15688	(02)	4	36.8	1.2	12	E	11 7 E	-0.0002	0.992
1264.12705	(02)	3	9.56	1.8	13	E	12 1 E	-0.0001	1.011
1276.31771	(08)	3	4.85	1.3	14	E	13 1 E	-0.0002	1.044
1276.76029	(02)	3	11.7	1.6	14	E	13 8 E	-0.0000	1.011
1277.63020	(02)	3	16.3	1.8	14	E	13 8 E	0.0001	0.989
1288.57669	(01)	3	2.46	1.1	15	E	14 1 E	-0.0003	1.030
1288.67498	(07)	2	3.02	1.2	15	E	14 2 E	-0.0002	0.944

† The positions and obs-cal positions are in cm^{-1}. The intensities are in $cm^{-2}\,atm^{-1}\,x10^{-3}$ at 296 K. The mean ratio of these calculated/observed intensities is 0.998 ± 5.3%.

Table 9 Comparison of transition dipole moments for the PH_3 dyad

Ref.	Source	ν_2	ν_4
	Present $<\lvert \mu_v \rvert>$	0.08251(5)	0.08626(5)
20	Kshirsagar et al. (1991)	0.0717(2)	0.0843(8)
14	Tarrago et al. (1981)†	0.091(3)	0.095(3)
23	Chong and Papousek (1992)‡	0.075 (calc)	0.086 (calc)

†Tarrago et al. used the low resolution integrated absorption of McKean and Schatz (19) assuming $S_{\nu 2} + S_{\nu 4} = 184\ cm^{-2} \cdot atm^{-1}$ at 300 K, with error of 1% and comparisons of the line intensities in the ν_2 and ν_4 bands.
‡ Chong and Papousek used intensities from Kshirsagar et al. (20).

Table 1d

(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)
(Q)P (16,A+, 9)	15 A+ 3 9 0	nu2	829.33880	-1.2	1.38E-03	1.39E-03	0.8	1.008	2	5.2
(Q)P (15,E , 1)	14 E 10 1 0	nu2	830.83489	-1.5	3.65E-03	3.52E-03	-3.6	0.964	2	2.7
(Q)P (15,E , 2)	14 E 9 2 0	nu2	831.22134	2.4	3.74E-03	3.50E-03	-6.5	0.935	2	1.4
(Q)P (15,A+, 3)	14 A+ 4 3 0	nu2	831.83836	-2.7	3.57E-03	3.35E-03	-6.1	0.939	2	1.5
(Q)P (15,A-, 3)	14 A- 4 3 0	nu2	831.89682	-6.5	3.51E-03	3.58E-03	1.9	1.019	2	1.2
(Q)P (15,E , 4)	14 E 8 4 0	nu2	832.78273	0.5	3.60E-03	3.41E-03	-5.3	0.947	2	2.9
(Q)P (15,E , 5)	14 E 7 5 0	nu2	833.97474	-2.4	3.42E-03	3.33E-03	-2.7	0.973	2	3.8
(Q)P (15,A-, 6)	14 A- 3 6 0	nu2	835.45658	-2.8	3.22E-03	3.23E-03	0.4	1.004	2	3.5
(Q)P (15,E , 7)	14 E 6 7 0	nu2	837.24447	-3.1	3.00E-03	3.10E-03	3.1	1.031	2	0.2
(Q)P (15,E , 8)	14 E 5 8 0	nu2	839.36072	-1.8	2.96E-03	2.93E-03	-1.0	0.990	2	0.0
(Q)P (15,A+, 9)	14 A+ 2 9 0	nu2	841.83343	-1.0	2.60E-03	2.71E-03	4.1	1.041	2	1.4
(Q)P (14,A+, 0)	13 A+ 5 0 0	nu2	842.59424	-1.1	6.94E-03	6.99E-03	0.8	1.008	2	0.1
(Q)P (14,E , 1)	13 E 9 1 0	nu2	842.72863	-1.1	7.16E-03	6.98E-03	-2.6	0.974	2	1.1
(Q)P (14,E , 2)	13 E 8 2 0	nu2	843.13312	-0.2	6.89E-03	6.92E-03	0.5	1.005	2	0.4
(Q)P (14,A+, 3)	13 A+ 4 3 0	nu2	843.79049	0.2	6.84E-03	6.66E-03	-2.6	0.974	2	2.7
(Q)P (14,A-, 3)	13 A- 4 3 0	nu2	843.83240	-0.9	7.08E-03	6.98E-03	-1.3	0.987	2	1.5
(Q)P (14,E , 4)	13 E 7 4 0	nu2	844.77102	-0.6	6.68E-03	6.68E-03	-0.1	0.999	2	0.3
(Q)P (14,E , 5)	13 E 6 5 0	nu2	846.02269	-1.1	6.55E-03	6.48E-03	-1.0	0.990	2	2.6
(Q)P (14,A-, 6)	13 A- 3 6 0	nu2	847.58048	-1.5	6.17E-03	6.23E-03	0.9	1.009	2	2.2
(Q)P (14,E , 7)	13 E 5 7 0	nu2	849.46345	-1.9	5.89E-03	5.89E-03	0.0	1.000	2	5.6
(Q)P (14,E , 8)	13 E 4 8 0	nu2	851.69719	0.0	5.71E-03	5.47E-03	-4.2	0.958	2	4.3
(Q)P (15,A+,12)	14 A+ 1 12 0	nu2	851.83104	2.6	1.61E-03	1.69E-03	5.4	1.054	2	4.2
(Q)P (14,A+, 9)	13 A+ 2 9 0	nu2	854.31449	0.6	4.92E-03	4.93E-03	0.4	1.004	2	1.6
(Q)P (13,A+, 0)	12 A+ 5 0 0	nu2	854.42060	0.3	1.33E-02	1.32E-02	-1.1	0.989	3	1.6
(Q)P (13,E , 1)	12 E 8 1 0	nu2	854.56130	1.6	1.36E-02	1.31E-02	-3.5	0.965	3	1.7
(Q)P (13,E , 2)	12 E 7 2 0	nu2	854.98506	4.3	1.35E-02	1.30E-02	-3.6	0.964	3	2.4
(Q)P (13,A+, 3)	12 A+ 4 3 0	nu2	855.68066	-2.2	1.32E-02	1.26E-02	-4.9	0.951	3	2.7
(Q)P (13,A-, 3)	12 A- 4 3 0	nu2	855.70965	-2.3	1.22E-02	1.30E-02	6.2	1.062	3	3.3
(Q)P (13,E , 4)	12 E 6 4 0	nu2	856.70160	0.2	1.25E-02	1.24E-02	-0.2	0.998	3	2.5
(Q)P (14,E ,10)	13 E 3 10 0	nu2	857.35945	0.8	4.09E-03	4.27E-03	4.4	1.044	2	4.0
(Q)P (13,E , 5)	12 E 5 5 0	nu2	858.01515	-1.1	1.20E-02	1.20E-02	-0.4	0.996	3	2.6
(Q)P (13,A-, 6)	12 A- 3 6 0	nu2	859.65272	1.0	1.14E-02	1.13E-02	-0.6	0.994	3	1.7
(Q)P (14,E ,11)	13 E 2 11 0	nu2	860.89144	1.7	3.21E-03	3.46E-03	7.5	1.075	2	3.3
(Q)P (13,E , 7)	12 E 4 7 0	nu2	861.63565	0.7	1.01E-02	1.05E-02	4.8	1.048	3	1.8
(Q)P (13,E , 8)	12 E 3 8 0	nu2	863.99332	-0.6	9.16E-03	9.54E-03	4.1	1.041	2	3.0
(Q)P (14,A+,12)	13 A+ 1 12 0	nu2	864.98885	1.1	2.34E-03	2.47E-03	5.8	1.058	2	0.1
(Q)P (12,A+, 0)	11 A+ 4 0 0	nu2	866.16681	-0.1	2.39E-02	2.37E-02	-0.8	0.992	3	2.1
(Q)P (12,E , 1)	11 E 8 1 0	nu2	866.31383	-1.0	2.40E-02	2.36E-02	-1.8	0.982	2	2.0
(Q)P (12,E , 2)	11 E 7 2 0	nu2	866.75704	1.1	2.32E-02	2.33E-02	0.0	1.000	3	1.0
(Q)P (13,A+, 9)	12 A+ 2 9 0	nu2	866.76479	1.2	8.14E-03	8.29E-03	1.9	1.019	3	1.6
(Q)P (12,A+, 3)	11 A+ 3 3 0	nu2	867.49139	-0.4	2.28E-02	2.25E-02	-1.5	0.985	3	3.4
(Q)P (12,A-, 3)	11 A- 3 3 0	nu2	867.51050	-1.2	2.28E-02	2.30E-02	0.6	1.006	3	1.4
(Q)P (12,E , 4)	11 E 6 4 0	nu2	868.55515	-1.6	2.09E-02	2.19E-02	5.0	1.050	2	2.5
(Q)P (12,E , 5)	11 E 5 5 0	nu2	869.93320	-0.6	2.08E-02	2.08E-02	0.4	1.004	3	2.0
(Q)P (13,E ,10)	12 E 2 10 0	nu2	870.00098	-1.9	6.52E-03	6.74E-03	3.4	1.034	2	0.0
(Q)P (12,A-, 6)	11 A- 2 6 0	nu2	871.65335	-0.8	1.95E-02	1.94E-02	-0.5	0.995	3	1.8
(Q)P (12,E , 7)	11 E 4 7 0	nu2	873.74110	1.5	1.73E-02	1.76E-02	2.1	1.021	2	1.6
(Q)P (13,E ,11)	12 E 1 11 0	nu2	873.77074	-2.8	4.71E-03	4.86E-03	3.3	1.033	2	0.1
(Q)P (12,E , 8)	11 E 3 8 0	nu2	876.22937	-1.0	1.51E-02	1.54E-02	1.8	1.018	3	2.0
(Q)P (11,A+, 0)	10 A+ 4 0 0	nu2	877.81277	1.0	4.04E-02	4.04E-02	0.0	1.000	3	2.2
(Q)P (11,E , 1)	10 E 7 1 0	nu2	877.96649	1.1	4.04E-02	4.02E-02	-0.5	0.995	3	1.7
(Q)P (13,A+,12)	12 A+ 1 12 0	nu2	878.15122	-2.3	2.48E-03	2.61E-03	5.2	1.052	2	1.9
(Q)P (11,E , 2)	10 E 6 2 0	nu2	878.42934	-0.7	3.97E-02	3.95E-02	-0.5	0.995	3	2.6
(Q)P (12,A+, 9)	11 A+ 1 9 0	nu2	879.16376	-0.3	1.26E-02	1.26E-02	-0.6	0.994	3	3.5
(Q)P (11,A+, 3)	10 A+ 3 3 0	nu2	879.20169	1.1	3.89E-02	3.80E-02	-2.2	0.978	3	2.0
(Q)P (11,A-, 3)	10 A- 3 3 0	nu2	879.21352	-1.3	3.82E-02	3.86E-02	0.9	1.009	3	2.5
(Q)P (11,E , 4)	10 E 5 4 0	nu2	880.31118	0.0	3.63E-02	3.66E-02	0.8	1.008	3	2.2
(Q)P (11,E , 5)	10 E 4 5 0	nu2	881.75539	0.9	3.44E-02	3.42E-02	-0.6	0.994	3	2.1
(Q)P (12,E ,10)	11 E 2 10 0	nu2	882.60306	1.0	9.28E-03	9.12E-03	-1.7	0.983	2	0.5
(Q)P (11,A+, 6)	10 A+ 2 6 0	nu2	883.56111	0.7	3.09E-02	3.12E-02	1.0	1.010	3	2.5
(Q)P (11,E , 7)	10 E 3 7 0	nu2	885.75710	-0.1	2.67E-02	2.73E-02	2.0	1.020	3	3.1
(Q)P (12,E ,11)	11 E 1 11 0	nu2	886.61779	-0.1	4.66E-03	4.95E-03	6.2	1.062	2	0.4
(Q)P (11,E , 8)	10 E 2 8 0	nu2	888.38220	2.4	2.21E-02	2.24E-02	1.1	1.011	3	3.0
(Q)P (10,A+, 0)	9 A+ 4 0 0	nu2	889.33577	0.2	6.55E-02	6.55E-02	0.0	1.000	3	1.6
(Q)P (10,E , 1)	9 E 6 1 0	nu2	889.49622	0.8	6.46E-02	6.50E-02	0.6	1.006	3	2.0
(Q)P (10,E , 2)	9 E 5 2 0	nu2	889.97951	0.7	6.33E-02	6.35E-02	0.4	1.004	3	2.4
(Q)P (10,A+, 3)	9 A+ 3 3 0	nu2	890.78878	1.5	6.08E-02	6.08E-02	0.0	1.000	3	2.6
(Q)P (10,A-, 3)	9 A- 3 3 0	nu2	890.79576	0.1	6.11E-02	6.13E-02	0.3	1.003	3	1.8
(Q)P (11,A+, 9)	10 A+ 1 9 0	nu2	891.48645	0.1	1.60E-02	1.63E-02	2.0	1.020	3	1.7
(Q)P (10,E , 4)	9 E 4 4 0	nu2	891.94589	0.6	5.78E-02	5.74E-02	-0.6	0.994	3	2.3
(Q)P (10,E , 5)	9 E 3 5 0	nu2	893.45746	0.9	5.23E-02	5.25E-02	0.4	1.004	3	1.6
(Q)P (11,E ,10)	10 E 1 10 0	nu2	895.13386	-0.1	8.50E-03	8.93E-03	5.1	1.051	2	1.0
(Q)P (10,A+, 6)	9 A+ 2 6 0	nu2	895.35083	1.6	4.61E-02	4.62E-02	0.2	1.002	2	2.5
(Q)P (10,E , 7)	9 E 2 7 0	nu2	897.65827	1.1	3.82E-02	3.81E-02	-0.3	0.997	3	2.1
(Q)P (10,E , 8)	9 E 1 8 0	nu2	900.42298	-1.7	2.77E-02	2.79E-02	0.8	1.008	3	2.4
(Q)P (9,A+, 0)	8 A+ 3 0 0	nu2	900.71180	0.3	1.02E-01	1.01E-01	-1.0	0.990	2	2.7
(Q)P (9,E , 1)	8 E 6 1 0	nu2	900.87889	0.6	1.01E-01	9.96E-02	-1.7	0.983	2	1.4
(Q)P (9,E , 2)	8 E 5 2 0	nu2	901.38241	0.3	9.74E-02	9.67E-02	-0.8	0.992	2	1.4
(Q)P (9,A+, 3)	8 A+ 2 3 0	nu2	902.22817	3.8	9.27E-02	9.15E-02	-1.4	0.986	2	2.1
(Q)P (9,A-, 3)	8 A- 2 3 0	nu2	902.23125	-4.2	9.27E-02	9.19E-02	-0.9	0.991	2	2.1
(Q)P (9,E , 4)	8 E 4 4 0	nu2	903.43365	0.7	8.50E-02	8.44E-02	-0.6	0.994	2	2.1
(Q)P (10,A+, 9)	9 A+ 1 9 0	nu2	903.70125	1.7	1.51E-02	1.54E-02	1.6	1.016	3	2.1
(Q)P (9,E , 5)	8 E 3 5 0	nu2	905.01305	1.0	7.55E-02	7.46E-02	-1.1	0.989	2	1.7
(Q)P (9,A+, 6)	8 A+ 1 6 0	nu2	906.99464	1.1	6.24E-02	6.19E-02	-0.9	0.991	2	1.6
(Q)P (9,E , 7)	8 E 2 7 0	nu2	909.41466	0.9	4.53E-02	4.56E-02	0.7	1.007	3	1.4
(Q)P (8,A+, 0)	7 A+ 3 0 0	nu2	911.91482	0.5	1.47E-01	1.46E-01	-1.0	0.990	2	2.0
(Q)P (8,E , 1)	7 E 5 1 0	nu2	912.08843	0.5	1.47E-01	1.44E-01	-2.0	0.980	2	1.8
(Q)P (9,E , 8)	8 E 1 8 0	nu2	912.32075	1.8	2.50E-02	2.53E-02	1.1	1.011	3	1.7
(Q)P (8,E , 2)	7 E 4 2 0	nu2	912.61191	0.5	1.39E-01	1.38E-01	-0.7	0.993	2	1.9
(Q)P (8,E , 4)	7 E 3 4 0	nu2	914.74676	1.3	1.16E-01	1.15E-01	-0.8	0.992	2	1.6
(Q)P (8,A+, 6)	7 A+ 1 6 0	nu2	918.46213	0.8	7.14E-02	7.11E-02	-0.4	0.996	2	1.8
(Q)P (8,E , 7)	7 E 1 7 0	nu2	920.99349	1.5	3.90E-02	3.96E-02	1.6	1.016	3	1.9
(Q)P (7,A+, 0)	6 A+ 3 0 0	nu2	922.91744	0.1	2.02E-01	2.00E-01	-1.0	0.990	2	1.8
(Q)P (7,E , 1)	6 E 4 1 0	nu2	923.09737	0.1	1.97E-01	1.96E-01	-0.6	0.994	2	1.5
(Q)P (7,E , 4)	6 E 2 4 0	nu2	925.85551	0.7	1.42E-01	1.41E-01	-0.5	0.995	2	2.1
(Q)P (7,E , 5)	6 E 1 5 0	nu2	927.56674	0.8	1.07E-01	1.06E-01	-0.9	0.991	2	1.6
(Q)P (7,A+, 6)	6 A+ 1 6 0	nu2	929.72019	0.8	5.95E-02	5.94E-02	-0.1	0.999	2	1.8
(Q)P (6,A+, 0)	5 A+ 2 0 0	nu2	933.69179	0.2	2.55E-01	2.56E-01	0.2	1.002	4	1.3
(Q)P (6,E , 1)	5 E 4 1 0	nu2	933.87760	-0.2	2.50E-01	2.50E-01	-0.1	0.999	4	1.3
(Q)P (6,E , 2)	5 E 3 2 0	nu2	934.43830	0.3	2.31E-01	2.30E-01	-0.1	0.999	4	1.3
(Q)P (6,A-, 3)	5 A- 1 3 0	nu2	935.38319	-2.3	1.97E-01	1.98E-01	0.6	1.006	3	1.0
(Q)P (6,E , 4)	5 E 2 4 0	nu2	936.72936	0.0	1.51E-01	1.50E-01	-0.9	0.991	4	1.4
(Q)P (6,E , 5)	5 E 1 5 0	nu2	938.50150	0.6	8.51E-02	8.50E-02	0.0	1.000	4	1.3
(Q)P (5,A+, 0)	4 A+ 2 0 0	nu2	944.20986	-0.3	3.01E-01	3.05E-01	1.1	1.011	3	0.4
(Q)P (5,E , 1)	4 E 3 1 0	nu2	944.40096	-1.3	2.92E-01	2.93E-01	0.4	1.004	4	1.2
(Q)P (5,E , 2)	4 E 2 2 0	nu2	944.97798	-0.4	2.60E-01	2.60E-01	0.0	1.000	4	1.0
(Q)P (5,A-, 3)	4 A- 1 3 0	nu2	945.95084	-0.9	1.98E-01	2.01E-01	1.6	1.016	3	0.5
(P)P (17,E ,13)	16 E 15 12-1	nu4	947.09327	-9.2	4.62E-03	4.49E-03	-2.9	0.971	4	3.1
(Q)P (5,E , 4)	4 E 1 4 0	nu2	947.33779	1.7	1.16E-01	1.16E-01	-0.1	0.999	5	1.9
(P)P (17,A+,12)	16 A+ 8 11-1	nu4	951.10815	-0.5	4.05E-03	4.01E-03	-1.0	0.990	5	2.7
(P)P (16,E ,13)	15 E 13 12-1	nu4	953.59027	-11.6	9.48E-03	9.22E-03	-2.8	0.972	6	2.5
(Q)P (4,A+, 0)	3 A+ 2 0 0	nu2	954.44497	-1.1	3.35E-01	3.33E-01	-0.5	0.995	6	1.6
(Q)P (4,E , 1)	3 E 2 1 0	nu2	954.64083	-0.7	3.08E-01	3.13E-01	1.7	1.017	6	0.9
(Q)P (4,E , 2)	3 E 1 2 0	nu2	955.23176	-1.0	2.55E-01	2.53E-01	-0.6	0.994	7	1.1
(Q)P (4,A+, 3)	3 A+ 1 3 0	nu2	956.22877	-0.3	1.50E-01	1.51E-01	0.6	1.006	7	1.8
(P)P (16,A+,12)	15 A+ 8 11-1	nu4	957.86073	0.4	8.20E-03	8.34E-03	1.8	1.018	6	3.0
(P)P (15,E ,13)	14 E 12 12-1	nu4	959.92918	-18.3	1.80E-02	1.78E-02	-1.1	0.989	6	2.2
(P)P (16,E ,11)	15 E 14 10-1	nu4	961.76210	3.3	6.99E-03	7.42E-03	6.2	1.062	4	2.8
(Q)Q (19,A-,12)	19 A+ 3 12 0	nu2	961.79982	0.2	7.66E-04	7.92E-04	3.3	1.033	2	0.1
(Q)Q (17,A+, 9)	17 A- 4 9 0	nu2	962.16466	-0.3	2.21E-03	2.11E-03	-4.7	0.953	3	2.6
(Q)Q (15,A+, 6)	15 A- 4 6 0	nu2	963.88111	-1.3	3.98E-03	4.00E-03	0.5	1.005	5	3.0
(Q)P (3,A+, 0)	2 A+ 1 0 0	nu2	964.37296	-1.4	3.21E-01	3.25E-01	1.2	1.012	6	1.6
(P)P (15,A+,12)	14 A+ 7 11-1	nu4	964.50313	0.8	1.66E-02	1.64E-02	-1.1	0.989	6	2.6
(Q)Q (17,E ,10)	17 E 6 10 0	nu2	964.67429	-1.2	2.81E-03	2.78E-03	-0.8	0.992	2	2.0
(Q)Q (14,E , 4)	14 E 8 4 0	nu2	964.71618	0.0	3.27E-03	3.49E-03	6.6	1.066	3	2.8
(Q)P (3,E , 2)	2 E 1 2 0	nu2	965.17474	-1.6	1.83E-01	1.83E-01	0.2	1.002	7	2:0
(P)P (16,E ,10)	15 E 16 9-1	nu4	965.34192	3.0	6.29E-03	6.50E-03	3.3	1.033	4	3.0
(Q)Q (15,E , 7)	15 E 6 7 0	nu2	965.64296	1.1	5.66E-03	5.71E-03	0.8	1.008	4	3.3
(Q)Q (14,E , 5)	14 E 7 5 0	nu2	965.94972	-3.3	6.11E-03	5.63E-03	-7.8	0.922	3	3.1
(Q)Q (18,A-,12)	18 A+ 3 12 0	nu2	966.28778	-0.8	2.11E-03	1.97E-03	-6.7	0.933	2	2.2
(Q)Q (17,E ,11)	17 E 5 11 0	nu2	967.53813	0.9	3.47E-03	3.63E-03	4.7	1.047	2	1.5
(Q)Q (15,E , 8)	15 E 5 8 0	nu2	967.72282	-0.8	7.76E-03	7.86E-03	1.3	1.013	2	0.0
(Q)Q (13,E , 4)	13 E 7 4 0	nu2	968.11006	0.3	6.97E-03	7.06E-03	1.3	1.013	4	3.4
(P)P (16,A+, 9)	15 A+ 9 8-1	nu4	968.62505	-0.9	5.34E-03	5.58E-03	4.4	1.044	5	2.7
(P)P (15,E ,11)	14 E 13 10-1	nu4	968.64383	4.1	1.51E-02	1.48E-02	-1.8	0.982	4	2.6
(Q)Q (16,E ,10)	16 E 5 10 0	nu2	968.82092	-1.3	6.26E-03	6.37E-03	1.8	1.018	3	1.3
(Q)Q (14,E , 7)	14 E 6 7 0	nu2	969.33183	-2.3	1.24E-02	1.20E-02	-2.6	0.974	4	1.5
(Q)Q (13,E , 5)	13 E 6 5 0	nu2	969.40118	-0.3	1.16E-02	1.14E-02	-1.8	0.982	5	3.0
(Q)Q (15,A-, 9)	15 A+ 3 9 0	nu2	970.14587	1.2	1.06E-02	1.06E-02	-0.6	0.994	5	2.9
(Q)Q (12,A-, 3)	12 A+ 4 3 0	nu2	970.34317	0.0	7.66E-03	7.64E-03	-0.3	0.997	4	2.6
(Q)Q (12,A+, 3)	12 A- 4 3 0	nu2	970.39862	-0.4	7.21E-03	7.45E-03	3.3	1.033	5	2.6
(Q)Q (17,A-,12)	17 A+ 2 12 0	nu2	970.79137	0.5	4.85E-03	4.70E-03	-3.1	0.969	5	3.0
(Q)Q (13,A+, 6)	13 A- 3 6 0	nu2	971.00768	0.5	1.74E-02	1.71E-02	-1.9	0.981	7	2.3
(P)P (14,A+,12)	13 A+ 6 11-1	nu4	971.01384	-1.7	3.03E-02	3.03E-02	-0.1	0.999	6	2.5
(Q)Q (14,E , 8)	14 E 5 8 0	nu2	971.51937	0.4	1.71E-02	1.66E-02	-2.7	0.973	6	3.3
(P)P (16,E , 8)	15 E 18 7-1	nu4	971.62203	-2.6	5.01E-03	4.67E-03	-6.7	0.933	2	0.7
(Q)Q (16,E ,11)	16 E 4 11 0	nu2	971.85241	-0.5	8.51E-03	8.32E-03	-2.2	0.978	5	3.0
(P)P (15,E ,10)	14 E 14 9-1	nu4	972.42368	2.6	1.26E-02	1.31E-02	3.8	1.038	6	2.0
(Q)Q (11,E , 2)	11 E 7 2 0	nu2	972.74271	-0.1	6.12E-03	6.17E-03	0.9	1.009	4	3.3
(Q)Q (12,E , 5)	12 E 5 5 0	nu2	972.75676	-0.1	2.19E-02	2.22E-02	1.6	1.016	6	1.9
(Q)Q (19,A-,15)	19 A+ 2 15 0	nu2	972.89972	6.2	1.69E-03	1.66E-03	-1.5	0.985	3	1.7
(Q)Q (13,E , 7)	13 E 5 7 0	nu2	972.94851	-0.4	2.46E-02	2.44E-02	-1.1	0.989	5	3.3
(Q)Q (11,A-, 3)	11 A+ 3 3 0	nu2	973.48866	4.6	1.45E-02	1.43E-02	-1.9	0.981	6	1.9
(Q)P (2,A+, 0)	1 A+ 1 0 0	nu2	973.97330	-1.4	2.68E-01	2.69E-01	0.4	1.004	7	1.2
(Q)P (2,E , 1)	1 E 1 1 0	nu2	974.17557	-0.8	2.04E-01	2.03E-01	-0.5	0.995	7	2.1
(Q)Q (12,A+, 6)	12 A- 3 6 0	nu2	974.43984	-1.1	3.36E-02	3.33E-02	-0.8	0.992	6	1.7
(Q)Q (17,E ,13)	17 E 4 13 0	nu2	974.49547	0.8	5.80E-03	6.05E-03	4.4	1.044	5	2.2
(Q)Q (11,E , 4)	11 E 6 4 0	nu2	974.58725	0.6	2.59E-02	2.58E-02	-0.4	0.996	6	2.4
(Q)Q (10,E , 1)	10 E 7 1 0	nu2	975.23727	2.0	2.64E-03	2.76E-03	4.5	1.045	2	1.4
(Q)Q (13,E , 8)	13 E 4 8 0	nu2	975.24957	-0.5	3.44E-02	3.37E-02	-2.2	0.978	6	3.2
(P)P (14,E ,11)	13 E 12 10-1	nu4	975.43216	5.9	2.73E-02	2.79E-02	2.2	1.022	6	1.9
(Q)Q (10,E , 2)	10 E 6 2 0	nu2	975.71076	0.1	1.10E-02	1.11E-02	1.1	1.011	6	1.8
(P)P (15,A+, 9)	14 A+ 8 8-1	nu4	975.88240	0.3	1.10E-02	1.14E-02	3.7	1.037	5	2.7
(Q)Q (11,E , 5)	11 E 5 5 0	nu2	976.00008	0.9	4.26E-02	4.17E-02	-2.2	0.978	7	2.8
(Q)Q (15,E ,11)	15 E 3 11 0	nu2	976.15766	-0.1	1.82E-02	1.83E-02	0.4	1.004	6	1.0
(Q)Q (12,E , 7)	12 E 4 7 0	nu2	976.47757	0.4	4.78E-02	4.76E-02	-0.5	0.995	6	2.9
(Q)Q (10,A-, 3)	10 A+ 3 3 0	nu2	976.49596	0.7	2.52E-02	2.57E-02	1.7	1.017	6	2.3
(Q)Q (10,A+, 3)	10 A- 3 3 0	nu2	976.51785	2.4	2.55E-02	2.54E-02	-0.3	0.997	6	2.5
(P)P (16,A+, 6)	15 A+ 11 5-1	nu4	976.74535	-8.0	2.84E-03	2.95E-03	4.2	1.042	2	2.6
(Q)Q (14,E ,10)	14 E 4 10 0	nu2	977.03239	0.7	3.00E-02	2.96E-02	-1.3	0.987	6	2.5
(P)P (13,A+,12)	12 A+ 6 11-1	nu4	977.36868	-7.1	5.30E-02	5.24E-02	-1.1	0.989	6	2.4
(Q)Q (10,E , 4)	10 E 5 4 0	nu2	977.63542	0.7	4.68E-02	4.66E-02	-0.3	0.997	6	2.5
(Q)Q (11,A+, 6)	11 A- 2 6 0	nu2	977.76310	0.4	6.31E-02	6.25E-02	-0.8	0.992	6	2.1
(Q)Q (13,A-, 9)	13 A+ 2 9 0	nu2	977.94432	0.7	4.59E-02	4.54E-02	-1.2	0.988	5	0.9
(Q)Q (9,E , 1)	9 E 6 1 0	nu2	978.03099	3.5	4.74E-03	4.81E-03	1.4	1.014	3	2.9
(Q)Q (18,A-,15)	18 A+ 2 15 0	nu2	978.15279	1.1	4.28E-03	4.15E-03	-3.0	0.970	3	2.1
(Q)Q (9,E , 2)	9 E 5 2 0	nu2	978.52370	-0.4	1.96E-02	1.94E-02	-1.0	0.990	5	2.1
(Q)Q (17,E ,14)	17 E 3 14 0	nu2	978.70637	0.7	7.96E-03	7.78E-03	-2.3	0.977	5	0.4
(Q)Q (12,E , 8)	12 E 3 8 0	nu2	978.89906	0.7	6.62E-02	6.57E-02	-0.8	0.992	6	1.5
(Q)Q (10,E , 5)	10 E 4 5 0	nu2	979.11192	0.9	7.64E-02	7.54E-02	-1.3	0.987	4	2.1
(Q)Q (16,E ,13)	16 E 3 13 0	nu2	979.26745	2.8	1.43E-02	1.39E-02	-3.0	0.970	3	1.4
(Q)Q (9,A-, 3)	9 A+ 3 3 0	nu2	979.34675	1.4	4.46E-02	4.47E-02	0.3	1.003	5	2.7
(Q)Q (9,A+, 3)	9 A- 3 3 0	nu2	979.35924	1.0	4.44E-02	4.45E-02	0.1	1.001	5	2.7
(P)P (14,E ,10)	13 E 13 9-1	nu4	979.43620	5.2	2.55E-02	2.51E-02	-1.6	0.984	4	3.0
(Q)Q (15,A-,12)	15 A+ 2 12 0	nu2	979.84459	0.9	2.46E-02	2.38E-02	-3.3	0.967	3	2.4
(Q)Q (11,E , 7)	11 E 4 7 0	nu2	979.90180	0.8	9.02E-02	8.94E-02	-0.9	0.991	6	2.1
(Q)Q (14,E ,11)	14 E 3 11 0	nu2	980.44580	1.4	3.87E-02	3.88E-02	0.3	1.003	3	1.3
(Q)Q (9,E , 4)	9 E 4 4 0	nu2	980.52963	0.9	8.29E-02	8.14E-02	-1.8	0.982	3	1.6
(Q)Q (10,A+, 6)	10 A- 2 6 0	nu2	980.95755	1.2	1.14E-01	1.13E-01	-0.9	0.991	5	0.9
(Q)Q (13,E ,10)	13 E 3 10 0	nu2	981.07683	0.4	6.22E-02	6.03E-02	-3.1	0.969	2	1.8
(Q)Q (8,E , 2)	8 E 5 2 0	nu2	981.15972	0.2	3.28E-02	3.28E-02	-0.1	0.999	3	2.1
(Q)Q (12,A-, 9)	12 A+ 2 9 0	nu2	981.74333	0.9	9.01E-02	8.88E-02	-1.4	0.986	5	2.9
(P)P (15,E , 7)	14 E 17 6-1	nu4	981.89811	1.0	7.59E-03	7.96E-03	4.9	1.049	2	1.3
(Q)Q (8,A-, 3)	8 A+ 2 3 0	nu2	982.01849	-1.0	7.62E-02	7.54E-02	-1.1	0.989	3	1.4

