

R12b

Search for molecular gas in XUV disk of M83

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We here report our deep CO(1-0) observations with the 45-m telescope at the Nobeyama Radio Observatory towards one of the brightest H II regions in the extended ultraviolet (XUV) disk of a nearby spiral galaxy, M 83. The H II region is located at $\sim 3x$ the optical disk radius, and its metallicity is as low as $0.3 Z_{\odot}$ (Bresolin et al. 2009). The mass of associated young stellar cluster (M_{\star}) is expected to be $\sim 5 \times 10^3 M_{\odot}$ according to our deep H α and optical broadband images taken with Suprime-Cam on the Subaru telescope (Koda et al. 2012). As a result, no apparent CO emission was detected after the 10.8-hrs integration. The achieved rms is 21.0 mK in T_{mb} scale over 0.32 km s^{-1} resolution. The upper limit for molecular gas mass (M_{mol}) is $6.2 \times 10^4 M_{\odot}$ assuming the Milky-Way X_{CO} and a Gaussian profile of CO emission with a peak of $2 \times \text{rms}$ and FWHM of 2.3 km s^{-1} . Our result suggests an 8x larger X_{CO} in the XUV disk than the Milky-Way value if we assume typical galactic disk SFE ($= \frac{M_{\star}}{M_{\star} + M_{\text{mol}}}$) of 1%. Otherwise we must conclude that SFE is elevated in XUV-disks compared to ordinary galactic environments in spite of their low gas densities.