Physical Conditions of Molecular Clouds in the Irregular Galaxies IC 10 and NGC 6822

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ABSTRACT

We have observed three molecular clouds in the Local Group dwarf irregular galaxies IC 10 and NGC 6822 in the $J = 2 - 1$ and $J = 3 - 2$ transitions of ^{12}CO and ^{13}CO with the James Clerk Maxwell Telescope. Analysis using a large velocity gradient code indicates that one of the clouds in IC 10 has a quite high kinetic temperature of ~ 100 K, while the second cloud is somewhat cooler. Interestingly, the line ratios for the cloud in NGC 6822 clearly indicate optically thin ^{12}CO lines with relatively high (> 50 K) kinetic temperatures. Comparison of these data with similar data for clouds in M33 will be used to determine whether the lower metallicity of the dwarf irregular galaxies has a significant effect on their physical structure.