(Q)Q (8,A+, 3)	8 A-	2	3 0	nu2	982.02539	0.8	7.53E-02	7.52E-02	-0.2	0.998	3	0.7
(Q)Q (9,E , 5)	9 E	3	5 0	nu2	982.07098	1.1	1.32E-01	1.32E-01	0.0	1.000	3	1.2
(P)P (13,E ,11)	12 E	10	10-1	nu4	982.11381	5.9	4.93E-02	4.94E-02	0.2	1.002	4	2.2
(Q)Q (11,E , 8)	11 E	3	8 0	nu2	982.44988	0.5	1.24E-01	1.24E-01	-0.6	0.994	5	1.6
(Q)Q (19,E ,17)	19 E	2	17 0	nu2	982.95911	-1.6	2.54E-03	2.72E-03	6.9	1.069	2	0.1
(Q)Q (7,E , 1)	7 E	5	1 0	nu2	983.06361	1.3	1.36E-02	1.33E-02	-2.2	0.978	3	3.4
(P)P (14,A+, 9)	13 A+	7	8-1	nu4	983.08655	2.0	2.21E-02	2.21E-02	0.3	1.003	4	1.9
(Q)Q (10,E , 7)	10 E	3	7 0	nu2	983.20097	-0.2	1.60E-01	1.62E-01	1.1	1.011	5	2.9
(Q)P (1,A+, 0)	0 A+	1	0 0	nu2	983.23042	-1.4	1.61E-01	1.60E-01	-0.8	0.992	5	0.9
(Q)Q (8,E , 4)	8 E	4	4 0	nu2	983.24676	0.0	1.39E-01	1.38E-01	-1.2	0.988	5	2.4
(Q)Q (18,E ,16)	18 E	2	16 0	nu2	983.25718	-0.7	5.35E-03	5.33E-03	-0.3	0.997	2	0.8
(Q)Q (17,A-,15)	17 A+	1	15 0	nu2	983.53051	3.5	1.02E-02	1.00E-02	-1.8	0.982	3	3.0
(P)P (12,A+,12)	11 A+	5	11-1	nu4	983.54593	-17.8	8.47E-02	8.40E-02	-0.8	0.992	5	1.2
(Q)Q (7,E , 2)	7 E	4	2 0	nu2	983.59510	1.3	5.31E-02	5.37E-02	1.1	1.011	3	1.0
(Q)Q (16,E ,14)	16 E	2	14 0	nu2	983.80093	1.8	1.76E-02	1.80E-02	2.1	1.021	3	1.0
(Q)Q (9,A-, 6)	9 A+	2	6 0	nu2	984.00085	0.4	1.97E-01	1.98E-01	0.4	1.004	5	1.2
(Q)Q (15,E ,13)	15 E	2	13 0	nu2	984.08191	1.4	3.06E-02	3.08E-02	0.8	1.008	3	1.4
(P)P (15,A+, 6)	14 A+	10	5-1	nu4	984.45196	-4.0	5.87E-03	6.28E-03	7.0	1.070	3	2.0
(Q)Q (13,E ,11)	13 E	2	11 0	nu2	984.70682	-0.2	7.94E-02	7.92E-02	-0.2	0.998	3	0.9
(Q)Q (8,E , 5)	8 E	3	5 0	nu2	984.85332	1.1	2.21E-01	2.23E-01	0.8	1.008	5	1.3
(Q)Q (12,E ,10)	12 E	2	10 0	nu2	985.06236	0.7	1.19E-01	1.18E-01	-0.4	0.996	5	0.8
(Q)Q (6,E , 1)	6 E	4	1 0	nu2	985.25483	0.5	2.09E-02	2.12E-02	1.1	1.011	2	0.6
(Q)Q (11,A-, 9)	11 A+	1	9 0	nu2	985.45244	0.0	1.68E-01	1.67E-01	-0.3	0.997	5	1.3
(Q)Q (7,E , 4)	7 E	3	4 0	nu2	985.76189	-0.2	2.23E-01	2.25E-01	0.8	1.008	5	1.8
(Q)Q (6,E , 2)	6 E	3	2 0	nu2	985.80442	-0.9	8.55E-02	8.57E-02	0.2	1.002	3	1.0
(Q)Q (10,E , 8)	10 E	2	8 0	nu2	985.88120	0.4	2.25E-01	2.25E-01	-0.2	0.998	5	1.5
(Q)Q (9,E , 7)	9 E	2	7 0	nu2	986.35205	0.7	2.86E-01	2.84E-01	-0.7	0.993	5	0.6
(P)P (13,E ,10)	12 E	11	9-1	nu4	986.37110	6.9	4.50E-02	4.53E-02	0.7	1.007	4	1.4
(P)P (14,E , 8)	13 E	14	7-1	nu4	986.41485	-1.5	1.86E-02	1.90E-02	2.4	1.024	3	1.9
(Q)Q (8,A-, 6)	8 A+	1	6 0	nu2	986.86812	-0.2	3.35E-01	3.35E-01	0.1	1.001	5	1.2
(Q)Q (5,E , 1)	5 E	4	1 0	nu2	987.19603	1.8	3.31E-02	3.31E-02	-0.3	0.997	3	1.3
(Q)Q (7,E , 5)	7 E	2	5 0	nu2	987.43267	0.3	3.64E-01	3.65E-01	0.2	1.002	5	0.6
(Q)Q (5,E , 2)	5 E	3	2 0	nu2	987.76258	-0.2	1.36E-01	1.34E-01	-1.3	0.987	5	1.3
(Q)Q (6,E , 4)	6 E	2	4 0	nu2	988.04838	0.6	3.60E-01	3.60E-01	-0.2	0.998	5	0.8
(Q)Q (5,A+, 3)	5 A-	1	3 0	nu2	988.71772	-3.4	3.11E-01	3.07E-01	-1.3	0.987	5	1.5
(Q)Q (4,E , 1)	4 E	3	1 0	nu2	988.86163	0.6	5.07E-02	5.11E-02	0.9	1.009	3	1.6
(Q)Q (13,A-,12)	13 A+	1	12 0	nu2	988.91326	-1.1	1.05E-01	1.04E-01	-1.3	0.987	5	2.4
(Q)Q (14,E ,13)	14 E	2	13 0	nu2	988.93201	0.0	6.80E-02	6.58E-02	-3.2	0.968	4	2.2
(Q)Q (11,E ,10)	11 E	2	10 0	nu2	988.96886	0.0	2.26E-01	2.23E-01	-1.1	0.989	5	1.0
(Q)Q (15,E ,14)	15 E	1	14 0	nu2	988.97694	-2.7	4.14E-02	4.00E-02	-3.4	0.966	5	2.9
(Q)Q (17,E ,16)	17 E	2	16 0	nu2	989.13276	-3.8	1.34E-02	1.30E-02	-3.0	0.970	3	3.2
(Q)Q (9,E , 8)	9 E	1	8 0	nu2	989.16789	0.3	3.95E-01	3.94E-01	-0.3	0.997	5	1.6
(Q)Q (18,E ,17)	18 E	1	17 0	nu2	989.23621	-0.8	7.33E-03	6.95E-03	-5.2	0.948	2	0.1
(Q)Q (8,E , 7)	8 E	2	7 0	nu2	989.32795	0.4	4.78E-01	4.81E-01	0.5	1.005	5	1.2
(Q)Q (19,A-,18)	19 A+	1	18 0	nu2	989.35069	-1.5	3.53E-03	3.57E-03	1.2	1.012	3	0.8
(P)P (14,E , 7)	13 E	16	6-1	nu4	989.43375	1.4	1.60E-02	1.59E-02	-0.8	0.992	4	2.5
(Q)Q (4,E , 2)	4 E	2	2 0	nu2	989.44356	-0.5	2.07E-01	2.07E-01	-0.2	0.998	5	0.7
(Q)Q (7,A-, 6)	7 A+	1	6 0	nu2	989.53156	0.0	5.49E-01	5.50E-01	0.1	1.001	4	1.4
(Q)Q (6,E , 5)	6 E	1	5 0	nu2	989.78100	0.1	5.82E-01	5.83E-01	0.2	1.002	5	1.4
(Q)Q (5,E , 4)	5 E	2	4 0	nu2	990.07817	-0.3	5.60E-01	5.63E-01	0.5	1.005	5	1.3
(Q)Q (4,A+, 3)	4 A-	1	3 0	nu2	990.42505	-0.6	4.76E-01	4.76E-01	-0.1	0.999	4	1.3
(Q)Q (3,E , 2)	3 E	1	2 0	nu2	990.82300	-1.5	3.22E-01	3.23E-01	0.3	1.003	5	1.2
(Q)Q (2,E , 1)	2 E	2	1 0	nu2	991.27384	-1.7	1.30E-01	1.31E-01	0.5	1.005	5	1.4
(Q)Q (5,E , 5)	5 E	1	5 0	nu2	991.86901	2.1	9.13E-01	9.13E-01	0.0	1.000	4	1.5
(Q)Q (2,E , 2)	2 E	1	2 0	nu2	991.87928	-0.9	5.34E-01	5.31E-01	-0.6	0.994	5	0.7
(Q)Q (6,A-, 6)	6 A+	1	6 0	nu2	991.96075	-0.9	8.78E-01	8.80E-01	0.2	1.002	3	1.0
(Q)Q (1,E , 1)	1 E	1	1 0	nu2	991.98170	-1.1	2.61E-01	2.59E-01	-0.7	0.993	5	1.3
(Q)Q (7,E , 7)	7 E	1	7 0	nu2	992.09850	0.0	7.89E-01	7.91E-01	0.3	1.003	4	1.1
(P)P (14,A+, 6)	13 A+	9	5-1	nu4	992.13909	-4.8	1.25E-02	1.27E-02	1.7	1.017	3	0.7
(Q)Q (8,E , 8)	8 E	1	8 0	nu2	992.28023	0.4	6.72E-01	6.69E-01	-0.4	0.996	5	1.7
(Q)Q (9,A-, 9)	9 A+	1	9 0	nu2	992.50402	-0.6	5.35E-01	5.36E-01	0.2	1.002	4	0.8
(Q)Q (10,E ,10)	10 E	1	10 0	nu2	992.76813	-0.3	4.12E-01	4.08E-01	-1.1	0.989	5	1.0
(Q)Q (11,E ,11)	11 E	1	11 0	nu2	993.07009	-1.3	2.96E-01	2.96E-01	-0.2	0.998	5	1.5
(Q)Q (12,A-,12)	12 A+	1	12 0	nu2	993.40706	-7.5	2.04E-01	2.05E-01	0.1	1.001	5	0.9
(P)P (13,E , 8)	12 E	12	7-1	nu4	993.74380	-0.2	3.54E-02	3.54E-02	0.2	1.002	3	2.5
(Q)Q (13,E ,13)	13 E	1	13 0	nu2	993.77800	-2.5	1.33E-01	1.35E-01	2.1	1.021	5	2.8
(Q)Q (14,E ,14)	14 E	1	14 0	nu2	994.17836	-2.9	8.64E-02	8.57E-02	-0.8	0.992	5	0.9
(P)P (14,E , 5)	13 E	18	4-1	nu4	994.51677	-0.4	9.05E-03	9.61E-03	6.1	1.061	2	3.4
(Q)Q (15,A-,15)	15 A+	1	15 0	nu2	994.60570	-1.5	5.28E-02	5.20E-02	-1.4	0.986	5	2.3
(P)P (11,E ,11)	10 E	8	10-1	nu4	995.11649	-1.6	1.28E-01	1.25E-01	-1.9	0.981	5	0.8
(Q)Q (17,E ,17)	17 E	1	17 0	nu2	995.52720	3.8	1.67E-02	1.69E-02	1.7	1.017	3	3.2
(Q)Q (18,A-,18)	18 A+	1	18 0	nu2	996.01369	7.6	9.03E-03	9.08E-03	0.7	1.007	3	2.9
(P)P (14,E , 4)	13 E	19	3-1	nu4	996.53918	0.4	6.77E-03	6.66E-03	-1.6	0.984	2	1.6
(P)P (13,E , 7)	12 E	14	6-1	nu4	996.93174	-2.1	2.97E-02	3.01E-02	1.0	1.010	3	1.5
(P)P (12,A+, 9)	11 A+	6	8-1	nu4	997.31391	6.1	7.11E-02	7.00E-02	-1.4	0.986	5	0.9
(P)P (14,A-, 3)	13 A-	10	2-1	nu4	997.94550	5.0	4.08E-03	4.23E-03	3.6	1.036	2	4.3
(P)P (14,A+, 3)	13 A+	11	2-1	nu4	998.42385	0.3	3.55E-03	3.81E-03	7.4	1.074	2	5.9
(P)P (13,A+, 6)	12 A+	8	5-1	nu4	999.79873	-5.2	2.42E-02	2.45E-02	1.1	1.011	3	1.4
(P)P (11,E ,10)	10 E	9	9-1	nu4	999.99087	7.9	1.26E-01	1.21E-01	-3.6	0.964	5	2.5
(Q)R (0,A+, 0)	1 A+	1	0 0	nu2	1000.68304	-1.8	1.93E-01	1.93E-01	0.0	1.000	5	1.3
(P)P (12,E , 8)	11 E	11	7-1	nu4	1001.02294	0.6	6.19E-02	6.23E-02	0.6	1.006	3	0.7
(P)P (13,E , 5)	12 E	16	4-1	nu4	1002.33231	-5.5	1.94E-02	1.88E-02	-2.9	0.971	3	1.8
(P)P (11,A+, 9)	10 A+	5	8-1	nu4	1004.33567	6.2	1.15E-01	1.13E-01	-1.7	0.983	5	1.0
(P)P (12,E , 7)	11 E	12	6-1	nu4	1004.38872	-2.7	5.45E-02	5.38E-02	-1.3	0.987	3	0.8
(P)P (13,E , 4)	12 E	17	3-1	nu4	1004.50529	-0.2	1.27E-02	1.33E-02	4.5	1.045	3	1.4
(P)P (13,A-, 3)	12 A-	9	2-1	nu4	1006.08029	3.5	8.06E-03	8.51E-03	5.5	1.055	2	1.6
(P)P (13,A+, 3)	12 A+	10	2-1	nu4	1006.48789	-8.4	7.70E-03	7.90E-03	2.6	1.026	2	0.1
(P)P (12,A+, 6)	11 A+	7	5-1	nu4	1007.42478	-3.5	4.41E-02	4.46E-02	1.3	1.013	5	1.8
(P)P (13,E , 2)	12 E	19	1-1	nu4	1007.61546	-1.0	3.73E-03	3.92E-03	5.0	1.050	2	8.0
(Q)R (1,A+, 0)	2 A+	1	0 0	nu2	1008.87885	-0.7	4.02E-01	3.96E-01	-1.5	0.985	5	1.5
(Q)R (1,E , 1)	2 E	2	1 0	nu2	1009.08003	-1.4	3.03E-01	2.98E-01	-1.8	0.982	5	0.8
(P)P (12,E , 5)	11 E	14	4-1	nu4	1010.12391	-3.6	3.44E-02	3.51E-02	2.0	1.020	3	0.8
(P)P (10,A+, 9)	9 A+	5	8-1	nu4	1011.30512	6.9	1.76E-01	1.72E-01	-2.2	0.978	5	1.0
(R)P (17,A+, 0)	16 A+	17	1 1	nu4	1011.54203	2.6	3.78E-03	3.63E-03	-3.9	0.961	2	0.1
(R)P (17,E , 4)	16 E	31	5 1	nu4	1011.57625	4.2	3.45E-03	3.19E-03	-7.5	0.925	2	1.7
(P)P (11,E , 7)	10 E	11	6-1	nu4	1011.80501	-1.6	9.11E-02	9.06E-02	-0.5	0.995	4	1.6
(P)P (12,E , 4)	11 E	15	3-1	nu4	1012.45977	-2.9	2.51E-02	2.54E-02	1.1	1.011	3	2.6
(P)P (12,A-, 3)	11 A-	8	2-1	nu4	1014.22268	1.1	1.63E-02	1.64E-02	0.7	1.007	3	1.6

