

Study of M82 Using Spectra from the Infrared Space Observatory

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We have studied the central parts of M82, which is a well-known infrared luminous, starburst galaxy, by analyzing archival data from the Infrared Space Observatory (ISO). M82 was observed at 11 positions covering ± 45 arcsec from the center along the major axis. We analyzed 4 emission lines, [ArIII] 8.99 μm , H₂ 17.034 μm , [FeII] 25.98 μm , and [SiII] 34.815 μm from SWS02 data. The integrated flux distributions of these lines are quite different. The H₂ line shows symmetric twin peaks at $\sim \pm 30$ arcsec from the center, which is a general characteristic of molecular lines in starburst or barred galaxies. This line appears to be associated with the rotating molecular ring at around ~ 200 pc just outside the inner spiral arm. The relative depletion of the H₂ line at the center may be due to the active star formation activity which dissociates the H₂ molecules. The other lines have peaks at the center and the distributions are nearly symmetric. The line profiles are deconvolved assuming that both intrinsic and instrumental profiles are Gaussian. The velocity dispersion outside the core is found to be ~ 50 kms⁻¹. The central velocity dispersion is much higher than 50 kms⁻¹, and different lines give different values. The large central velocity dispersion (σ) is mostly due to the rotation, but there is also evidence for a high σ for [ArIII] line. We also generated position-velocity maps for these four lines. We found very diverse features from these maps.