

Processing of the Interstellar Medium in M83

We have mapped the eastern spiral arm of M83 in the ^{12}CO ($J=2-1$) transition using CSO. The Nyquist-sampled CO map covers a $2.1' \times 3.7'$ field at a sensitivity with $\text{Tr}^* < 20$ mK in a $32''$ beam. This is the most sensitive CO map of this source taken to date. The molecular gas is detected in arm and interarm regions. We have also measured the ^{12}CO ($J=3-2$) line in a $21''$ beam at 14 positions in both arm and interarms regions. We compared the molecular gas distribution with other gas and star formation tracers. The HI arm is displaced by approximately $8''$ downstream from the CO arm, while the dust lanes run along the inner edge of the CO arm. The CO emission correlates better with the non-thermal emission than with the H-beta emission. This implies cosmic ray heating is a more important contributor to the CO emission brightness than UV heating via star formation. We further investigate the heating and photodissociation processes along the eastern arm of M83 by combining our CO observations with ISO C[II], O[I] and far-infrared continuum maps.