(R)P (16,E ,11)	15 E	20	12 1	nu4	1014.54977	-1.3	2.06E-03	1.97E-03	-4.7	0.953	2	7.9
(P)P (12,A+, 3)	11 A+	9	2-1	nu4	1014.56205	-4.4	1.58E-02	1.56E-02	-1.1	0.989	2	0.1
(P)P (11,A+, 6)	10 A+	6	5-1	nu4	1015.01451	-2.7	7.80E-02	7.68E-02	-1.5	0.985	5	1.5
(R)P (16,E ,10)	15 E	21	11 1	nu4	1015.32370	-2.8	2.53E-03	2.62E-03	3.4	1.034	2	4.2
(P)P (10,E , 8)	9 E	8	7-1	nu4	1015.44613	3.0	1.62E-01	1.60E-01	-1.5	0.985	5	2.2
(P)P (12,E , 2)	11 E	18	1-1	nu4	1015.85998	0.2	7.48E-03	7.66E-03	2.4	1.024	2	0.2
(R)P (16,A+, 3)	15 A+	15	4 1	nu4	1016.03006	4.0	6.51E-03	6.33E-03	-2.7	0.973	2	0.0
(R)P (16,E , 4)	15 E	29	5 1	nu4	1016.47207	-1.9	6.24E-03	6.16E-03	-1.3	0.987	2	2.4
(R)P (16,E , 7)	15 E	27	8 1	nu4	1016.50503	-3.6	4.42E-03	4.55E-03	3.1	1.031	3	1.6
(Q)R (2,A+, 0)	3 A+	2	0 0	nu2	1016.73114	-1.0	5.82E-01	5.78E-01	-0.7	0.993	5	0.8
(R)P (16,A-, 3)	15 A-	15	4 1	nu4	1016.80574	-4.6	7.13E-03	6.92E-03	-3.0	0.970	2	2.0
(Q)R (2,E , 1)	3 E	2	1 0	nu2	1016.92931	-1.5	5.23E-01	5.16E-01	-1.2	0.988	5	1.1
(Q)R (2,E , 2)	3 E	1	2 0	nu2	1017.52756	-0.6	3.31E-01	3.27E-01	-1.2	0.988	5	0.9
(P)P (11,E , 5)	10 E	12	4-1	nu4	1017.88448	-4.2	6.10E-02	6.18E-02	1.3	1.013	3	1.8
(P)P (9,A+, 9)	8 A+	4	8-1	nu4	1018.24112	4.7	2.47E-01	2.41E-01	-2.2	0.978	5	1.6
(P)P (10,E , 7)	9 E	9	6-1	nu4	1019.18708	-0.4	1.45E-01	1.43E-01	-1.2	0.988	5	1.0
(R)P (15,E ,11)	14 E	18	12 1	nu4	1019.90686	-0.7	2.59E-03	2.52E-03	-3.0	0.970	2	3.9
(P)P (11,E , 4)	10 E	14	3-1	nu4	1020.39355	-1.5	4.53E-02	4.60E-02	1.6	1.016	3	0.8
(R)P (15,A+, 3)	14 A+	14	4 1	nu4	1021.07511	-0.3	1.21E-02	1.18E-02	-2.5	0.975	3	2.6
(R)P (15,A+, 0)	14 A+	15	1 1	nu4	1021.14335	2.1	1.42E-02	1.36E-02	-4.5	0.955	3	1.3
(R)P (15,A+, 9)	14 A+	11	10 1	nu4	1021.21798	-6.4	4.93E-03	4.99E-03	1.1	1.011	2	1.1
(R)P (15,E , 2)	14 E	28	3 1	nu4	1021.28311	1.1	1.35E-02	1.29E-02	-4.0	0.960	3	0.8
(R)P (15,E , 4)	14 E	27	5 1	nu4	1021.53236	3.9	1.14E-02	1.12E-02	-1.7	0.983	3	1.4
(R)P (15,A-, 3)	14 A-	14	4 1	nu4	1021.72403	-1.6	1.27E-02	1.26E-02	-0.6	0.994	3	2.5
(R)P (15,E , 7)	14 E	25	8 1	nu4	1021.76315	-3.6	7.86E-03	7.60E-03	-3.3	0.967	3	2.9
(R)P (15,A-, 6)	14 A-	13	7 1	nu4	1021.77885	-5.5	8.81E-03	8.91E-03	1.1	1.011	2	5.0
(P)P (11,A-, 3)	10 A-	7	2-1	nu4	1022.36029	-0.8	2.97E-02	3.04E-02	2.5	1.025	3	0.8
(P)P (10,A+, 6)	9 A+	6	5-1	nu4	1022.57121	-3.5	1.26E-01	1.24E-01	-1.0	0.990	5	2.2
(P)P (9,E , 8)	8 E	7	7-1	nu4	1022.61365	-5.6	2.33E-01	2.31E-01	-0.7	0.993	5	0.9
(P)P (11,A+, 3)	10 A+	8	2-1	nu4	1022.63297	-4.7	2.97E-02	2.95E-02	-0.5	0.995	3	2.4
(P)P (11,E , 2)	10 E	16	1-1	nu4	1024.11610	1.5	1.48E-02	1.52E-02	2.6	1.026	3	2.5
(Q)R (3,A+, 0)	4 A+	2	0 0	nu2	1024.25442	-0.6	7.12E-01	7.15E-01	0.4	1.004	5	1.3
(Q)R (3,E , 1)	4 E	3	1 0	nu2	1024.44862	-1.3	6.74E-01	6.73E-01	-0.2	0.998	5	1.2
(Q)R (3,E , 2)	4 E	2	2 0	nu2	1025.03475	-1.5	5.44E-01	5.46E-01	0.4	1.004	5	2.3
(P)P (11,E , 1)	10 E	17	0 1	nu4	1025.14926	-2.6	4.12E-03	4.17E-03	1.3	1.013	2	1.2
(R)P (14,E ,11)	13 E	15	12 1	nu4	1025.47665	4.5	2.64E-03	2.55E-03	-3.4	0.966	2	5.6
(P)P (10,E , 5)	9 E	10	4-1	nu4	1025.61296	-4.0	1.04E-01	1.03E-01	-1.2	0.988	5	1.8
(Q)R (3,A-, 3)	4 A-	1	3 0	nu2	1026.02315	-1.1	3.25E-01	3.26E-01	0.3	1.003	5	1.0
(R)P (14,A+, 0)	13 A+	14	1 1	nu4	1026.15826	0.0	2.50E-02	2.43E-02	-2.6	0.974	3	1.7
(R)P (14,A+, 3)	13 A+	13	4 1	nu4	1026.28563	-4.0	2.08E-02	2.06E-02	-0.9	0.991	3	0.9
(R)P (14,E , 2)	13 E	26	3 1	nu4	1026.35954	0.2	2.38E-02	2.28E-02	-4.1	0.959	3	1.5
(P)P (9,E , 7)	8 E	8	6-1	nu4	1026.54913	1.4	2.15E-01	2.13E-01	-1.1	0.989	5	2.5
(R)P (14,E , 4)	13 E	25	5 1	nu4	1026.77438	-2.3	1.96E-02	1.90E-02	-2.9	0.971	3	3.3
(R)P (14,A+, 9)	13 A+	10	10 1	nu4	1026.79187	-2.4	7.02E-03	6.80E-03	-3.1	0.969	3	1.4
(R)P (14,A-, 3)	13 A-	13	4 1	nu4	1026.82064	-0.2	2.23E-02	2.17E-02	-2.8	0.972	3	2.1
(R)P (14,E , 5)	13 E	24	6 1	nu4	1027.00064	-4.9	1.68E-02	1.67E-02	-0.7	0.993	3	2.6
(R)P (14,E , 8)	13 E	20	9 1	nu4	1027.05859	-3.5	9.40E-03	9.10E-03	-3.2	0.968	3	1.8
(R)P (14,A+, 6)	13 A+	12	7 1	nu4	1027.15046	-6.3	1.40E-02	1.42E-02	1.8	1.018	3	2.7
(R)P (14,A-, 6)	13 A-	12	7 1	nu4	1027.17591	-8.4	1.43E-02	1.42E-02	-0.3	0.997	3	0.6
(R)P (14,E , 7)	13 E	23	8 1	nu4	1027.23983	-1.4	1.16E-02	1.16E-02	-0.3	0.997	2	4.4
(P)P (10,E , 4)	9 E	12	3-1	nu4	1028.29907	-2.7	7.82E-02	7.86E-02	0.6	1.006	3	1.2
(P)P (8,E , 8)	7 E	6	7-1	nu4	1029.78734	2.4	3.15E-01	3.10E-01	-1.6	0.984	5	1.5
(P)P (9,A+, 6)	8 A+	5	5-1	nu4	1030.10616	-2.0	1.89E-01	1.88E-01	-0.2	0.998	5	1.2
(P)P (10,A-, 3)	9 A-	6	2-1	nu4	1030.48129	-1.0	5.36E-02	5.36E-02	0.0	1.000	3	1.4
(P)P (10,A+, 3)	9 A+	7	2-1	nu4	1030.69093	-1.7	5.37E-02	5.28E-02	-1.7	0.983	3	1.8
(R)P (13,A+, 0)	12 A+	13	1 1	nu4	1031.33167	-3.1	4.13E-02	4.13E-02	-0.2	0.998	4	1.8
(Q)R (4,A+, 0)	5 A+	2	0 0	nu2	1031.46672	-0.3	7.82E-01	7.89E-01	0.9	1.009	4	1.5
(R)P (13,A-, 3)	12 A-	12	4 1	nu4	1032.11486	-0.4	3.59E-02	3.52E-02	-2.0	0.980	3	2.4
(R)P (13,E , 4)	12 E	23	5 1	nu4	1032.22342	8.0	2.93E-02	3.02E-02	2.8	1.028	5	0.3
(Q)R (4,E , 2)	5 E	3	2 0	nu2	1032.22823	0.4	6.71E-01	6.75E-01	0.6	1.006	5	2.1
(P)P (10,E , 2)	9 E	14	1-1	nu4	1032.38588	0.2	2.79E-02	2.81E-02	0.8	1.008	3	1.0
(R)P (13,E , 5)	12 E	22	6 1	nu4	1032.54238	-4.3	2.59E-02	2.56E-02	-1.0	0.990	3	1.0
(R)P (13,A+, 9)	12 A+	9	10 1	nu4	1032.58572	0.8	7.99E-03	7.93E-03	-0.7	0.993	2	0.6
(R)P (13,A+, 6)	12 A+	11	7 1	nu4	1032.78021	-1.9	2.12E-02	2.09E-02	-1.1	0.989	3	0.7
(R)P (13,A-, 6)	12 A-	11	7 1	nu4	1032.80185	-1.5	2.17E-02	2.09E-02	-3.6	0.964	3	3.4
(R)P (13,E , 8)	12 E	18	9 1	nu4	1032.83974	0.2	1.14E-02	1.19E-02	4.6	1.046	3	2.7
(Q)R (4,A-, 3)	5 A-	1	3 0	nu2	1033.19195	-2.1	5.23E-01	5.26E-01	0.4	1.004	4	0.5
(P)P (9,E , 5)	8 E	9	4-1	nu4	1033.31494	-4.8	1.62E-01	1.59E-01	-1.8	0.982	5	2.5
(P)P (10,E , 1)	9 E	15	0 1	nu4	1033.56451	2.0	7.63E-03	8.03E-03	5.2	1.052	2	2.7
(P)P (8,E , 7)	7 E	7	6-1	nu4	1033.91431	0.1	2.96E-01	2.94E-01	-0.8	0.992	5	1.0
(Q)R (4,E , 4)	5 E	2	4 0	nu2	1034.56443	0.8	3.07E-01	3.05E-01	-0.4	0.996	5	1.3
(P)P (9,E , 4)	8 E	10	3-1	nu4	1036.17512	-4.2	1.27E-01	1.26E-01	-0.3	0.997	5	1.1
(R)P (12,A+, 0)	11 A+	12	1 1	nu4	1036.67804	-2.0	6.70E-02	6.63E-02	-1.1	0.989	3	0.9
(R)P (12,E , 1)	11 E	23	2 1	nu4	1036.78036	-0.6	6.53E-02	6.45E-02	-1.3	0.987	3	0.7
(R)P (12,E , 2)	11 E	22	3 1	nu4	1037.06439	-0.1	6.04E-02	5.94E-02	-1.5	0.985	3	0.2
(R)P (12,A+, 3)	11 A+	11	4 1	nu4	1037.28904	-2.6	5.17E-02	5.16E-02	-0.2	0.998	3	0.8
(R)P (12,A-, 3)	11 A-	11	4 1	nu4	1037.63022	4.4	5.31E-02	5.33E-02	0.2	1.002	4	1.6
(P)P (8,A+, 6)	7 A+	4	5-1	nu4	1037.63891	-2.1	2.67E-01	2.67E-01	-0.1	0.999	5	0.9
(R)P (12,E , 4)	11 E	21	5 1	nu4	1037.90075	-1.3	4.43E-02	4.43E-02	0.1	1.001	4	1.3
(R)P (12,E , 5)	11 E	20	6 1	nu4	1038.32646	-0.7	3.57E-02	3.61E-02	1.1	1.011	3	0.8
(Q)R (5,A+, 0)	6 A+	3	0 0	nu2	1038.38863	-0.7	7.90E-01	7.97E-01	1.0	1.010	4	1.8
(Q)R (5,E , 1)	6 E	4	1 0	nu2	1038.57328	2.7	7.75E-01	7.79E-01	0.4	1.004	4	3.1
(R)P (12,A+, 9)	11 A+	8	10 1	nu4	1038.62362	-0.9	7.08E-03	7.34E-03	3.7	1.037	3	2.5
(R)P (12,A+, 6)	11 A+	10	7 1	nu4	1038.65718	-1.7	2.78E-02	2.79E-02	0.4	1.004	3	0.9
(R)P (12,A-, 6)	11 A-	10	7 1	nu4	1038.67785	-0.8	2.82E-02	2.78E-02	-1.4	0.986	3	0.8
(P)P (9,A+, 3)	8 A+	6	2-1	nu4	1038.72691	-4.2	9.00E-02	8.87E-02	-1.4	0.986	5	0.8
(R)P (12,E , 7)	11 E	17	8 1	nu4	1038.83275	0.0	1.93E-02	1.97E-02	2.1	1.021	3	2.6
(R)P (12,E , 8)	11 E	16	9 1	nu4	1038.84920	1.1	1.31E-02	1.33E-02	2.1	1.021	3	1.7
(Q)R (5,E , 2)	6 E	3	2 0	nu2	1039.12878	-0.6	7.10E-01	7.21E-01	1.6	1.016	5	1.6
(P)P (9,E , 2)	8 E	12	1-1	nu4	1040.65263	1.0	4.91E-02	4.98E-02	1.4	1.014	4	1.8
(P)P (8,E , 5)	7 E	8	4-1	nu4	1041.00585	-2.5	2.32E-01	2.31E-01	-0.1	0.999	5	0.9
(P)P (7,E , 7)	6 E	5	6-1	nu4	1041.31757	0.1	3.83E-01	3.77E-01	-1.4	0.986	5	2.1
(Q)R (5,E , 4)	6 E	2	4 0	nu2	1041.39713	-0.3	4.70E-01	4.75E-01	1.2	1.012	5	1.6
(P)P (9,E , 1)	8 E	13	0 1	nu4	1042.01043	1.8	1.46E-02	1.50E-02	3.2	1.032	2	1.4
(R)P (11,A+, 0)	10 A+	11	1 1	nu4	1042.21286	0.2	1.02E-01	1.01E-01	-1.2	0.988	5	2.8
(R)P (11,E , 1)	10 E	21	2 1	nu4	1042.35311	-0.1	1.01E-01	9.69E-02	-3.9	0.961	5	3.2
(R)P (11,E , 2)	10 E	20	3 1	nu4	1042.73575	0.8	8.78E-02	8.71E-02	-0.8	0.992	3	0.7
(R)P (11,A+, 3)	10 A+	10	4 1	nu4	1043.13196	-3.9	7.16E-02	7.31E-02	2.1	1.021	4	2.1

