

## INFERRING THE TEMPERATURE AND DENSITY OF DIFFUSE INTERSTELLAR CLOUDS FROM C<sub>3</sub> OBSERVATIONS

NICOLE KOEPPEN, *Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, IL, USA*; BENJAMIN J. McCALL, *Departments of Chemistry and Astronomy, University of Illinois at Urbana-Champaign, Urbana, IL, USA*.

Observations of carbon chain molecules are useful in determining the number densities and temperatures of diffuse interstellar clouds. In 2003, C<sub>3</sub> was observed towards ten different sightlines and the rotational distributions were determined using the oscillator strengths available at that time.<sup>a</sup> The population of each rotational level was adjusted individually in order to obtain the best fit for all of the P, Q, and R branch lines. This past year, the effect of perturbing states on the C<sub>3</sub> spectrum was elucidated, and improved oscillator strengths determined.<sup>b</sup> With these new values, we have redetermined the rotational distribution of C<sub>3</sub> in these ten sightlines, and used a rotational excitation model analogous to that of Roueff et al.<sup>c</sup> and collisional cross sections from Smith et al.<sup>d</sup> to infer the kinetic temperatures and number densities.

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<sup>a</sup>Adamkovics et al. *Ap.J.*, 595, 235 (2003)

<sup>b</sup>Schmidt et al. *MNRAS*, 441, 1134 (2014)

<sup>c</sup>Roueff et al. *A&A*, 384, 629 (2002)

<sup>d</sup>Smith et al. *J. Phys. Chem. A*, 118, 6351 (2014)