Fundamental Physics at JPL

Presented to the
Fundamental Physics Investigator Workshop
Dana Point, CA

Ulf Israelsson
JPL/Caltech
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Agenda

- Program Activities
  - JPL Update
  - NASA HQ Update
- Low Temperature and Condensed Matter Physics Status
- Laser Cooling and Atomic Physics Status
- Gravitational Physics Status
- Biological Physics Status
- Use of Guest Investigators
- Conclusions
Program Activities

JPL Update
- Charles Elachi new Director
- Physicist Tom Prince new Chief Scientist
- Larry Simmons Assistant Lab Director for Astronomy and Physics
  - Fred O’Callaghan Program Manager for all Microgravity FP activities under Simmons

NASA HQ Update
- Mary Kicza new Associate Administrator for NASA’s Office of Biological and Physical Research (OBPR) (Code U)
- ISS Payloads budget control transferred back to OBPR
  - Better protection from ISS vehicle problems
- Microgravity lead center role transferred back to HQ from MSFC
  - MSFC continue to support HQ in vital ISS and outreach functions
- NRA’s now released annually.
  - 2001 NRA FP proposal deadline was April 12, 2002
- ISS Research Maximization and Prioritization Task force
Low Temperature and Condensed Matter Physics Status

- LTMPF has received budget authority for full flight development, following a Preliminary Design Review (PDR) last year
- Decision point for a second facility in 2003
  - Will enable on-orbit swap-out every 16 months.
- ISS slips has forced 7 month launch delay
  - First LTMPF mission now 11/05
  - Additional delays very likely
- Carrier for Shuttle transport to ISS remains unresolved
- Guest investigators for first mission selected from 00 NRA
  - CQ (PI Goodstein) uses DYNAMX Instrument
  - COEX (PI Hahn) uses MISTE Instrument
  - Combined SCR/RDR held in May, 2002
- NASA may select LTMPF-M3 candidate experiments from 01 NRA
- Critical Viscosity of Xenon (CVX-2) planned for Shuttle launch this summer
Laser Cooling and Atomic Physics Status

- **PARCS Requirements Definition Review (RDR) held last year**
  - Preliminary Design Review (PDR) scheduled in 2002
  - Authority for full flight development anticipated after PDR

- **RACE Science Concept Review (SCR) held last year**
  - RDR planned in 2003

- **ISS slips has forced further launch delay**
  - PARCS now targeted for 11/05
  - Additional delays very likely

- **Carrier for Shuttle transport to ISS remains unresolved**

- **New flight definition experiments selected from 00 NRA**
  - Condensate Laboratory Aboard the Space Station (CLASS) (PI Phillips)
  - Quantum Interferometer Test of Equivalence (QuITE) (PI Kasevich)
  - Combined SCR planned in 2003
  - Hardware development budget not yet in place

- **NASA may select additional flight definition experiments from 01 NRA**
Satellite Test of the Equivalence Principle (STEP)
- One of the winners in the first phase SMEX selection
- Phase 2 proposal submitted and site visit held at Stanford
- Winners to be announced this summer
- Continue making good progress on retiring technical risks

Superconducting Microwave Oscillator (SUMO)
- Second flight of LTMPF delayed due to ISS slip
- Continue instrument design activities

New flight definition experiment selected from 00 NRA
- Test of the Principle of Equivalence using an Einstein Elevator (TPEEE) (PI Shapiro)
- Balloon flight experiment

NASA may select additional flight definition experiments from 01 NRA

JPL “thrust areas” under development
- Gravitational Physics (Code U)
- Gravitational Wave Astronomy (Code S)
- Seven ground investigations selected from the 2000 NRA
- NASA is asking the scientific community to justify need for experimentation in space
- If space justification can be documented, NASA is interested to select flight experiments from future NRAs
Use of Guest Investigators

- Developing instruments for flight is a costly undertaking
- NASA and JPL want to ensure that instruments are utilized as efficiently as possible and that the investment in hardware is benefiting a wide scientific community
- One way is to allow guest investigations to use existing hardware
  - Similar to “observation time” on NASA telescopes
  - Will promote communication and collaboration with national and international scientists
- The requirements by a primary investigator determines the design of a new instrument
- A description of the instrument capability under development will be advertised in future NRAs, soliciting guest investigators to propose.
- Incorporation of guest investigations are not allowed to add any risk to the development of the primary investigator’s instrument
- Pilot program guest investigators have been selected to participate in the first LTMPF mission
- Interested in ideas on how to strengthen the guest investigator concept and how best to use in other sub-disciplines
- Discussion Session to be held Friday from 10:15 to 11:45
Conclusions

- **Need to maintain vitality in the research program - striving to simply maintain status quo is NOT adequate**
  - Explore new research directions in all sub-disciplines
  - Creative use of flight guest investigators
  - Pursue collaborations with Code S

- **Need investigators advocacy support**
  - Outreach to public, NASA, and Congress
  - Relevance of science and technology
  - Weekly highlights and press releases are important

- **Where we are currently pushing on the budget envelope**
  - STEP collaboration
  - Funding for CLASS and/or QuITE

- **There is a bright future ahead for the discipline**
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