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(Q)R (5,E , 5)	6	E	1	5 0	nu2	1043.14832	-0.3	2.72E-01	2.72E-01	0.3	1.003	5	0.8
(R)P (11,A-, 3)	10	A-	10	4 1	nu4	1043.39183	2.0	7.64E-02	7.49E-02	-1.9	0.981	3	0.5
(R)P (11,E , 4)	10	E	19	5 1	nu4	1043.83546	-3.5	6.01E-02	5.99E-02	-0.5	0.995	3	2.1
(P)P (8,E , 4)	7	E	9	3-1	nu4	1044.02920	-4.6	1.89E-01	1.89E-01	-0.3	0.997	5	1.3
(R)P (11,E , 5)	10	E	18	6 1	nu4	1044.37589	2.0	4.52E-02	4.60E-02	2.0	1.020	3	1.1
**(U)P (10,A+, 0)	9	A+	9	4 1	nu4	1044.59322	-2.9	4.19E-03	4.89E-03	16.6	1.166	2	6.4
(R)P (11,A+, 6)	10	A+	9	7 1	nu4	1044.80210	2.5	3.22E-02	3.31E-02	3.0	1.030	2	0.8
(R)P (11,A-, 6)	10	A-	9	7 1	nu4	1044.84158	2.6	3.18E-02	3.16E-02	-0.4	0.996	3	0.6
(R)P (11,A+, 9)	10	A+	7	10 1	nu4	1044.92117	-4.7	4.61E-03	4.33E-03	-6.1	0.939	3	2.3
(Q)R (6,A+, 0)	7	A+	3	0 0	nu2	1045.04219	-0.8	7.30E-01	7.47E-01	2.2	1.022	5	2.6
(R)P (11,E , 7)	10	E	15	8 1	nu4	1045.06203	-6.0	2.14E-02	2.16E-02	0.9	1.009	4	3.2
(R)P (11,E , 8)	10	E	13	9 1	nu4	1045.11751	-0.8	1.17E-02	1.18E-02	0.8	1.008	3	3.2
(P)P (7,A+, 6)	6	A+	4	5-1	nu4	1045.19941	-2.8	3.49E-01	3.51E-01	0.7	1.007	5	1.3
(Q)R (6,E , 1)	7	E	5	1 0	nu2	1045.22100	1.0	7.26E-01	7.35E-01	1.1	1.011	5	2.0
(Q)R (6,E , 2)	7	E	4	2 0	nu2	1045.75950	0.5	6.87E-01	6.98E-01	1.5	1.015	5	2.3
(P)P (8,A-, 3)	7	A-	4	2-1	nu4	1046.63774	-2.9	1.42E-01	1.40E-01	-1.7	0.983	2	0.0
(P)P (8,A+, 3)	7	A+	5	2-1	nu4	1046.73921	-6.1	1.39E-01	1.39E-01	0.1	1.001	5	0.8
(R)P (10,E , 1)	9	E	19	2 1	nu4	1048.14549	1.6	1.36E-01	1.37E-01	0.6	1.006	5	1.7
(R)P (10,E , 2)	9	E	18	3 1	nu4	1048.65496	1.6	1.16E-01	1.19E-01	1.8	1.018	5	2.4
(P)P (7,E , 5)	6	E	6	4-1	nu4	1048.71048	-3.9	3.14E-01	3.13E-01	-0.5	0.995	5	1.4
(P)P (8,E , 2)	7	E	10	1-1	nu4	1048.90294	-0.3	8.37E-02	8.32E-02	-0.6	0.994	3	0.0
(R)P (10,A+, 3)	9	A+	9	4 1	nu4	1049.24118	0.6	9.53E-02	9.50E-02	-0.3	0.997	3	0.7
(R)P (10,A-, 3)	9	A-	9	4 1	nu4	1049.42978	3.5	9.76E-02	9.69E-02	-0.7	0.993	3	1.0
(Q)R (6,E , 5)	7	E	2	5 0	nu2	1049.64700	0.3	4.11E-01	4.08E-01	-0.6	0.994	5	1.5
(R)P (10,E , 4)	9	E	17	5 1	nu4	1050.05368	3.2	7.46E-02	7.32E-02	-1.9	0.981	3	2.2
(P)P (8,E , 1)	7	E	11	0 1	nu4	1050.47727	1.2	2.73E-02	2.73E-02	0.1	1.001	3	1.4
(R)P (10,E , 5)	9	E	16	6 1	nu4	1050.71117	2.1	5.28R-02	5.22E-02	-1.2	0.988	2	0.3
(R)P (10,A-, 6)	9	A-	7	7 1	nu4	1051.22233	1.1	3.36E-02	3.34E-02	-0.6	0.994	4	2.3
(R)P (10,A+, 6)	9	A+	8	7 1	nu4	1051.22945	-2.7	3.44E-02	3.37E-02	-2.1	0.979	4	2.3
(Q)R (7,A+, 0)	8	A+	3	0 0	nu2	1051.44960	-0.4	6.45E-01	6.53E-01	1.3	1.013	5	2.1
(R)P (10,E , 7)	9	E	13	8 1	nu4	1051.55953	1.6	1.77E-02	1.82E-02	2.9	1.029	3	1.9
(Q)R (7,E , 1)	8	E	6	1 0	nu2	1051.62242	0.9	6.35E-01	6.46E-01	1.7	1.017	5	1.7
(Q)R (6,A+, 6)	7	A+	1	6 0	nu2	1051.77240	1.1	2.31E-01	2.33E-01	0.7	1.007	5	0.8
(P)P (7,E , 4)	6	E	7	3-1	nu4	1051.87993	-5.3	2.66E-01	2.63E-01	-1.2	0.988	5	0.9
(Q)R (7,E , 2)	8	E	5	2 0	nu2	1052.14279	-0.2	6.16E-01	6.23E-01	1.1	1.011	5	1.8
(P)P (6,A+, 6)	5	A+	3	5-1	nu4	1052.82748	-4.5	4.29E-01	4.31E-01	0.6	1.006	4	2.0
(Q)R (7,A+, 3)	8	A+	2	3 0	nu2	1053.01573	-0.3	5.78E-01	5.83E-01	0.9	1.009	5	0.9
(Q)R (7,A-, 3)	8	A-	2	3 0	nu2	1053.02106	-0.4	5.79E-01	5.84E-01	0.9	1.009	5	1.1
(R)P (9,A+, 0)	8	A+	9	1 1	nu4	1053.91963	1.5	1.93E-01	1.94E-01	1.0	1.010	5	2.6
(R)P (9,E , 1)	8	E	17	2 1	nu4	1054.18260	2.1	1.82E-01	1.80E-01	-1.0	0.990	5	2.6
(Q)R (7,E , 4)	8	E	4	4 0	nu2	1054.26207	0.3	5.21E-01	5.25E-01	0.7	1.007	5	1.1
(P)P (7,A-, 3)	6	A-	4	2-1	nu4	1054.67462	-1.6	1.99E-01	2.02E-01	1.7	1.017	5	1.0
(P)P (7,A+, 3)	6	A+	5	2-1	nu4	1054.73620	-3.7	2.03E-01	2.02E-01	-0.3	0.997	5	0.7
(R)P (9,E , 2)	8	E	16	3 1	nu4	1054.85363	3.2	1.50E-01	1.48E-01	-1.0	0.990	5	0.6
(R)P (9,A+, 3)	8	A+	8	4 1	nu4	1055.64483	2.3	1.12E-01	1.12E-01	-0.2	0.998	5	1.2
(R)P (9,A-, 3)	8	A-	8	4 1	nu4	1055.77303	3.5	1.14E-01	1.13E-01	-0.2	0.998	5	1.2
(Q)R (7,E , 5)	8	E	3	5 0	nu2	1055.89293	1.2	4.40E-01	4.43E-01	0.8	1.008	5	1.2
(P)P (6,E , 5)	5	E	5	4-1	nu4	1056.46499	-5.1	3.95E-01	3.92E-01	-0.7	0.993	5	0.9
(R)P (9,E , 4)	8	E	15	5 1	nu4	1056.57609	3.1	8.10E-02	7.93E-02	-2.1	0.979	3	0.5
(P)P (7,E , 2)	6	E	8	1-1	nu4	1057.12764	-1.5	1.31E-01	1.30E-01	-1.1	0.989	5	2.4
(R)P (9,E , 5)	8	E	14	6 1	nu4	1057.34756	2.6	5.02E-02	5.06E-02	0.9	1.009	4	2.2
(Q)R (8,A+, 0)	9	A+	4	0 0	nu2	1057.63240	-0.3	5.31E-01	5.37E-01	1.1	1.011	5	1.1
(Q)R (8,E , 1)	9	E	6	1 0	nu2	1057.79911	0.7	5.23E-01	5.33E-01	1.9	1.019	5	1.0
(Q)R (7,A+, 6)	8	A+	1	6 0	nu2	1057.93765	0.0	3.33E-01	3.34E-01	0.5	1.005	5	0.7
(R)P (9,A+, 6)	8	A+	7	7 1	nu4	1057.95017	-2.2	2.69E-02	2.72E-02	1.1	1.011	5	3.5
(Q)R (8,E , 2)	9	E	5	2 0	nu2	1058.30108	0.2	5.13E-01	5.19E-01	1.1	1.011	5	1.0
(P)P (7,E , 1)	6	E	10	0 1	nu4	1058.95263	3.4	4.76E-02	4.74E-02	-0.3	0.997	3	1.7
(Q)R (8,A+, 3)	9	A+	3	3 0	nu2	1059.14042	1.7	4.95E-01	4.95E-01	0.0	1.000	5	1.9
(Q)R (8,A-, 3)	9	A-	3	3 0	nu2	1059.14988	-0.6	4.93E-01	4.96E-01	0.6	1.006	5	0.9
(P)P (6,E , 4)	5	E	6	3-1	nu4	1059.75852	-4.8	3.40E-01	3.38E-01	-0.5	0.995	5	0.9
(R)P (8,A+, 0)	7	A+	8	1 1	nu4	1060.13222	2.9	2.46E-01	2.46E-01	-0.2	0.998	5	0.5
(Q)R (8,E , 4)	9	E	4	4 0	nu2	1060.34271	-0.1	4.62E-01	4.61E-01	-0.3	0.997	5	0.5
(Q)R (7,E , 7)	8	E	2	7 0	nu2	1060.43327	2.0	1.90E-01	1.90E-01	-0.1	0.999	5	0.8
(R)P (8,E , 1)	7	E	15	2 1	nu4	1060.49450	2.9	2.21E-01	2.20E-01	-0.6	0.994	5	2.2
(R)P (8,E , 2)	7	E	14	3 1	nu4	1061.36537	3.9	1.68E-01	1.68E-01	-0.2	0.998	5	1.8
(Q)R (8,E , 5)	9	E	3	5 0	nu2	1061.91106	-0.7	4.11E-01	4.13E-01	0.4	1.004	5	0.9
(R)P (8,A+, 3)	7	A+	7	4 1	nu4	1062.36785	2.7	1.14E-01	1.16E-01	1.9	1.019	5	2.4
(R)P (8,A-, 3)	7	A-	7	4 1	nu4	1062.44751	5.3	1.23E-01	1.18E-01	-3.9	0.961	5	2.1
(P)P (6,A-, 3)	5	A-	3	2-1	nu4	1062.70643	-2.8	2.70E-01	2.69E-01	-0.3	0.997	5	1.5
(P)P (6,A+, 3)	5	A+	4	2-1	nu4	1062.73937	-3.1	2.75E-01	2.70E-01	-2.1	0.979	5	1.6
(R)P (8,E , 4)	7	E	13	5 1	nu4	1063.41796	2.5	7.41E-02	7.36E-02	-0.6	0.994	3	1.0
(Q)R (9,A+, 0)	10	A+	4	0 0	nu2	1063.61109	0.3	4.15E-01	4.16E-01	0.4	1.004	5	0.8
(Q)R (9,E , 1)	10	E	7	1 0	nu2	1063.77158	0.1	4.13E-01	4.14E-01	0.3	1.003	5	1.0
(Q)R (8,A+, 6)	9	A+	2	6 0	nu2	1063.87450	0.8	3.46E-01	3.48E-01	0.5	1.005	5	1.0
(Q)R (9,E , 2)	10	E	6	2 0	nu2	1064.25498	-0.7	4.09E-01	4.06E-01	-0.7	0.993	5	1.1
(R)P (8,E , 5)	7	E	12	6 1	nu4	1064.29136	1.2	3.95E-02	3.91E-02	-1.2	0.988	4	2.1
**(U)P (7,A+, 0)	6	A+	6	4 1	nu4	1064.69847	-2.4	4.11E-03	4.04E-03	-1.7	0.983	2	0.6
(R)P (8,A+, 6)	7	A+	6	7 1	nu4	1064.96560	-1.3	1.42E-02	1.40E-02	-1.6	0.984	3	1.9
(Q)R (9,A+, 3)	10	A+	3	3 0	nu2	1065.05928	0.0	3.94E-01	3.92E-01	-0.4	0.996	5	0.4
(Q)R (9,A-, 3)	10	A-	3	3 0	nu2	1065.07558	-0.1	3.94E-01	3.94E-01	-0.2	0.998	5	0.4
(Q)R (9,E , 4)	10	E	5	4 0	nu2	1066.21908	0.2	3.71E-01	3.73E-01	0.7	1.007	5	1.4
(Q)R (8,E , 7)	9	E	2	7 0	nu2	1066.26538	0.6	2.62E-01	2.62E-01	0.2	1.002	5	0.9
(R)P (7,A+, 0)	6	A+	7	1 1	nu4	1066.61320	2.4	2.94E-01	2.89E-01	-1.7	0.983	5	0.4
(R)P (7,E , 1)	6	E	13	2 1	nu4	1067.11615	2.6	2.46E-01	2.43E-01	-1.1	0.989	5	1.3
(P)P (6,E , 1)	5	E	8	0 1	nu4	1067.41588	1.3	8.10E-02	7.94E-02	-2.0	0.980	3	0.5
(P)P (5,E , 4)	4	E	5	3-1	nu4	1067.70640	-5.3	4.07E-01	4.03E-01	-1.1	0.989	5	1.3
(Q)R (9,E , 5)	10	E	4	5 0	nu2	1067.72538	0.5	3.45E-01	3.46E-01	0.2	1.002	5	0.6
(R)P (7,E , 2)	6	E	12	3 1	nu4	1068.22142	2.7	1.71E-01	1.67E-01	-1.9	0.981	5	0.8
(Q)R (8,E , 8)	9	E	1	8 0	nu2	1069.12758	1.0	1.49E-01	1.49E-01	-0.1	0.999	5	0.7
(Q)R (10,A+, 0)	11	A+	4	0 0	nu2	1069.40445	-0.1	3.08E-01	3.05E-01	-1.1	0.989	5	1.1
(R)P (7,A+, 3)	6	A+	6	4 1	nu4	1069.42528	2.3	1.05E-01	1.03E-01	-1.8	0.982	5	2.0
(R)P (7,A-, 3)	6	A-	6	4 1	nu4	1069.46856	3.8	1.06E-01	1.04E-01	-1.2	0.988	5	1.6
(Q)R (10,E , 1)	11	E	8	1 0	nu2	1069.55892	-0.1	3.05E-01	3.04E-01	-0.6	0.994	5	1.7
(Q)R (9,A+, 6)	10	A+	2	6 0	nu2	1069.60767	1.0	3.09E-01	3.10E-01	0.1	1.001	5	1.3
(Q)R (10,E , 2)	11	E	7	2 0	nu2	1070.02412	0.6	3.05E-01	3.00E-01	-1.9	0.981	5	1.5
(R)P (7,E , 4)	6	E	11	5 1	nu4	1070.58252	-0.5	5.51E-02	5.43E-02	-1.4	0.986	2	2.5
(P)P (5,A-, 3)	4	A-	2	2-1	nu4	1070.77049	-4.6	3.38E-01	3.29E-01	-2.7	0.973	5	1.2
(P)P (5,A+, 3)	4	A+	3	2-1	nu4	1070.78520	-4.8	3.31E-01	3.29E-01	-0.5	0.995	5	1.6
(Q)R (10,A+, 3)	11	A+	3	3 0	nu2	1070.79223	0.7	2.92E-01	2.92E-01	-0.1	0.999	5	1.9
(Q)R (10,A-, 3)	11	A-	3	3 0	nu2	1070.81796	-0.8	2.96E-01	2.93E-01	-1.0	0.990	5	0.6
(R)P (7,E , 5)	6	E	9	6 1	nu4	1071.53851	-1.7	1.87E-02	1.90E-02	1.6	1.016	3	1.8
(Q)R (9,E , 7)	10	E	3	7 0	nu2	1071.89482	0.1	2.65E-01	2.61E-01	-1.4	0.986	5	1.4
(Q)R (10,E , 4)	11	E	6	4 0	nu2	1071.91128	-0.8	2.84E-01	2.82E-01	-0.6	0.994	5	0.9
(Q)R (10,E , 5)	11	E	5	5 0	nu2	1073.35660	0.8	2.70E-01	2.68E-01	-0.9	0.991	5	1.3
(R)P (6,A+, 0)	5	A+	6	1 1	nu4	1073.38560	2.2	3.21E-01	3.15E-01	-1.9	0.981	5	1.6
(P)P (5,E , 2)	4	E	6	1-1	nu4	1073.52577	-3.8	2.45E-01	2.39E-01	-2.6	0.974	5	0.7
**(S)P (6,E , 1)	5	E	10	3 1	nu4	1073.86192	5.5	3.73E-03	3.92E-03	5.1	1.051	2	6.8
(Q)R (9,E , 8)	10	E	2	8 0	nu2	1074.62599	1.2	1.97E-01	1.97E-01	-0.1	0.999	5	1.1
(Q)R (11,A+, 0)	12	A+	5	0 0	nu2	1075.02986	0.3	2.13E-01	2.12E-01	-0.7	0.993	5	1.1
(Q)R (10,A-, 6)	11	A-	2	6 0	nu2	1075.15949	0.5	2.49E-01	2.48E-01	-0.3	0.997	5	1.1
(Q)R (11,E , 1)	12	E	8	1 0	nu2	1075.17839	0.3	2.15E-01	2.11E-01	-1.7	0.983	5	1.0
(R)P (6,E , 2)	5	E	10	3 1	nu4	1075.44246	3.1	1.45E-01	1.42E-01	-2.2	0.978	5	1.6
(Q)R (11,E , 2)	12	E	7	2 0	nu2	1075.62551	0.0	2.13E-01	2.09E-01	-1.8	0.982	5	0.7
(P)P (4,E , 4)	3	E	3	3-1	nu4	1075.77143	-6.1	4.53E-01	4.46E-01	-1.7	0.983	5	0.8
(P)P (5,E , 1)	4	E	7	0 1	nu4	1075.85461	-0.7	1.21E-01	1.20E-01	-0.6	0.994	5	1.6
(Q)R (11,A+, 3)	12	A+	4	3 0	nu2	1076.35631	0.3	2.08E-01	2.05E-01	-1.5	0.985	5	0.6
(Q)R (11,A-, 3)	12	A-	4	3 0	nu2	1076.39540	-0.3	2.08E-01	2.06E-01	-0.6	0.994	5	2.6
(R)P (6,A+, 3)	5	A+	5	4 1	nu4	1076.81777	2.2	7.24E-02	7.27E-02	0.4	1.004	3	2.5
(R)P (6,A-, 3)	5	A-	5	4 1	nu4	1076.83725	5.3	7.63E-02	7.36E-02	-3.5	0.965	3	1.0
(Q)R (10,E , 7)	11	E	4	7 0	nu2	1077.34558	-0.2	2.23E-01	2.22E-01	-0.2	0.998	5	1.1
(Q)R (11,E , 4)	12	E	6	4 0	nu2	1077.43764	-1.2	2.02E-01	2.00E-01	-0.9	0.991	5	1.0
(Q)R (9,A+, 9)	10	A+	1	9 0	nu2	1077.85208	0.5	1.13E-01	1.13E-01	-0.2	0.998	5	1.0
(R)P (6,E , 4)	5	E	9	5 1	nu4	1078.06132	-1.3	2.56E-02	2.57E-02	0.3	1.003	3	2.4
(Q)R (11,E , 5)	12	E	5	5 0	nu2	1078.82347	-0.3	1.95E-01	1.93E-01	-0.8	0.992	5	0.9
(P)P (4,A-, 3)	3	A-	2	2-1	nu4	1078.91634	-4.2	3.77E-01	3.69E-01	-2.2	0.978	5	1.8
(P)P (4,A+, 3)	3	A+	3	2-1	nu4	1078.92118	-6.1	3.77E-01	3.69E-01	-2.2	0.978	5	1.8
(Q)R (10,E , 8)	11	E	3	8 0	nu2	1079.94905	0.2	1.91E-01	1.88E-01	-1.5	0.985	5	1.3
(R)P (5,A+, 0)	4	A+	5	1 1	nu4	1080.47170	-0.2	3.18E-01	3.13E-01	-1.6	0.984	5	1.3
(Q)R (12,A+, 0)	13	A+	5	0 0	nu2	1080.50258	-0.6	1.41E-01	1.39E-01	-1.5	0.985	5	1.8
(Q)R (11,A-, 6)	12	A-	3	6 0	nu2	1080.54954	-0.4	1.84E-01	1.83E-01	-0.4	0.996	5	1.0
(Q)R (12,E , 1)	13	E	9	1 0	nu2	1080.64542	0.3	1.41E-01	1.39E-01	-1.4	0.986	3	0.7
(Q)R (12,E , 2)	13	E	8	2 0	nu2	1081.07500	-0.5	1.40E-01	1.38E-01	-1.6	0.984	5	1.4
(R)P (5,E , 1)	4	E	8	2 1	nu4	1081.42950	1.5	1.14E-01	1.11E-01	-2.6	0.974	5	1.0
**(S)P (5,E , 1)	4	E	9	3 1	nu4	1081.45645	1.6	9.16E-02	8.95E-02	-2.2	0.978	3	0.8
(P)P (4,E , 2)	3	E	4	1-1	nu4	1081.76307	-3.2	2.80E-01	2.75E-01	-1.8	0.982	5	2.4
(Q)R (12,A+, 3)	13	A+	4	3 0	nu2	1081.76702	-0.2	1.40E-01	1.36E-01	-3.1	0.969	5	2.4
(Q)R (12,A-, 3)	13	A-	4	3 0	nu2	1081.82396	0.3	1.40E-01	1.38E-01	-1.7	0.983	5	2.6
(Q)R (11,E , 7)	12	E	4	7 0	nu2	1082.63835	0.5	1.72E-01	1.70E-01	-0.8	0.992	3	0.6
(Q)R (12,E , 4)	13	E	7	4 0	nu2	1082.81431	-0.2	1.36E-01	1.34E-01	-1.3	0.987	5	1.1
(R)P (5,E , 2)	4	E	9	3 1	nu4	1083.04335	1.8	5.49E-02	5.37E-02	-2.2	0.978	3	1.3
(Q)R (12,E , 5)	13	E	6	5 0	nu2	1084.14269	-0.3	1.32E-01	1.31E-01	-0.8	0.992	5	3.2
(P)P (4,E , 1)	3	E	5	0 1	nu4	1084.27127	-1.9	1.60E-01	1.58E-01	-1.2	0.988	5	1.4
(R)P (5,A+, 3)	4	A+	4	4 1	nu4	1084.53000	0.4	3.35E-02	3.31E-02	-1.1	0.989	3	1.0
(R)P (5,A-, 3)	4	A-	4	4 1	nu4	1084.53612	2.0	3.46E-02	3.34E-02	-3.3	0.967	3	2.0
(Q)R (11,E , 8)	12	E	3	8 0	nu2	1085.11942	0.7	1.51E-01	1.53E-01	0.9	1.009	5	2.2
(Q)R (12,A-, 6)	13	A-	3	6 0	nu2	1085.79478	-1.8	1.28E-01	1.26E-01	-1.3	0.987	5	2.0
(Q)R (13,A+, 0)	14	A+	5	0 0	nu2	1085.83669	0.7	8.85E-02	8.71E-02	-1.6	0.984	3	1.4
(Q)R (13,E , 1)	14	E	10	1 0	nu2	1085.97358	-2.1	8.94E-02	8.70E-02	-2.7	0.973	5	1.0
(Q)R (13,E , 2)	14	E	9	2 0	nu2	1086.38656	-0.1	8.64E-02	8.67E-02	0.3	1.003	3	1.2
(Q)R (10,E ,10)	11	E	2	10 0	nu2	1086.60305	-1.0	8.34E-02	8.17E-02	-2.1	0.979	4	1.8
(Q)R (13,A+, 3)	14	A+	4	3 0	nu2	1087.03776	-1.5	8.65E-02	8.52E-02	-1.5	0.985	3	1.4
(Q)R (13,A-, 3)	14	A-	4	3 0	nu2	1087.11782	-1.6	8.80E-02	8.69E-02	-1.3	0.987	3	0.1
(Q)R (12,E , 7)	13	E	5	7 0	nu2	1087.79032	-1.8	1.21E-01	1.20E-01	-0.6	0.994	5	2.0
(R)P (4,A+, 0)	3	A+	4	1 1	nu4	1087.89262	-0.8	2.84E-01	2.78E-01	-1.9	0.981	5	1.0
(Q)R (11,A+, 9)	12	A+	2	9 0	nu2	1088.03194	0.5	1.29E-01	1.30E-01	0.2	1.002	5	1.0
(Q)R (13,E , 4)	14	E	8	4 0	nu2	1088.05502	-1.1	8.46E-02	8.51E-02	0.6	1.006	3	1.6
(R)P (4,E , 1)	3	E	6	2 1	nu4	1089.20076	0.1	1.34E-01	1.30E-01	-3.1	0.969	5	2.5
(Q)R (13,E , 5)	14	E	7	5 0	nu2	1089.32844	-0.2	8.43E-02	8.38E-02	-0.6	0.994	3	1.8
(P)P (3,E , 2)	2	E	3	1-1	nu4	1090.09736	-4.9	2.87E-01	2.83E-01	-1.1	0.989	5	1.2
(Q)R (12,E , 8)	13	E	4	8 0	nu2	1090.15526	0.3	1.12E-01	1.12E-01	-0.4	0.996	3	0.8
(Q)R (13,A-, 6)	14	A-	3	6 0	nu2	1090.90981	-3.0	8.25E-02	8.19E-02	-0.8	0.992	5	2.3
(R)P (4,E , 2)	3	E	7	3 1	nu4	1090.95815	0.4	4.28E-02	4.25E-02	-0.5	0.995	3	1.3
(Q)R (14,A+, 0)	15	A+	6	0 0	nu2	1091.04393	0.0	5.29E-02	5.18E-02	-2.1	0.979	3	1.4
(Q)R (14,E , 1)	15	E	11	1 0	nu2	1091.17579	0.5	5.28E-02	5.18E-02	-2.1	0.979	3	1.2
(Q)R (11,E ,10)	12	E	2	10 0	nu2	1091.42824	0.5	9.78E-02	9.86E-02	0.8	1.008	3	0.3
(Q)R (14,E , 2)	15	E	10	2 0	nu2	1091.57238	0.5	5.34E-02	5.16E-02	-3.3	0.967	3	2.8
(Q)R (14,A-, 3)	15	A-	5	3 0	nu2	1092.29044	1.6	5.32E-02	5.22E-02	-1.9	0.981	3	1.5
(P)P (3,E , 1)	2	E	4	0 1	nu4	1092.70723	-4.1	1.72E-01	1.71E-01	-0.7	0.993	5	1.8
(Q)R (13,E , 7)	14	E	6	7 0	nu2	1092.81686	-1.1	7.85E-02	7.92E-02	0.8	1.008	3	1.2
(Q)R (12,A+, 9)	13	A+	2	9 0	nu2	1092.92284	0.2	1.00E-01	1.01E-01	0.6	1.006	5	1.1
(Q)R (14,E , 4)	15	E	9	4 0	nu2	1093.17233	-0.4	5.20E-02	5.11E-02	-1.8	0.982	2	0.7
(Q)R (14,E , 5)	15	E	8	5 0	nu2	1094.39289	-1.7	5.28E-02	5.07E-02	-4.0	0.960	2	0.2
(Q)R (13,E , 8)	14	E	5	8 0	nu2	1095.07173	-0.3	7.39E-02	7.56E-02	2.2	1.022	3	2.0
(Q)R (11,E ,11)	12	E	1	11 0	nu2	1095.37702	-0.2	5.66E-02	5.69E-02	0.6	1.006	3	1.9
(R)P (3,A+, 0)	2	A+	3	1 1	nu4	1095.66913	-1.9	2.09E-01	2.07E-01	-0.9	0.991	5	2.6
(Q)R (14,A-, 6)	15	A-	4	6 0	nu2	1095.90709	-3.7	5.03E-02	5.00E-02	-0.6	0.994	3	1.1
(Q)R (15,E , 1)	16	E	13	1 0	nu2	1096.26212	1.1	2.94E-02	2.93E-02	-0.6	0.994	3	0.5
(Q)R (15,E , 2)	16	E	12	2 0	nu2	1096.64328	1.4	3.00E-02	2.93E-02	-2.4	0.976	3	2.2
(Q)R (15,A+, 3)	16	A+	5	3 0	nu2	1097.20531	-1.3	2.93E-02	2.87E-02	-2.1	0.979	3	2.1
(R)P (3,E , 1)	2	E	5	2 1	nu4	1097.33618	1.4	5.61E-02	5.51E-02	-1.8	0.982	3	0.5
(Q)R (15,A-, 3)	16	A-	5	3 0	nu2	1097.35201	-0.2	3.01E-02	2.98E-02	-0.8	0.992	4	2.5
(Q)R (13,A+, 9)	14	A+	2	9 0	nu2	1097.70332	-0.4	7.03E-02	7.06E-02	0.4	1.004	5	1.4
(Q)R (14,E , 7)	15	E	6	7 0	nu2	1097.72993	-2.0	4.81E-02	4.90E-02	1.9	1.019	4	1.1
(Q)R (15,E , 4)	16	E	11	4 0	nu2	1098.17664	0.6	2.97E-02	2.91E-02	-1.9	0.981	3	2.8
(Q)R (15,E , 5)	16	E	9	5 0	nu2	1099.34713	0.4	2.91E-02	2.91E-02	0.0	1.000	3	0.7
(P)Q (11,E ,10)	11	E	10	9-1	nu4	1099.58919	10.5	5.42E-03	5.59E-03	3.1	1.031	3	2.0
(Q)R (12,E ,11)	13	E	2	11 0	nu2	1099.86055	1.1	6.54E-02	6.57E-02	0.4	1.004	3	2.3
(Q)R (14,E , 8)	15	E	5	8 0	nu2	1099.88106	-2.7	4.72E-02	4.76E-02	0.9	1.009	4	2.1
(P)Q (9,A-, 9)	9	A+	5	8-1	nu4	1100.10818	7.5	6.09E-03	6.10E-03	0.2	1.002	3	0.9
(Q)R (13,E ,10)	14	E	4	10 0	nu2	1100.74990	1.6	6.37E-02	6.38E-02	0.2	1.002	3	1.9
(Q)R (15,A-, 6)	16	A-	4	6 0	nu2	1100.79715	-4.7	2.93E-02	2.89E-02	-1.3	0.987	2	4.6
(P)Q (14,E ,11)	14	E	13	10-1	nu4	1101.07972	4.4	3.12E-03	3.39E-03	8.4	1.084	2	8.6
(Q)R (16,A+, 0)	17	A+	7	0 0	nu2	1101.12016	-1.6	1.58E-02	1.57E-02	-0.3	0.997	3	0.7
(P)P (2,E , 1)	1	E	3	0 1	nu4	1101.23761	-4.6	1.50E-01	1.48E-01	-1.3	0.987	3	0.3
(Q)R (16,E , 2)	17	E	12	2 0	nu2	1101.60874	1.2	1.58E-02	1.58E-02	0.0	1.000	3	1.7
(P)Q (10,A-, 9)	10	A+	5	8-1	nu4	1101.89851	8.7	1.10E-02	1.11E-02	0.9	1.009	3	3.1

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(Q)R (16,A+, 3)	17	A+	6	3 0	nu2	1102.12099	-0.2	1.57E-02	1.54E-02	-2.2	0.978	3	0.7
(Q)R (14,A+, 9)	15	A+	3	9 0	nu2	1102.38570	-0.6	4.46E-02	4.56E-02	2.1	1.021	5	2.5
(Q)R (15,E , 7)	16	E	8	7 0	nu2	1102.54041	0.0	2.84E-02	2.86E-02	0.6	1.006	3	0.2
(P)Q (8,E , 8)	8	E	7	7-1	nu4	1102.57445	6.2	1.22E-02	1.18E-02	-3.7	0.963	3	2.7
(Q)R (16,E , 4)	17	E	11	4 0	nu2	1103.07698	1.8	1.61E-02	1.58E-02	-2.2	0.978	3	1.7
(P)Q (13,E ,10)	13	E	13	9-1	nu4	1103.15374	6.4	6.44E-03	6.93E-03	7.7	1.077	2	1.3
(P)Q (11,A-, 9)	11	A+	6	8-1	nu4	1103.60257	6.2	1.35E-02	1.36E-02	0.7	1.007	2	1.2
(R)P (2,A+, 0)	1	A+	2	1 1	nu4	1103.81313	-2.2	1.11E-01	1.10E-01	-0.4	0.996	3	0.8
(Q)R (12,A+,12)	13	A+	1	12 0	nu2	1104.16963	-1.0	3.78E-02	3.82E-02	0.8	1.008	3	0.4
(P)Q (9,E , 8)	9	E	8	7-1	nu4	1104.19097	4.3	2.04E-02	2.06E-02	0.9	1.009	3	1.6
(Q)R (16,E , 5)	17	E	10	5 0	nu2	1104.19975	1.2	1.59E-02	1.58E-02	-0.4	0.996	3	1.0
(Q)R (13,E ,11)	14	E	3	11 0	nu2	1104.26121	-0.2	5.38E-02	5.46E-02	1.6	1.016	3	1.0
(Q)R (15,E , 8)	16	E	7	8 0	nu2	1104.59398	-1.1	2.78E-02	2.81E-02	1.2	1.012	3	2.0
(P)Q (14,E ,10)	14	E	14	9-1	nu4	1104.75584	0.6	5.75E-03	5.82E-03	1.3	1.013	2	6.5
(P)Q (12,A-, 9)	12	A+	7	8-1	nu4	1105.20974	2.2	1.31E-02	1.35E-02	2.6	1.026	3	1.3
(Q)R (14,E ,10)	15	E	4	10 0	nu2	1105.27559	-0.9	4.19E-02	4.27E-02	2.1	1.021	2	1.5
(P)Q (10,E , 8)	10	E	10	7-1	nu4	1105.75478	14.2	2.46E-02	2.49E-02	1.4	1.014	3	1.3
(P)Q (8,E , 7)	8	E	8	6-1	nu4	1106.46224	-0.9	3.52E-02	3.56E-02	1.1	1.011	4	2.0
(P)Q (13,A-, 9)	13	A+	7	8-1	nu4	1106.71631	1.4	1.11E-02	1.15E-02	2.8	1.028	3	2.3
(Q)R (15,A-, 9)	16	A-	3	9 0	nu2	1106.97946	-2.1	2.77E-02	2.74E-02	-1.0	0.990	3	1.0
(Q)R (16,E , 7)	17	E	9	7 0	nu2	1107.25657	0.6	1.67E-02	1.58E-02	-5.7	0.943	2	1.0
(Q)R (13,A+,12)	14	A+	1	12 0	nu2	1108.30637	0.3	4.15E-02	4.20E-02	1.3	1.013	4	0.7
(Q)R (14,E ,11)	15	E	3	11 0	nu2	1108.59364	1.1	3.87E-02	3.88E-02	0.5	1.005	4	1.7
(P)Q (12,E , 8)	12	E	12	7-1	nu4	1108.64937	-0.6	2.05E-02	2.15E-02	5.0	1.050	3	0.4
(P)Q (7,A-, 6)	7	A+	4	5-1	nu4	1108.70830	-3.3	5.80E-02	5.77E-02	-0.7	0.993	4	0.6
(Q)R (17,E , 5)	18	E	11	5 0	nu2	1108.95885	3.9	8.43E-03	8.17E-03	-3.1	0.969	2	2.4
(Q)R (16,E , 8)	17	E	7	8 0	nu2	1109.21761	0.8	1.56E-02	1.57E-02	0.4	1.004	2	0.2
(P)Q (10,E , 7)	10	E	11	6-1	nu4	1109.24909	0.4	4.13E-02	4.35E-02	5.2	1.052	4	0.8
(Q)R (15,E ,10)	16	E	5	10 0	nu2	1109.72461	-0.9	2.65E-02	2.64E-02	-0.5	0.995	4	2.3
(P)Q (5,E , 5)	5	E	5	4-1	nu4	1109.83238	-4.8	5.23E-02	5.13E-02	-2.0	0.980	4	2.1
(P)P (1,E , 1)	0	E	1	0 1	nu4	1109.93514	-4.2	9.98E-02	9.89E-02	-0.9	0.991	4	1.2
(P)Q (8,A-, 6)	8	A+	5	5-1	nu4	1109.97973	-2.4	6.99E-02	7.05E-02	0.8	1.008	5	3.2
(P)Q (11,E , 7)	11	E	12	6-1	nu4	1110.54956	-2.0	3.75E-02	3.86E-02	2.7	1.027	4	1.2
(P)Q (6,E , 5)	6	E	6	4-1	nu4	1110.92489	-3.1	8.98E-02	8.79E-02	-2.0	0.980	4	1.2
(P)Q (9,A-, 6)	9	A+	6	5-1	nu4	1111.22140	-3.0	7.24E-02	7.26E-02	0.2	1.002	4	0.7
(Q)R (16,A-, 9)	17	A-	4	9 0	nu2	1111.49265	-1.4	1.54E-02	1.55E-02	0.7	1.007	3	1.5
(P)Q (12,E , 7)	12	E	14	6-1	nu4	1111.77368	-2.2	2.97E-02	3.08E-02	3.5	1.035	3	1.5
(Q)R (17,E , 7)	18	E	9	7 0	nu2	1111.88602	2.7	7.93E-03	8.25E-03	4.0	1.040	2	4.6
(P)Q (7,E , 5)	7	E	8	4-1	nu4	1112.04522	-4.8	1.07E-01	1.09E-01	1.8	1.018	5	1.4
(P)Q (4,E , 4)	4	E	5	3-1	nu4	1112.19263	-4.5	7.29E-02	7.30E-02	0.2	1.002	3	0.8
(Q)R (14,A+,12)	15	A+	2	12 0	nu2	1112.39566	2.3	3.26E-02	3.34E-02	2.4	1.024	4	2.2
(P)Q (10,A-, 6)	10	A+	6	5-1	nu4	1112.41080	-3.6	6.54E-02	6.60E-02	0.9	1.009	5	1.9
(Q)R (15,E ,11)	16	E	4	11 0	nu2	1112.86441	-2.2	2.42E-02	2.49E-02	2.7	1.027	3	1.2
(P)Q (13,E , 7)	13	E	16	6-1	nu4	1112.91839	-1.3	2.17E-02	2.25E-02	3.5	1.035	3	2.4
(Q)R (13,E ,13)	14	E	2	13 0	nu2	1112.97707	0.0	2.40E-02	2.46E-02	2.5	1.025	3	1.3
(P)Q (5,E , 4)	5	E	6	3-1	nu4	1113.10740	-4.4	1.29E-01	1.26E-01	-1.9	0.981	5	1.5
(P)Q (8,E , 5)	8	E	9	4-1	nu4	1113.15533	-3.5	1.14E-01	1.15E-01	0.8	1.008	4	0.4
(P)Q (11,A-, 6)	11	A+	7	5-1	nu4	1113.53431	-4.5	5.20E-02	5.43E-02	4.5	1.045	4	2.2
(Q)R (18,E , 5)	19	E	12	5 0	nu2	1113.62989	-2.7	4.21E-03	4.01E-03	-4.9	0.951	2	4.4
(Q)R (17,E , 8)	18	E	8	8 0	nu2	1113.76094	2.5	7.89E-03	8.26E-03	4.7	1.047	3	3.1
(P)Q (6,E , 4)	6	E	7	3-1	nu4	1114.07298	-3.6	1.58E-01	1.60E-01	1.4	1.014	5	1.9
(Q)R (16,E ,10)	17	E	6	10 0	nu2	1114.10333	-1.4	1.54E-02	1.52E-02	-1.4	0.986	4	3.2
(P)Q (9,E , 5)	9	E	10	4-1	nu4	1114.22655	-3.1	1.03E-01	1.08E-01	4.3	1.043	4	3.1
(P)Q (3,A+, 3)	3	A-	2	2-1	nu4	1114.51460	-3.3	9.60E-02	9.75E-02	1.5	1.015	5	3.0
(P)Q (12,A-, 6)	12	A+	8	5-1	nu4	1114.58623	-3.5	3.90E-02	4.10E-02	5.0	1.050	4	0.9
(P)Q (15,E , 7)	15	E	19	6-1	nu4	1114.97891	-0.2	9.83E-03	9.54E-03	-2.9	0.971	2	2.3
(P)Q (7,E , 4)	7	E	9	3-1	nu4	1115.04458	-3.6	1.75E-01	1.74E-01	-0.2	0.998	5	1.7
(P)Q (10,E , 5)	10	E	12	4-1	nu4	1115.24102	-4.1	9.09E-02	9.17E-02	0.9	1.009	5	2.8
(P)Q (4,A-, 3)	4	A+	3	2-1	nu4	1115.25938	-4.0	1.74E-01	1.70E-01	-2.2	0.978	5	0.8
(P)Q (13,A-, 6)	13	A+	9	5-1	nu4	1115.56607	-4.8	2.72E-02	2.86E-02	5.1	1.051	3	0.6
(Q)R (17,A+, 9)	18	A+	5	9 0	nu2	1115.93144	0.5	8.15E-03	8.25E-03	1.2	1.012	2	3.2
(P)Q (8,E , 4)	8	E	10	3-1	nu4	1115.98840	-3.2	1.70E-01	1.69E-01	-0.8	0.992	5	1.7
(P)Q (5,A+, 3)	5	A-	3	2-1	nu4	1116.04101	-3.4	2.22E-01	2.22E-01	0.1	1.001	5	0.7
(P)Q (5,A-, 3)	5	A+	4	2-1	nu4	1116.07374	-3.4	2.29E-01	2.22E-01	-2.9	0.971	5	1.7
(P)Q (11,E , 5)	11	E	14	4-1	nu4	1116.19064	-3.6	7.02E-02	7.16E-02	2.0	1.020	3	1.1
(Q)R (15,A+,12)	16	A+	2	12 0	nu2	1116.44731	2.0	2.21E-02	2.27E-02	2.9	1.029	3	1.2
(Q)R (14,E ,13)	15	E	2	13 0	nu2	1116.75997	2.2	2.54E-02	2.59E-02	1.8	1.018	4	2.7
(P)Q (2,E , 2)	2	E	3	1-1	nu4	1116.80188	-4.4	1.22E-01	1.21E-01	-1.2	0.988	5	1.3
(P)Q (6,A+, 3)	6	A-	4	2-1	nu4	1116.85118	-1.9	2.49E-01	2.50E-01	0.2	1.002	5	1.0
(P)Q (9,E , 4)	9	E	12	3-1	nu4	1116.88272	-3.3	1.44E-01	1.48E-01	3.0	1.030	5	1.7
(P)Q (6,A-, 3)	6	A+	5	2-1	nu4	1116.91223	-3.2	2.49E-01	2.50E-01	0.7	1.007	5	1.2
(P)Q (12,E , 5)	12	E	16	4-1	nu4	1117.07406	-3.1	5.15E-02	5.17E-02	0.3	1.003	3	2.9
(Q)R (16,E ,11)	17	E	5	11 0	nu2	1117.08020	-1.2	1.53E-02	1.47E-02	-4.4	0.956	4	3.4
(P)Q (3,E , 2)	3	E	4	1-1	nu4	1117.35434	-3.4	2.18E-01	2.13E-01	-2.3	0.977	5	1.1
(P)Q (7,A+, 3)	7	A-	4	2-1	nu4	1117.63506	-1.4	2.45E-01	2.51E-01	2.3	1.023	5	1.4
(P)Q (10,E , 4)	10	E	14	3-1	nu4	1117.71762	-2.5	1.18E-01	1.20E-01	1.4	1.014	5	1.4
(P)Q (7,A-, 3)	7	A+	5	2-1	nu4	1117.73529	-3.2	2.54E-01	2.52E-01	-0.7	0.993	5	0.9
(P)Q (13,E , 5)	13	E	18	4-1	nu4	1117.89491	-3.1	3.29E-02	3.48E-02	5.8	1.058	4	1.5
(P)Q (4,E , 2)	4	E	6	1-1	nu4	1117.99153	-2.1	2.93E-01	2.90E-01	-1.3	0.987	5	0.9
(P)Q (8,A+, 3)	8	A-	5	2-1	nu4	1118.36894	-2.3	2.24E-01	2.28E-01	2.1	1.021	5	0.6
(Q)R (17,E ,10)	18	E	7	10 0	nu2	1118.41712	0.1	8.39E-03	8.19E-03	-2.4	0.976	2	5.7
(P)Q (11,E , 4)	11	E	15	3-1	nu4	1118.49160	-3.4	8.69E-02	8.96E-02	3.1	1.031	5	2.5
(P)Q (5,E , 2)	5	E	7	1-1	nu4	1118.65272	-1.9	3.40E-01	3.41E-01	0.3	1.003	5	0.6
(P)Q (14,E , 5)	14	E	20	4-1	nu4	1118.66028	3.4	2.16E-02	2.20E-02	1.9	1.019	4	2.5
(P)Q (17,A+, 6)	17	A-	12	5-1	nu4	1118.87791	9.8	3.35E-03	3.53E-03	5.3	1.053	3	3.1
(P)Q (12,E , 4)	12	E	17	3-1	nu4	1119.20950	-1.1	5.93E-02	6.24E-02	5.4	1.054	4	1.4
(P)Q (9,A-, 3)	9	A+	7	2-1	nu4	1119.24881	-2.7	1.92E-01	1.93E-01	0.6	1.006	5	1.2
(P)Q (6,E , 2)	6	E	8	1-1	nu4	1119.29221	-0.6	3.61E-01	3.58E-01	-0.7	0.993	5	1.1
(P)Q (2,E , 1)	2	E	4	0 1	nu4	1119.40874	-2.8	2.44E-01	2.41E-01	-1.0	0.990	5	0.6
(P)Q (10,A+, 3)	10	A-	7	2-1	nu4	1119.66423	-1.0	1.43E-01	1.48E-01	3.3	1.033	5	0.9
(P)Q (7,E , 2)	7	E	10	1-1	nu4	1119.88611	0.3	3.36E-01	3.40E-01	1.2	1.012	5	0.2
(P)Q (10,A-, 3)	10	A+	8	2-1	nu4	1119.92749	-2.6	1.50E-01	1.50E-01	0.1	1.001	5	0.6
(P)Q (11,A+, 3)	11	A-	8	2-1	nu4	1120.23571	0.3	1.01E-01	1.06E-01	5.5	1.055	2	1.0
(P)Q (4,E , 1)	4	E	7	0 1	nu4	1120.31505	-1.1	4.44E-01	4.48E-01	1.0	1.010	2	0.2
(P)Q (8,E , 2)	8	E	12	1-1	nu4	1120.42978	-0.7	2.93E-01	2.94E-01	0.2	1.002	5	1.4
(Q)R (16,A+,12)	17	A+	2	12 0	nu2	1120.45919	-3.4	1.40E-02	1.39E-02	-0.9	0.991	6	3.4
(P)Q (14,E , 4)	14	E	21	3-1	nu4	1120.50634	1.2	2.32E-02	2.51E-02	8.1	1.081	5	1.6
(Q)R (15,E ,13)	16	E	3	13 0	nu2	1120.53360	2.7	1.92E-02	1.97E-02	2.4	1.024	4	1.6

(P)Q (11,A-, 3)	11	A+	9	2-1	nu4	1120.55889	-3.7	1.07E-01	1.08E-01	0.9	1.009	5	1.3
(P)Q (5,E , 1)	5	E	8	0 1	nu4	1120.73397	-0.1	4.99E-01	4.93E-01	-1.3	0.987	5	1.6
(P)Q (9,E , 2)	9	E	14	1-1	nu4	1120.93019	0.3	2.33E-01	2.35E-01	1.1	1.011	5	2.6
(P)Q (12,A-, 3)	12	A+	10	2-1	nu4	1121.15070	-3.2	7.31E-02	7.34E-02	0.3	1.003	3	0.7
(P)Q (10,E , 2)	10	E	16	1-1	nu4	1121.39735	0.6	1.73E-01	1.75E-01	1.5	1.015	5	1.9
(R)Q (3,A+, 0)	3	A-	3	1 1	nu4	1121.41446	-1.3	5.75E-01	5.73E-01	-0.4	0.996	5	1.2
(P)Q (7,E , 1)	7	E	11	0 1	nu4	1121.45243	1.8	4.24E-01	4.27E-01	0.7	1.007	5	0.5
(R)Q (4,A+, 0)	4	A-	3	1 1	nu4	1121.53190	0.2	6.20E-01	6.19E-01	-0.1	0.999	5	1.2
(R)Q (5,A+, 0)	5	A-	4	1 1	nu4	1121.67747	0.5	6.11E-01	6.09E-01	-0.3	0.997	5	1.6
(P)Q (8,E , 1)	8	E	13	0 1	nu4	1121.77883	1.8	3.50E-01	3.51E-01	0.5	1.005	5	1.3
(P)Q (11,E , 2)	11	E	18	1-1	nu4	1121.84621	4.6	1.16E-01	1.20E-01	3.4	1.034	2	0.4
(P)Q (14,A-, 3)	14	A+	12	2-1	nu4	1122.25430	1.6	2.64E-02	2.82E-02	6.7	1.067	6	1.7
(P)Q (10,E , 1)	10	E	17	0 1	nu4	1122.42035	1.4	1.91E-01	1.95E-01	2.3	1.023	5	2.3
(R)Q (9,A+, 0)	9	A-	8	1 1	nu4	1122.51968	2.9	2.82E-01	2.83E-01	0.3	1.003	5	1.5
(P)Q (17,E , 4)	17	E	27	3-1	nu4	1122.56230	-1.8	3.15E-03	3.31E-03	5.1	1.051	2	2.5
(P)Q (13,E , 2)	13	E	21	1-1	nu4	1122.70872	2.3	4.69E-02	5.01E-02	7.0	1.070	6	2.0
(P)Q (11,E , 1)	11	E	19	0 1	nu4	1122.75168	-0.4	1.30E-01	1.33E-01	2.3	1.023	5	1.3
(P)Q (15,A-, 3)	15	A+	13	2-1	nu4	1122.83175	3.1	1.46E-02	1.56E-02	6.7	1.067	3	1.1
(R)Q (11,A+, 0)	11	A-	9	1 1	nu4	1123.03237	0.8	1.35E-01	1.37E-01	1.5	1.015	5	0.7
(R)Q (12,A+, 0)	12	A-	10	1 1	nu4	1123.32432	0.8	8.43E-02	8.86E-02	5.1	1.051	4	0.9
(P)Q (14,E , 1)	14	E	24	0 1	nu4	1123.70349	1.7	2.92E-02	3.12E-02	6.7	1.067	3	2.8
(P)Q (15,E , 1)	15	E	25	0 1	nu4	1124.01484	3.1	1.84E-02	1.76E-02	-4.8	0.952	3	2.2
(R)Q (2,E , 1)	2	E	5	2 1	nu4	1124.03738	-0.4	1.43E-01	1.40E-01	-1.9	0.981	5	1.4
(P)Q (16,E , 1)	16	E	27	0 1	nu4	1124.35076	1.4	9.57E-03	9.49E-03	-0.9	0.991	2	0.6
(Q)R (17,A+,12)	18	A+	3	12 0	nu2	1124.44265	-0.8	7.89E-03	7.83E-03	-0.7	0.993	3	2.5
(R)Q (3,E , 1)	3	E	6	2 1	nu4	1124.78791	-0.2	1.69E-01	1.68E-01	-0.9	0.991	5	0.9
(Q)R (15,E ,14)	16	E	2	14 0	nu2	1125.21357	2.2	1.44E-02	1.53E-02	6.5	1.065	3	2.4
**(S)Q (4,E , 1)	4	E	9	3 1	nu4	1125.91704	2.7	5.88E-02	5.71E-02	-2.9	0.971	3	1.1
(R)Q (3,E , 2)	3	E	7	3 1	nu4	1126.54939	-0.1	1.58E-01	1.54E-01	-2.7	0.973	5	1.2
**(S)Q (5,E , 1)	5	E	10	3 1	nu4	1127.18054	9.4	4.16E-03	3.96E-03	-5.0	0.950	2	2.4
(R)Q (5,E , 1)	5	E	11	2 1	nu4	1127.40555	2.7	9.51E-02	9.39E-02	-1.3	0.987	4	1.9
**(Q)Q (4,E , 2)	4	E	8	2 1	nu4	1127.48189	0.7	8.63E-02	8.55E-02	-1.0	0.990	5	3.0
(R)Q (4,E , 2)	4	E	9	3 1	nu4	1127.50890	1.4	1.19E-01	1.17E-01	-1.8	0.982	5	2.0
(Q)R (17,E ,13)	18	E	5	13 0	nu2	1128.07543	-3.8	7.33E-03	7.45E-03	1.7	1.017	2	2.3
(Q)R (18,A+,12)	19	A+	3	12 0	nu2	1128.39062	-0.2	4.00E-03	4.12E-03	2.9	1.029	2	2.9
(Q)R (16,E ,14)	17	E	3	14 0	nu2	1128.66702	4.6	1.08E-02	1.11E-02	3.0	1.030	2	0.4
(R)Q (5,E , 2)	5	E	10	3 1	nu4	1128.76675	2.7	1.87E-01	1.84E-01	-1.8	0.982	5	1.0
**(S)Q (6,E , 1)	6	E	12	3 1	nu4	1128.80572	8.7	2.96E-03	3.19E-03	8.0	1.080	2	6.5
(R)Q (6,E , 1)	6	E	13	2 1	nu4	1129.27369	3.8	6.04E-02	5.93E-02	-1.8	0.982	3	1.8
(R)Q (5,A-, 3)	5	A+	5	4 1	nu4	1130.15215	2.0	2.02E-01	2.01E-01	-0.4	0.996	5	1.0
(R)Q (5,A+, 3)	5	A-	5	4 1	nu4	1130.17154	1.8	2.04E-01	2.03E-01	-0.3	0.997	5	1.0
(R)Q (6,E , 2)	6	E	12	3 1	nu4	1130.38599	3.6	1.45E-01	1.45E-01	-0.2	0.998	5	1.5
(R)R (0,A+, 0)	1	A+	2	1 1	nu4	1130.52295	-1.8	1.97E-01	1.93E-01	-2.0	0.980	5	2.3
(Q)R (15,A+,15)	16	A+	1	15 0	nu2	1130.61803	-1.6	8.86E-03	9.13E-03	3.1	1.031	3	2.4
(R)Q (5,E , 4)	5	E	9	5 1	nu4	1131.41028	-0.1	1.47E-01	1.44E-01	-2.0	0.980	5	0.5
(R)Q (6,A-, 3)	6	A+	6	4 1	nu4	1131.60134	3.1	1.93E-01	1.90E-01	-1.5	0.985	5	0.5
(R)Q (6,A+, 3)	6	A-	6	4 1	nu4	1131.64518	4.1	1.95E-01	1.93E-01	-1.2	0.988	5	2.0
(R)Q (7,E , 2)	7	E	14	3 1	nu4	1132.34870	6.1	1.03E-01	1.01E-01	-1.2	0.988	5	2.6
**(S)Q (8,E , 1)	8	E	16	3 1	nu4	1133.06578	8.6	3.04E-03	2.87E-03	-5.6	0.944	2	8.1
(Q)R (16,A+,15)	17	A+	1	15 0	nu2	1133.65800	3.6	8.67E-03	8.73E-03	0.7	1.007	3	2.8
(R)Q (6,E , 5)	6	E	9	6 1	nu4	1133.75295	-0.6	1.24E-01	1.26E-01	1.5	1.015	4	3.3
(R)Q (8,E , 1)	8	E	17	2 1	nu4	1133.95114	3.5	1.99E-02	2.06E-02	3.5	1.035	3	0.8
(R)Q (7,E , 4)	7	E	13	5 1	nu4	1134.43331	3.2	1.78E-01	1.76E-01	-1.0	0.990	5	0.4
(R)Q (7,E , 5)	7	E	12	6 1	nu4	1135.33094	1.0	1.65E-01	1.63E-01	-1.4	0.986	5	1.4
(R)Q (8,A-, 3)	8	A+	8	4 1	nu4	1135.43558	1.8	1.10E-01	1.08E-01	-2.1	0.979	4	2.0
(R)Q (8,A+, 3)	8	A-	8	4 1	nu4	1135.56682	5.0	1.11E-01	1.12E-01	0.4	1.004	5	1.0
(R)Q (7,A-, 6)	7	A+	6	7 1	nu4	1136.03503	-2.3	1.11E-01	1.08E-01	-2.6	0.974	5	1.4
(R)Q (8,E , 4)	8	E	15	5 1	nu4	1136.38929	3.3	1.42E-01	1.40E-01	-1.6	0.984	5	0.6
(R)Q (9,E , 1)	9	E	19	2 1	nu4	1136.68013	3.0	1.21E-02	1.17E-02	-3.7	0.963	2	2.1
(Q)R (17,A+,15)	18	A+	2	15 0	nu2	1136.78530	4.3	5.73E-03	6.05E-03	5.7	1.057	3	1.6
(R)Q (8,E , 5)	8	E	14	6 1	nu4	1137.18791	3.5	1.52E-01	1.50E-01	-1.6	0.984	5	0.5
(R)Q (9,E , 2)	9	E	18	3 1	nu4	1137.19930	2.0	4.07E-02	3.99E-02	-2.1	0.979	5	2.1
(P)R (1,E , 1)	2	E	4	0 1	nu4	1137.21493	-2.5	1.92E-02	1.94E-02	1.2	1.012	4	0.8
(R)Q (8,A-, 6)	8	A+	7	7 1	nu4	1137.82365	-3.5	1.34E-01	1.34E-01	0.3	1.003	5	3.3
(R)Q (8,E , 7)	8	E	11	8 1	nu4	1138.25203	-3.5	8.75E-02	8.71E-02	-0.4	0.996	4	1.1
(R)Q (9,E , 4)	9	E	17	5 1	nu4	1138.63725	1.8	1.02E-01	9.95E-02	-2.1	0.979	5	1.2
(R)Q (9,E , 5)	9	E	16	6 1	nu4	1139.32458	1.2	1.17E-01	1.17E-01	0.1	1.001	4	3.3
(Q)R (16,E ,16)	17	E	2	16 0	nu2	1139.44278	0.1	5.08E-03	5.26E-03	3.5	1.035	2	0.6
(R)Q (10,E , 1)	10	E	21	2 1	nu4	1139.62385	0.4	6.01E-03	6.47E-03	7.8	1.078	2	1.8
(R)Q (9,A+, 6)	9	A-	7	7 1	nu4	1139.87262	2.5	1.22E-01	1.19E-01	-2.3	0.977	5	2.8
(R)Q (9,A-, 6)	9	A+	8	7 1	nu4	1139.88005	1.9	1.25E-01	1.20E-01	-3.8	0.962	5	2.9
(Q)R (18,A+,15)	19	A+	2	15 0	nu2	1139.98432	4.5	3.62E-03	3.59E-03	-0.8	0.992	3	2.7
(R)Q (9,E , 7)	9	E	13	8 1	nu4	1140.25322	0.3	1.08E-01	1.05E-01	-2.6	0.974	4	1.9
(R)Q (9,E , 8)	9	E	11	9 1	nu4	1140.40251	-3.1	6.71E-02	6.73E-02	0.4	1.004	3	0.5
(R)Q (10,A-, 3)	10	A+	10	4 1	nu4	1140.42637	-2.9	4.46E-02	4.25E-02	-4.7	0.953	4	2.3
(R)Q (10,A+, 3)	10	A-	10	4 1	nu4	1140.69590	3.1	4.53E-02	4.63E-02	2.3	1.023	4	1.8
**(L)Q (10,A+, 6)	10	A-	8	1 1	nu4	1141.44978	-0.5	5.13E-03	4.81E-03	-6.2	0.938	2	2.1
(R)Q (10,E , 5)	10	E	18	6 1	nu4	1141.73230	0.8	8.24E-02	8.14E-02	-1.1	0.989	3	0.9
(R)Q (10,A-, 6)	10	A+	9	7 1	nu4	1142.19843	2.0	9.22E-02	9.09E-02	-1.5	0.985	4	0.8
(R)Q (10,A+, 6)	10	A-	9	7 1	nu4	1142.23786	1.5	8.42E-02	8.62E-02	2.4	1.024	4	3.2
(R)Q (10,A-, 9)	10	A+	7	10 1	nu4	1142.48386	-3.7	5.12E-02	4.99E-02	-2.6	0.974	5	2.2
(R)Q (10,E , 7)	10	E	15	8 1	nu4	1142.50662	1.1	9.29E-02	9.09E-02	-2.2	0.978	5	2.8
(R)Q (10,E , 8)	10	E	13	9 1	nu4	1142.61684	0.5	7.90E-02	7.84E-02	-0.7	0.993	3	1.4
(R)Q (11,E , 1)	11	E	23	2 1	nu4	1142.75475	0.2	3.79E-03	3.51E-03	-7.5	0.925	2	5.2
(R)Q (11,E , 2)	11	E	22	3 1	nu4	1143.05011	-0.8	1.26E-02	1.30E-02	3.3	1.033	3	2.1
(R)Q (11,A-, 3)	11	A+	11	4 1	nu4	1143.28576	-3.1	2.52E-02	2.43E-02	-3.7	0.963	3	3.2
(R)Q (11,A+, 3)	11	A-	11	4 1	nu4	1143.64304	1.5	2.56E-02	2.75E-02	7.3	1.073	3	0.6
(R)Q (11,E , 4)	11	E	21	5 1	nu4	1143.93274	-0.2	3.99E-02	3.96E-02	-0.6	0.994	4	1.5
(P)R (2,E , 2)	3	E	4	1-1	nu4	1144.05899	-1.6	6.32E-03	6.15E-03	-2.6	0.974	3	1.8
(R)Q (11,E , 5)	11	E	20	6 1	nu4	1144.39328	0.2	5.29E-02	5.22E-02	-1.3	0.987	3	1.2
(R)Q (11,E ,10)	11	E	13	11 1	nu4	1144.49409	-2.8	3.58E-02	3.54E-02	-1.1	0.989	4	1.3
(R)Q (11,A-, 6)	11	A+	10	7 1	nu4	1144.76707	0.9	6.20E-02	6.18E-02	-0.4	0.996	3	1.3
(R)Q (11,A+, 6)	11	A-	10	7 1	nu4	1144.78786	3.0	6.27E-02	6.14E-02	-2.1	0.979	3	1.0
(R)Q (11,A-, 9)	11	A+	8	10 1	nu4	1144.91233	-0.3	5.63E-02	5.60E-02	-0.6	0.994	5	3.4
(R)Q (11,E , 7)	11	E	17	8 1	nu4	1144.99358	0.6	6.59E-02	6.49E-02	-1.5	0.985	3	1.0
(R)Q (11,E , 8)	11	E	16	9 1	nu4	1145.06952	0.7	6.58E-02	6.56E-02	-0.4	0.996	3	0.1
(R)Q (12,E , 2)	12	E	24	3 1	nu4	1146.26862	0.6	7.29E-03	7.00E-03	-4.0	0.960	3	1.8
(R)Q (12,A-, 3)	12	A+	12	4 1	nu4	1146.34468	-4.3	1.35E-02	1.32E-02	-2.6	0.974	3	3.0

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(R)Q (12,E ,11)	12	E	13	12	1	nu4	1146.43083	-2.9	2.46E-02	2.41E-02	-1.8	0.982	3	1.7
(R)Q (12,E , 4)	12	E	23	5	1	nu4	1146.92678	-1.4	2.36E-02	2.28E-02	-3.5	0.965	3	3.0
(R)Q (12,E ,10)	12	E	15	11	1	nu4	1147.13788	-0.8	3.83E-02	3.83E-02	0.1	1.001	4	1.9
(R)Q (12,E , 5)	12	E	22	6	1	nu4	1147.28389	-4.3	3.20E-02	3.12E-02	-2.5	0.975	4	1.8
(R)Q (12,A-, 9)	12	A+	9	10	1	nu4	1147.56467	4.6	4.49E-02	4.51E-02	0.6	1.006	2	1.2
(R)Q (12,A+, 6)	12	A-	11	7	1	nu4	1147.58902	-3.1	3.82E-02	3.85E-02	0.7	1.007	3	1.2
(R)Q (12,E , 8)	12	E	18	9	1	nu4	1147.74529	-0.4	4.64E-02	4.65E-02	0.3	1.003	4	0.4
(Q)R (17,E ,17)	18	E	1	17	0	nu2	1148.26375	1.6	2.70E-03	2.91E-03	7.7	1.077	3	3.0
(R)Q (13,E ,11)	13	E	15	12	1	nu4	1149.29192	1.5	2.52E-02	2.51E-02	-0.4	0.996	2	2.5
(R)Q (13,E ,10)	13	E	17	11	1	nu4	1149.98927	0.9	2.98E-02	2.97E-02	-0.3	0.997	3	1.1
(R)Q (14,E ,13)	14	E	15	14	1	nu4	1150.07628	-1.2	1.05E-02	9.93E-03	-5.7	0.943	3	3.0
(R)Q (13,E , 4)	13	E	25	5	1	nu4	1150.11335	-2.1	1.25E-02	1.24E-02	-1.1	0.989	2	0.3
(R)R (2,A+, 0)	3	A+	4	1	1	nu4	1150.17887	0.1	2.80E-01	2.73E-01	-2.3	0.977	5	0.7
(R)Q (13,E , 5)	13	E	24	6	1	nu4	1150.37929	-2.5	1.77E-02	1.76E-02	-0.9	0.991	3	2.7
(R)Q (13,A-, 9)	13	A+	10	10	1	nu4	1150.42174	-1.9	3.14E-02	3.09E-02	-1.5	0.985	3	1.0
(R)Q (13,A+, 6)	13	A-	12	7	1	nu4	1150.60319	-5.6	2.23E-02	2.24E-02	0.6	1.006	4	1.9
(R)Q (13,E , 8)	13	E	20	9	1	nu4	1150.61118	-1.9	2.95E-02	2.94E-02	-0.5	0.995	3	2.1
(R)Q (13,E , 7)	13	E	23	8	1	nu4	1150.72450	-3.8	2.65E-02	2.63E-02	-0.9	0.991	3	1.4
(R)Q (14,A-,12)	14	A+	9	13	1	nu4	1151.37222	1.8	1.61E-02	1.58E-02	-1.8	0.982	3	2.0
(R)R (2,E , 1)	3	E	6	2	1	nu4	1151.48936	0.5	3.09E-01	3.03E-01	-2.1	0.979	5	0.9
(R)Q (14,E ,11)	14	E	18	12	1	nu4	1152.34300	2.1	1.94E-02	1.87E-02	-3.5	0.965	3	2.8
(R)R (2,E , 2)	3	E	7	3	1	nu4	1153.25330	-5.7	4.78E-01	4.64E-01	-3.0	0.970	5	1.3
(R)Q (14,E , 4)	14	E	27	5	1	nu4	1153.46537	-1.0	6.60E-03	6.42E-03	-2.7	0.973	2	3.1
(P)R (3,E , 2)	4	E	6	1	-1	nu4	1153.58284	-1.9	6.02E-03	5.92E-03	-1.6	0.984	2	3.0
(R)Q (14,E , 5)	14	E	26	6	1	nu4	1153.65272	-0.8	9.00E-03	9.34E-03	3.8	1.038	2	0.2
(R)Q (14,A-, 6)	14	A+	13	7	1	nu4	1153.77341	-4.2	1.20E-02	1.23E-02	2.6	1.026	3	1.3
(R)Q (14,E , 7)	14	E	25	8	1	nu4	1153.85038	-4.1	1.39E-02	1.50E-02	7.7	1.077	2	2.0
(R)Q (15,A-,12)	15	A+	10	13	1	nu4	1154.62368	1.5	1.16E-02	1.13E-02	-2.4	0.976	3	2.8
(P)R (3,E , 1)	4	E	7	0	1	nu4	1155.90244	1.0	1.06E-02	1.03E-02	-2.6	0.974	2	2.5
(R)Q (15,A+, 9)	15	A-	11	10	1	nu4	1156.58861	-2.5	9.68E-03	1.02E-02	5.3	1.053	2	1.8
(R)Q (15,A-, 9)	15	A+	12	10	1	nu4	1156.60388	-3.4	1.01E-02	1.04E-02	2.5	1.025	3	3.5
(R)Q (15,E , 4)	15	E	29	5	1	nu4	1156.95766	-3.0	2.93E-03	3.17E-03	8.4	1.084	2	3.1
(Q)R (18,A+,18)	19	A+	1	18	0	nu2	1157.07513	-4.5	1.63E-03	1.55E-03	-4.4	0.956	2	1.8
(R)Q (15,E , 8)	15	E	26	9	1	nu4	1157.09337	-4.3	9.28E-03	9.14E-03	-1.5	0.985	2	0.4
(R)Q (15,A-, 6)	15	A+	14	7	1	nu4	1157.13062	-3.3	6.03E-03	6.34E-03	5.1	1.051	2	2.1
(R)Q (15,E , 7)	15	E	27	8	1	nu4	1157.15229	1.3	7.37E-03	7.95E-03	7.9	1.079	2	2.9
(R)Q (15,A+, 6)	15	A-	14	7	1	nu4	1157.17062	-5.1	6.63E-03	6.36E-03	-4.1	0.959	2	0.4
(R)Q (16,E ,10)	16	E	24	11	1	nu4	1159.54136	-1.8	6.13E-03	6.23E-03	1.7	1.017	2	0.2
(R)Q (16,E , 7)	16	E	29	8	1	nu4	1160.60137	-1.5	4.17E-03	3.99E-03	-4.4	0.956	2	7.6
(R)R (3,E , 1)	4	E	8	2	1	nu4	1161.47712	1.1	1.64E-01	1.62E-01	-0.8	0.992	5	3.3
**(S)R (3,E , 1)	4	E	9	3	1	nu4	1161.50406	1.1	1.30E-01	1.28E-01	-1.6	0.984	5	2.6
(R)Q (17,A-,12)	17	A+	12	13	1	nu4	1161.54490	0.6	3.95E-03	3.79E-03	-4.1	0.959	2	0.4
(R)Q (17,E ,10)	17	E	26	11	1	nu4	1162.70273	2.9	2.64E-03	2.50E-03	-5.5	0.945	2	5.5
**(Q)R (3,E , 2)	4	E	8	2	1	nu4	1163.07310	-0.1	1.78E-01	1.76E-01	-0.9	0.991	5	1.8
(R)R (3,E , 2)	4	E	9	3	1	nu4	1163.10023	1.8	2.29E-01	2.24E-01	-2.0	0.980	5	2.3
(R)R (3,A+, 3)	4	A+	4	4	1	nu4	1164.60226	0.3	6.06E-01	5.85E-01	-3.6	0.964	5	2.7
(R)R (3,A-, 3)	4	A-	4	4	1	nu4	1164.60832	0.7	6.13E-01	5.87E-01	-4.2	0.958	5	3.3
(P)R (4,E , 1)	5	E	8	0	1	nu4	1165.19472	2.6	3.55E-03	3.69E-03	3.9	1.039	2	5.0
**(O)R (3,A+, 3)	4	A+	5	1	1	nu4	1165.30979	1.1	3.50E-03	3.21E-03	-8.5	0.915	2	1.4
(R)R (4,A+, 0)	5	A+	6	1	1	nu4	1171.16061	2.5	2.41E-01	2.36E-01	-2.2	0.978	5	0.4
(R)R (4,E , 1)	5	E	11	2	1	nu4	1171.86593	1.7	2.56E-01	2.54E-01	-0.8	0.992	5	3.0
(R)R (4,E , 2)	5	E	10	3	1	nu4	1173.23231	2.4	3.35E-01	3.28E-01	-1.9	0.981	5	1.6
**(Q)R (4,E , 2)	5	E	11	2	1	nu4	1173.45788	1.3	6.03E-03	5.86E-03	-2.9	0.971	2	3.1
(R)R (4,A-, 3)	5	A-	5	4	1	nu4	1174.64563	1.7	4.74E-01	4.66E-01	-1.8	0.982	5	1.0
(R)R (4,E , 4)	5	E	9	5	1	nu4	1175.89642	-0.2	6.72E-01	6.61E-01	-1.5	0.985	5	0.7
(P)R (7,A+, 6)	8	A+	5	5	-1	nu4	1181.04940	-0.8	2.92E-03	3.01E-03	3.2	1.032	2	3.4
(R)R (5,A+, 0)	6	A+	7	1	1	nu4	1182.08441	1.8	1.95E-01	1.94E-01	-0.4	0.996	5	1.0
(R)R (5,E , 1)	6	E	13	2	1	nu4	1182.59176	2.2	2.14E-01	2.10E-01	-1.9	0.981	5	2.2
(R)R (5,E , 2)	6	E	12	3	1	nu4	1183.71027	3.1	2.62E-01	2.63E-01	0.1	1.001	5	1.8
(R)R (5,A+, 3)	6	A+	6	4	1	nu4	1184.93596	2.9	3.55E-01	3.56E-01	0.2	1.002	5	1.7
(R)R (5,A-, 3)	6	A-	6	4	1	nu4	1184.97955	3.8	3.63E-01	3.57E-01	-1.7	0.983	5	1.1
(R)R (5,E , 4)	6	E	11	5	1	nu4	1186.12442	1.3	5.00E-01	4.94E-01	-1.3	0.987	5	1.3
(R)R (5,E , 5)	6	E	9	6	1	nu4	1187.12022	-1.5	6.83E-01	6.76E-01	-1.0	0.990	5	0.6
**(L)R (5,E , 5)	6	E	10	0	1	nu4	1187.19388	3.4	6.93E-03	6.68E-03	-3.7	0.963	2	5.9
(P)R (9,A+, 9)	10	A+	5	8	-1	nu4	1190.70136	7.2	2.43E-03	2.56E-03	5.4	1.054	2	6.7
(P)R (8,A+, 6)	9	A+	6	5	-1	nu4	1191.09526	-0.5	4.56E-03	4.78E-03	4.7	1.047	2	2.0
(R)R (6,A+, 0)	7	A+	8	1	1	nu4	1193.25982	3.9	1.51E-01	1.49E-01	-1.1	0.989	5	2.4
(R)R (6,E , 1)	7	E	15	2	1	nu4	1193.62702	2.9	1.60E-01	1.61E-01	0.7	1.007	5	1.2
(R)R (6,E , 2)	7	E	14	3	1	nu4	1194.51291	3.4	1.99E-01	1.97E-01	-1.2	0.988	5	3.1
(R)R (6,A+, 3)	7	A+	7	4	1	nu4	1195.54016	2.0	2.58E-01	2.60E-01	0.8	1.008	5	0.5
(R)R (6,A-, 3)	7	A-	7	4	1	nu4	1195.62053	4.0	2.62E-01	2.60E-01	-0.7	0.993	5	1.1
(R)R (6,E , 4)	7	E	13	5	1	nu4	1196.62617	3.0	3.57E-01	3.54E-01	-0.9	0.991	5	0.3
(R)R (6,E , 5)	7	E	12	6	1	nu4	1197.54526	0.9	4.90E-01	4.83E-01	-1.4	0.986	5	0.6
(P)R (9,E , 7)	10	E	11	6	-1	nu4	1197.94298	1.1	5.87E-03	5.78E-03	-1.6	0.984	2	2.2
(R)R (6,A+, 6)	7	A+	6	7	1	nu4	1198.27561	-3.6	6.57E-01	6.57E-01	0.0	1.000	4	0.9
(P)R (9,A+, 6)	10	A+	6	5	-1	nu4	1201.06098	-3.3	5.59E-03	5.69E-03	1.7	1.017	2	0.6
(P)R (10,A+, 9)	11	A+	6	8	-1	nu4	1201.16521	6.7	4.53E-03	4.66E-03	2.7	1.027	2	1.9
(P)R (9,E , 5)	10	E	12	4	-1	nu4	1203.85473	-2.0	4.47E-03	4.80E-03	7.4	1.074	2	1.1
(R)R (7,A+, 0)	8	A+	9	1	1	nu4	1204.65748	1.3	1.05E-01	1.08E-01	2.3	1.023	4	3.3
(P)R (10,E , 8)	11	E	11	7	-1	nu4	1204.74252	0.8	5.56E-03	5.90E-03	6.0	1.060	2	3.3
(R)R (7,E , 1)	8	E	17	2	1	nu4	1204.92614	2.5	1.15E-01	1.15E-01	0.3	1.003	5	3.4
(R)R (7,E , 2)	8	E	16	3	1	nu4	1205.61400	2.6	1.41E-01	1.39E-01	-0.9	0.991	4	0.7
(P)R (9,E , 4)	10	E	14	3	-1	nu4	1206.30113	-4.5	3.27E-03	3.49E-03	6.6	1.066	2	2.5
(R)R (7,A+, 3)	8	A+	8	4	1	nu4	1206.43273	1.6	1.80E-01	1.81E-01	0.6	1.006	5	1.5
(R)R (7,A-, 3)	8	A-	8	4	1	nu4	1206.56253	4.2	1.80E-01	1.80E-01	0.1	1.001	5	1.0
(R)R (7,E , 4)	8	E	15	5	1	nu4	1207.40452	2.8	2.42E-01	2.42E-01	0.0	1.000	5	1.4
(P)R (10,E , 7)	11	E	12	6	-1	nu4	1207.99332	-3.2	6.23E-03	6.14E-03	-1.5	0.985	2	1.4
(R)R (7,E , 5)	8	E	14	6	1	nu4	1208.22737	2.1	3.31E-01	3.28E-01	-0.9	0.991	5	1.4
(R)R (7,A+, 6)	8	A+	7	7	1	nu4	1208.89312	-3.9	4.41E-01	4.43E-01	0.3	1.003	3	1.0
(R)R (7,E , 7)	8	E	11	8	1	nu4	1209.35722	-3.2	6.07E-01	5.95E-01	-2.0	0.980	5	0.9
(P)R (10,A+, 6)	11	A+	7	5	-1	nu4	1210.93071	-4.4	5.45E-03	5.60E-03	2.6	1.026	3	1.4
(P)R (11,A+, 9)	12	A+	7	8	-1	nu4	1211.49876	5.9	5.10E-03	5.35E-03	4.9	1.049	3	2.6
(P)R (12,E ,11)	13	E	12	10	-1	nu4	1214.40182	10.8	3.00E-03	3.38E-03	12.8	1.128	2	8.5
(P)R (11,E , 8)	12	E	12	7	-1	nu4	1214.86977	-0.2	6.07E-03	5.75E-03	-5.3	0.947	2	1.4
(P)R (10,E , 4)	11	E	15	3	-1	nu4	1215.81583	-2.8	3.18E-03	3.27E-03	2.7	1.027	2	6.0
(R)R (8,A+, 0)	9	A+	10	1	1	nu4	1216.25021	0.7	7.37E-02	7.33E-02	-0.6	0.994	3	0.9
(R)R (8,E , 1)	9	E	19	2	1	nu4	1216.44952	12.9	7.87E-02	7.82E-02	-0.6	0.994	3	0.1
(R)R (8,E , 2)	9	E	18	3	1	nu4	1216.97657	1.5	9.30E-02	9.31E-02	0.1	1.001	3	1.2

(R)R (8,A+, 3)	9	A+	9	4	1	nu4	1217.59274	0.0	1.18E-01	1.20E-01	2.0	1.020	3	1.0
(R)R (8,A-, 3)	9	A-	9	4	1	nu4	1217.78403	4.1	1.20E-01	1.18E-01	-1.7	0.983	4	1.9
(P)R (12,E ,10)	13	E	13	9	-1	nu4	1218.21449	2.7	4.38E-03	4.43E-03	1.2	1.012	2	6.2
(R)R (8,E , 4)	9	E	17	5	1	nu4	1218.45040	1.5	1.60E-01	1.58E-01	-1.2	0.988	5	0.9
(R)R (8,E , 5)	9	E	16	6	1	nu4	1219.16487	1.5	2.19E-01	2.12E-01	-3.3	0.967	5	2.2
(R)R (8,A-, 6)	9	A-	7	7	1	nu4	1219.74616	1.8	2.87E-01	2.84E-01	-1.2	0.988	5	2.0
(R)R (8,A+, 6)	9	A+	8	7	1	nu4	1219.75362	1.5	2.91E-01	2.85E-01	-2.1	0.979	5	1.5
(R)R (8,E , 7)	9	E	13	8	1	nu4	1220.16654	0.1	3.88E-01	3.82E-01	-1.5	0.985	5	1.6
(R)R (8,E , 8)	9	E	11	9	1	nu4	1220.36210	-3.4	5.22E-01	5.09E-01	-2.5	0.975	5	0.8
(P)R (12,A+, 9)	13	A+	7	8	-1	nu4	1221.69492	1.8	4.81E-03	4.86E-03	0.9	1.009	2	2.3
(P)R (13,E ,11)	14	E	13	10	-1	nu4	1224.89550	6.5	3.67E-03	3.41E-03	-7.3	0.927	2	5.7
(P)R (12,E , 7)	13	E	16	6	-1	nu4	1227.76012	-3.5	4.41E-03	4.31E-03	-2.2	0.978	2	6.8
(R)R (9,A+, 0)	10	A+	11	1	1	nu4	1228.01128	0.5	4.95E-02	4.72E-02	-4.6	0.954	3	2.3
(R)R (9,E , 1)	10	E	21	2	1	nu4	1228.15823	-0.8	4.88E-02	5.01E-02	2.6	1.026	4	3.0
(R)R (9,A+, 3)	10	A+	10	4	1	nu4	1228.98982	-2.3	7.32E-02	7.54E-02	2.9	1.029	3	0.4
(R)R (9,A-, 3)	10	A-	10	4	1	nu4	1229.25382	2.5	7.43E-02	7.38E-02	-0.7	0.993	2	0.8
(R)R (9,E , 4)	10	E	19	5	1	nu4	1229.74372	0.3	1.01E-01	9.79E-02	-3.0	0.970	3	2.5
**(L)R (9,A-, 6)	10	A-	8	1	1	nu4	1230.10012	1.5	8.99E-03	9.70E-03	7.8	1.078	2	3.9
(R)R (9,A+, 6)	10	A+	9	7	1	nu4	1230.84846	0.8	1.72E-01	1.75E-01	2.2	1.022	5	2.4
(R)R (9,A-, 6)	10	A-	9	7	1	nu4	1230.88793	0.8	1.66E-01	1.66E-01	-0.2	0.998	5	1.6
(R)R (9,A+, 9)	10	A+	7	10	1	nu4	1231.28680	-4.3	4.24E-01	4.13E-01	-2.7	0.973	4	0.4
(P)R (14,A+,12)	15	A+	8	11	-1	nu4	1231.54479	3.2	2.39E-03	2.45E-03	2.7	1.027	2	1.7
(R)R (10,A+, 0)	11	A+	12	1	1	nu4	1239.91573	-1.5	2.80E-02	2.88E-02	2.9	1.029	5	3.5
(R)R (10,E , 1)	11	E	23	2	1	nu4	1240.02515	-2.7	2.96E-02	3.04E-02	2.8	1.028	5	2.1
(R)R (10,E , 2)	11	E	22	3	1	nu4	1240.33156	0.3	3.48E-02	3.54E-02	1.7	1.017	5	2.1
(R)R (10,A-, 3)	11	A-	11	4	1	nu4	1240.93739	1.9	4.46E-02	4.37E-02	-2.0	0.980	6	3.4
(R)R (10,E , 4)	11	E	21	5	1	nu4	1241.25689	-0.4	5.73E-02	5.78E-02	0.9	1.009	5	1.5
(R)R (10,E , 5)	11	E	20	6	1	nu4	1241.74971	-0.8	7.54E-02	7.69E-02	2.0	1.020	4	1.9
(R)R (10,E ,10)	11	E	13	11	1	nu4	1242.12827	-3.9	3.21E-01	3.20E-01	-0.4	0.996	3	0.9
(R)R (10,A+, 6)	11	A+	10	7	1	nu4	1242.16332	-0.5	1.03E-01	1.03E-01	-0.2	0.998	4	0.7
(R)R (10,A-, 6)	11	A-	10	7	1	nu4	1242.18384	-1.0	1.01E-01	1.02E-01	0.7	1.007	4	0.4
(R)R (10,E , 7)	11	E	17	8	1	nu4	1242.43742	0.2	1.34E-01	1.34E-01	-0.2	0.998	4	0.8
(R)R (10,A+, 9)	11	A+	8	10	1	nu4	1242.47489	-0.6	2.40E-01	2.42E-01	1.0	1.010	3	0.8
(R)R (10,E , 8)	11	E	16	9	1	nu4	1242.56872	0.7	1.84E-01	1.83E-01	-0.7	0.993	4	0.7
**(-)R (10,E , 7)	11	E	18	1	-1	nu4	1242.62524	-1.2	3.35E-03	3.36E-03	0.3	1.003	2	0.3
(P)R (14,A+, 6)	15	A+	11	5	-1	nu4	1249.35500	-2.1	1.61E-03	1.57E-03	-2.5	0.975	2	5.0
(R)R (11,A+, 0)	12	A+	13	1	1	nu4	1251.94132	0.8	1.69E-02	1.67E-02	-0.9	0.991	4	2.4
(R)R (11,E , 2)	12	E	24	3	1	nu4	1252.25429	-0.6	1.98E-02	2.03E-02	2.4	1.024	4	1.3
(R)R (11,A+, 3)	12	A+	12	4	1	nu4	1252.35776	-4.6	2.49E-02	2.58E-02	3.5	1.035	3	1.2
(R)R (11,A-, 3)	12	A-	12	4	1	nu4	1252.80034	-1.1	2.51E-02	2.46E-02	-2.0	0.980	5	1.2
(R)R (11,E ,11)	12	E	13	12	1	nu4	1252.88335	-1.9	2.35E-01	2.36E-01	0.4	1.004	4	0.9
(R)R (11,E , 4)	12	E	23	5	1	nu4	1252.95850	-3.0	3.16E-02	3.26E-02	3.0	1.030	5	1.8
(R)R (11,E , 5)	12	E	22	6	1	nu4	1253.35069	-3.6	4.29E-02	4.31E-02	0.5	1.005	4	2.1
(R)R (11,E ,10)	12	E	15	11	1	nu4	1253.50372	-1.4	1.79E-01	1.79E-01	0.0	1.000	4	0.8
(R)R (11,A+, 6)	12	A+	11	7	1	nu4	1253.67715	-2.1	5.74E-02	5.75E-02	0.2	1.002	4	1.5
(R)R (11,A-, 6)	12	A-	11	7	1	nu4	1253.69866	-3.0	5.79E-02	5.73E-02	-1.1	0.989	4	0.8
(R)R (11,A+, 9)	12	A+	9	10	1	nu4	1253.85279	-0.7	1.33E-01	1.36E-01	1.7	1.017	4	1.9
(R)R (11,E , 8)	12	E	18	9	1	nu4	1253.96557	-1.2	1.02E-01	1.02E-01	0.7	1.007	4	2.3
(R)R (12,A+,12)	13	A+	8	13	1	nu4	1263.54859	-2.0	1.68E-01	1.66E-01	-0.9	0.991	3	2.4
(R)R (12,A+, 0)	13	A+	14	1	1	nu4	1264.06670	1.5	9.13E-03	9.20E-03	0.8	1.008	3	1.5
(R)R (12,A+, 3)	13	A+	13	4	1	nu4	1264.26242	-1.8	1.37E-02	1.41E-02	2.6	1.026	2	1.5
(R)R (12,E , 2)	13	E	26	3	1	nu4	1264.30151	0.8	1.08E-02	1.10E-02	2.3	1.023	2	2.7
(R)R (12,E ,11)	13	E	15	12	1	nu4	1264.44541	0.4	1.27E-01	1.26E-01	-0.2	0.998	4	0.8
(R)R (12,A-, 3)	13	A-	13	4	1	nu4	1264.81253	4.3	1.37E-02	1.32E-02	-3.8	0.962	2	0.2
(R)R (12,E , 4)	13	E	25	5	1	nu4	1264.81763	-2.3	1.70E-02	1.75E-02	3.2	1.032	3	0.0
(R)R (12,E ,10)	13	E	17	11	1	nu4	1265.05040	1.0	9.71E-02	9.60E-02	-1.1	0.989	4	1.1
(R)R (12,E , 5)	13	E	24	6	1	nu4	1265.12084	-2.1	2.24E-02	2.30E-02	2.8	1.028	3	1.0
(R)R (12,A+, 6)	13	A+	12	7	1	nu4	1265.36490	-5.0	3.00E-02	3.07E-02	2.4	1.024	4	1.9
(R)R (12,A-, 6)	13	A-	12	7	1	nu4	1265.39066	-4.2	3.06E-02	3.06E-02	-0.1	0.999	4	2.3
(R)R (12,A+, 9)	13	A+	10	10	1	nu4	1265.39998	-5.2	7.24E-02	7.26E-02	0.2	1.002	4	0.8
(R)R (12,E , 8)	13	E	20	9	1	nu4	1265.51668	-3.0	5.38E-02	5.42E-02	0.7	1.007	4	1.1
(R)R (12,E , 7)	13	E	23	8	1	nu4	1265.56630	-5.3	4.00E-02	4.03E-02	0.7	1.007	4	0.7
(R)R (13,A+,12)	14	A+	9	13	1	nu4	1275.29682	1.5	8.57E-02	8.54E-02	-0.4	0.996	4	1.5
(R)R (13,E ,11)	14	E	18	12	1	nu4	1276.15848	1.2	6.57E-02	6.48E-02	-1.3	0.987	3	0.8
(R)R (13,E , 2)	14	E	28	3	1	nu4	1276.44853	0.6	5.63E-03	5.74E-03	1.9	1.019	3	3.0
(R)R (13,E ,10)	14	E	19	11	1	nu4	1276.74502	-2.5	4.92E-02	4.91E-02	-0.1	0.999	3	0.3
(R)R (13,E , 4)	14	E	27	5	1	nu4	1276.80431	-1.1	8.83E-03	8.97E-03	1.6	1.016	2	2.7
(R)R (13,A-, 3)	14	A-	14	4	1	nu4	1276.94482	1.2	7.00E-03	6.73E-03	-3.9	0.961	2	0.7
(R)R (13,E , 5)	14	E	26	6	1	nu4	1277.03101	-2.0	1.15E-02	1.18E-02	2.2	1.022	3	1.6
(R)R (13,A+, 9)	14	A+	11	10	1	nu4	1277.08768	-7.7	3.71E-02	3.70E-02	-0.2	0.998	2	1.5
(R)R (13,A+, 6)	14	A+	13	7	1	nu4	1277.20059	-2.4	1.53E-02	1.56E-02	2.2	1.022	3	1.9
(R)R (13,A-, 6)	14	A-	13	7	1	nu4	1277.23216	-4.9	1.57E-02	1.56E-02	-0.8	0.992	3	1.1
(R)R (13,E , 7)	14	E	25	8	1	nu4	1277.33502	-6.8	2.06E-02	2.07E-02	0.8	1.008	3	0.6
(R)R (14,E ,13)	15	E	17	14	1	nu4	1286.05531	2.2	5.57E-02	5.51E-02	-1.0	0.990	3	0.6
(R)R (14,A+,12)	15	A+	10	13	1	nu4	1287.17461	1.5	4.21E-02	4.19E-02	-0.4	0.996	2	0.2
(R)R (14,E ,11)	15	E	20	12	1	nu4	1287.99783	-1.0	3.19E-02	3.18E-02	-0.3	0.997	3	0.2
(R)R (14,E ,10)	15	E	21	11	1	nu4	1288.55998	-0.1	2.41E-02	2.40E-02	-0.3	0.997	3	0.8
(R)R (14,A-, 9)	15	A-	11	10	1	nu4	1288.82883	-0.4	1.68E-02	1.73E-02	2.9	1.029	2	1.6
(R)R (14,A+, 9)	15	A+	12	10	1	nu4	1288.84388	-3.5	1.82E-02	1.75E-02	-3.8	0.962	2	1.6
(R)R (14,E , 4)	15	E	29	5	1	nu4	1288.89153	0.7	4.21E-03	4.41E-03	4.7	1.047	2	1.9
(R)R (14,E , 5)	15	E	28	6	1	nu4	1289.05453	0.6	6.00E-03	5.76E-03	-4.1	0.959	3	1.0
(R)R (14,A+, 6)	15	A+	14	7	1	nu4	1289.15707	-1.5	7.61E-03	7.63E-03	0.3	1.003	3	3.5
(R)R (14,A-, 6)	15	A-	14	7	1	nu4	1289.19720	-1.5	7.71E-03	7.62E-03	-1.3	0.987	2	2.3
(R)R (14,E , 7)	15	E	27	8	1	nu4	1289.23901	-4.3	1.03E-02	1.01E-02	-1.8	0.982	3	1.7
(R)R (14,E , 8)	15	E	26	9	1	nu4	1289.25175	-4.8	1.30E-02	1.30E-02	-0.1	0.999	3	2.0
(R)R (15,E ,11)	16	E	22	12	1	nu4	1299.93539	-0.3	1.45E-02	1.49E-02	2.7	1.027	3	2.8
(R)R (15,E ,10)	16	E	24	11	1	nu4	1300.44502	-1.7	1.08E-02	1.11E-02	2.4	1.024	3	2.5
(R)R (15,A-, 9)	16	A-	13	10	1	nu4	1301.12988	-2.4	6.91E-03	7.17E-03	3.9	1.039	3	2.7
(R)R (15,E , 8)	16	E	28	9	1	nu4	1301.19380	-1.2	6.65E-03	6.23E-03	-6.3	0.937	3	3.0
(R)R (15,A+, 6)	16	A+	15	7	1	nu4	1301.20965	1.6	3.64E-03	3.56E-03	-2.1	0.979	2	7.1
(R)R (15,E , 7)	16	E	29	8	1	nu4	1301.24816	-1.3	4.89E-03	4.73E-03	-3.4	0.966	2	1.4
(R)R (15,A-, 6)	16	A-	15	7	1	nu4	1301.26062	0.0	3.72E-03	3.56E-03	-4.4	0.956	2	0.6
(R)R (15,A+, 9)	16	A+	14	10	1	nu4	1301.30059	-2.4	6.33E-03	6.12E-03	-3.4	0.966	3	1.4
(R)R (16,A+,12)	17	A+	12	13	1	nu4	1311.21321	1.6	8.86E-03	8.81E-03	-0.5	0.995	3	1.0
(R)R (16,E ,10)	17	E	26	11	1	nu4	1312.13162	1.2	3.89E-03	4.00E-03	2.8	1.028	2	4.1
(R)R (16,A+, 9)	17	A+	15	10	1	nu4	1313.09857	-1.4	3.86E-03	3.60E-03	-6.9	0.931	2	0.5
(R)R (16,E , 8)	17	E	30	9	1	nu4	1313.24321	0.8	3.01E-03	2.80E-03	-7.0	0.930	2	1.0
(R)R (17,A+,12)	18	A+	13	13	1	nu4	1323.30869	2.9	3.68E-03	3.78E-03	2.5	1.025	3	1.7

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   (R)R (18,A+,12)  19 A+ 14 13 1  nu4   1335.36643       6.8 1.49E-03 1.52E-03      1.8   1.018  2   3.6
(I) Lower state quantum numbers
(II) Upper state quantum numbers
(III) Vibrational Band
(IV) Observed frequencies (in cm-1)
(V) Observed-calculated values x10000 (in cm-1)
(VI) Observed intensities in cm-2atm-1 at 296 K
(VII) Calculated intensities in cm-2atm-1 at 296 K
(VIII) (Iobs-Icalc)/Iobs in %
(IX) Icalc/Iobs
(X) number of spectra used in the analysis
(XI) precision of the measurements.
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tabla II

(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)
(Q)P (8,E , 1)	7 E 5 1 0	2nu2-nu2	904.70123	45.9	2.17E-03	2.01E-03	-7.587	0.924	1	0.0
(Q)P (8,E , 2)	7 E 4 2 0	2nu2-nu2	905.15928	47.9	2.15E-03	1.93E-03	-10.087	0.899	1	0.0
(Q)P (7,A+, 0)	6 A+ 3 0 0	2nu2-nu2	914.92904	55.7	3.09E-03	2.85E-03	-7.756	0.922	2	2.1
(Q)P (7,E , 1)	6 E 4 1 0	2nu2-nu2	915.08401	56.0	3.10E-03	2.80E-03	-9.539	0.905	2	0.6
(Q)P (7,A+, 3)	6 A+ 2 3 0	2nu2-nu2	916.33361	55.3	2.56E-03	2.41E-03	-6.104	0.939	1	0.0
(Q)P (6,E , 2)	5 E 3 2 0	2nu2-nu2	925.70490	58.2	3.45E-03	3.37E-03	-2.445	0.976	2	0.7
(Q)P (5,A+, 0)	4 A+ 2 0 0	2nu2-nu2	934.97030	54.1	4.80E-03	4.51E-03	-5.991	0.940	4	2.1
(Q)P (5,E , 1)	4 E 3 1 0	2nu2-nu2	935.12914	52.6	4.76E-03	4.35E-03	-8.521	0.915	4	2.0
(Q)P (5,E , 2)	4 E 2 2 0	2nu2-nu2	935.60715	46.8	3.70E-03	3.85E-03	4.253	1.043	2	0.9
(Q)P (5,A+, 3)	4 A+ 1 3 0	2nu2-nu2	936.40816	25.4	3.20E-03	2.99E-03	-6.435	0.936	2	1.1
(Q)P (4,A+, 0)	3 A+ 2 0 0	2nu2-nu2	944.60562	43.9	5.33E-03	4.99E-03	-6.402	0.936	4	2.3
(Q)Q (8,E , 4)	8 E 4 4 0	2nu2-nu2	973.46039	44.5	2.15E-03	2.11E-03	-2.109	0.979	2	4.9
(Q)Q (9,A+, 6)	9 A- 2 6 0	2nu2-nu2	974.14600	38.6	3.10E-03	3.02E-03	-2.630	0.974	5	2.6
(Q)Q (11,A-, 9)	11 A+ 1 9 0	2nu2-nu2	975.48037	8.8	2.71E-03	2.53E-03	-6.691	0.933	4	2.8
(Q)Q (10,E , 8)	10 E 2 8 0	2nu2-nu2	975.77817	39.7	3.68E-03	3.40E-03	-7.506	0.924	3	3.1
(Q)Q (9,E , 7)	9 E 2 7 0	2nu2-nu2	976.11078	53.3	4.22E-03	4.31E-03	2.139	1.023	2	0.2
(Q)Q (8,A+, 6)	8 A- 1 6 0	2nu2-nu2	976.48155	59.7	5.16E-03	5.11E-03	-1.017	0.990	3	1.8
(Q)Q (7,E , 5)	7 E 2 5 0	2nu2-nu2	976.89261	58.0	5.41E-03	5.58E-03	3.144	1.031	2	0.5
(Q)Q (6,E , 4)	6 E 2 4 0	2nu2-nu2	977.34672	55.4	5.30E-03	5.51E-03	3.844	1.038	3	2.4
(Q)Q (7,A-, 6)	7 A+ 1 6 0	2nu2-nu2	978.59831	21.6	8.20E-03	8.39E-03	2.357	1.024	6	3.3
(Q)Q (5,E , 4)	5 E 2 4 0	2nu2-nu2	978.93843	24.6	7.92E-03	8.61E-03	8.756	1.088	2	1.6
(Q)Q (4,A+, 3)	4 A- 1 3 0	2nu2-nu2	979.17504	25.2	6.65E-03	7.29E-03	9.737	1.097	2	1.8
(Q)Q (2,E , 1)	2 E 2 1 0	2nu2-nu2	979.78801	23.8	2.04E-03	2.01E-03	-1.295	0.987	1	0.0
(Q)Q (3,A+, 3)	3 A- 1 3 0	2nu2-nu2	980.24757	-7.5	1.11E-02	1.14E-02	2.966	1.030	3	2.6
(Q)Q (2,E , 2)	2 E 1 2 0	2nu2-nu2	980.26262	4.4	8.02E-03	8.15E-03	1.601	1.016	3	3.5
(Q)Q (4,E , 4)	4 E 1 4 0	2nu2-nu2	980.27910	-25.5	1.29E-02	1.33E-02	3.172	1.032	3	2.2
(Q)Q (5,E , 5)	5 E 1 5 0	2nu2-nu2	980.35646	-48.5	1.35E-02	1.40E-02	3.343	1.033	3	1.9
(Q)Q (6,A-, 6)	6 A+ 1 6 0	2nu2-nu2	980.47839	-77.6	1.30E-02	1.34E-02	3.563	1.036	3	1.3
(Q)R (1,A+, 0)	2 A+ 1 0 0	2nu2-nu2	996.73038	31.3	6.08E-03	6.11E-03	0.541	1.005	2	3.8
(Q)R (1,E , 1)	2 E 2 1 0	2nu2-nu2	996.88658	25.9	4.41E-03	4.60E-03	4.349	1.043	3	2.8
(Q)R (2,A+, 0)	3 A+ 2 0 0	2nu2-nu2	1004.48708	44.7	8.65E-03	8.96E-03	3.656	1.037	2	0.8
(Q)R (2,E , 1)	3 E 2 1 0	2nu2-nu2	1004.64143	39.3	7.76E-03	8.00E-03	3.054	1.031	3	2.2
(Q)R (3,A+, 0)	4 A+ 2 0 0	2nu2-nu2	1011.99204	54.8	1.08E-02	1.11E-02	3.359	1.034	2	2.1
(Q)R (3,E , 1)	4 E 3 1 0	2nu2-nu2	1012.14468	53.7	9.92E-03	1.05E-02	5.667	1.057	2	0.1
(Q)R (3,A-, 3)	4 A- 1 3 0	2nu2-nu2	1013.37131	26.1	4.70E-03	5.05E-03	7.320	1.073	3	1.8
(Q)R (4,E , 1)	5 E 4 1 0	2nu2-nu2	1019.40363	59.9	1.13E-02	1.19E-02	5.194	1.052	3	1.2
(Q)R (4,E , 2)	5 E 3 2 0	2nu2-nu2	1019.85582	59.2	1.01E-02	1.05E-02	4.459	1.045	2	0.7
(Q)R (4,A-, 3)	5 A- 1 3 0	2nu2-nu2	1020.61266	48.6	7.74E-03	8.19E-03	5.794	1.058	2	2.9
(Q)R (5,E , 1)	6 E 4 1 0	2nu2-nu2	1026.42745	57.6	1.25E-02	1.23E-02	-1.764	0.982	2	2.3
(Q)R (5,E , 2)	6 E 3 2 0	2nu2-nu2	1026.87198	60.0	1.08E-02	1.13E-02	4.853	1.049	3	2.7
(Q)R (6,A+, 0)	7 A+ 3 0 0	2nu2-nu2	1033.08115	44.1	1.12E-02	1.19E-02	6.233	1.062	3	1.9
(Q)R (6,E , 1)	7 E 5 1 0	2nu2-nu2	1033.22618	45.7	1.11E-02	1.17E-02	5.096	1.051	3	3.3
(Q)R (6,E , 4)	7 E 3 4 0	2nu2-nu2	1035.42225	61.1	8.24E-03	8.46E-03	2.745	1.027	2	4.6
(Q)R (6,A-, 6)	7 A- 1 6 0	2nu2-nu2	1038.40966	20.6	3.67E-03	3.60E-03	-1.878	0.981	2	1.3
(Q)R (7,A+, 0)	8 A+ 3 0 0	2nu2-nu2	1039.66893	23.9	1.10E-02	1.05E-02	-4.401	0.956	2	2.0
(Q)R (7,E , 1)	8 E 6 1 0	2nu2-nu2	1039.81086	25.0	1.04E-02	1.03E-02	-0.096	0.999	3	2.0
(Q)R (7,E , 5)	8 E 3 5 0	2nu2-nu2	1043.26911	55.3	6.47E-03	6.97E-03	7.835	1.078	2	2.9
(Q)R (8,A+, 0)	9 A+ 4 0 0	2nu2-nu2	1046.05511	2.2	8.53E-03	8.70E-03	1.982	1.020	2	0.9
(Q)R (8,E , 1)	9 E 6 1 0	2nu2-nu2	1046.19361	0.8	8.10E-03	8.62E-03	6.359	1.064	3	2.4
(Q)R (8,E , 2)	9 E 5 2 0	2nu2-nu2	1046.61023	-1.5	9.02E-03	8.38E-03	-7.123	0.929	2	3.6
(Q)R (8,A-, 3)	9 A- 3 3 0	2nu2-nu2	1047.32071	87.1	7.75E-03	7.98E-03	2.980	1.030	2	1.3
(Q)R (8,E , 4)	9 E 4 4 0	2nu2-nu2	1048.29222	1.1	7.50E-03	7.37E-03	-1.770	0.982	2	1.2
(Q)R (8,E , 5)	9 E 3 5 0	2nu2-nu2	1049.57061	16.2	6.47E-03	6.55E-03	1.267	1.013	2	2.1
(Q)R (8,A-, 6)	9 A- 2 6 0	2nu2-nu2	1051.15218	37.6	5.28E-03	5.47E-03	3.679	1.037	3	3.1
(Q)R (9,A+, 0)	10 A+ 4 0 0	2nu2-nu2	1052.25199	-16.5	6.56E-03	6.82E-03	3.978	1.040	2	6.0
(Q)R (9,E , 1)	10 E 7 1 0	2nu2-nu2	1052.38695	-20.4	6.31E-03	6.78E-03	7.375	1.074	2	1.2
(Q)R (9,E , 2)	10 E 6 2 0	2nu2-nu2	1052.79285	-30.7	7.24E-03	6.63E-03	-8.336	0.917	2	2.5
(Q)R (9,E , 4)	10 E 5 4 0	2nu2-nu2	1054.43136	-55.0	5.86E-03	6.04E-03	3.076	1.031	2	0.3
(Q)R (9,E , 5)	10 E 4 5 0	2nu2-nu2	1055.67702	-50.6	5.54E-03	5.56E-03	0.185	1.002	2	1.6
(Q)R (10,E , 1)	11 E 8 1 0	2nu2-nu2	1058.40343	-32.0	4.53E-03	5.04E-03	11.290	1.113	2	0.4
(Q)R (10,E , 2)	11 E 7 2 0	2nu2-nu2	1058.79835	-51.6	4.89E-03	4.96E-03	1.436	1.014	2	4.5
(Q)R (10,A-, 9)	11 A- 1 9 0	2nu2-nu2	1069.44654	10.5	2.27E-03	2.20E-03	-2.921	0.971	3	2.6

(I) Lower state quantum numbers
(II) Upper state quantum numbers
(III) Vibrational Band
(IV) Observed frequencies (in cm-1)
(V) Observed-calculated values x10000 (in cm-1)
(VI) Observed intensities in cm-2atm-1 at 296 K
(VII) Calculated intensities in cm-2atm-1 at 296 K
(VIII) (Iobs-Icalc)/Iobs in %
(IX) Icalc/Iobs
(X) number of spectra used in the analysis
(XI) precision of the measurements.