

**C₃: RO-VIBRATIONAL ENERGY LEVELS AND LINE-STRENGTHS FOR
THE ELECTRONIC GROUND-STATE**

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Although propadienediylidene (tricarbon, C₃) is a major constituent of carbon vapour and therefore a vital molecule for diagnosing the state of astrophysical and terrestrial gases containing carbon, available spectroscopic data on hot C₃ are sparse and studies limited as a consequence. As steps towards constructing a full line-list involving states with energies ($\leq 4000 \text{ cm}^{-1}$) we have undertaken two tasks. First, levels and corresponding line strengths have been calculated for ¹²C¹²C¹²C and its isotopologues (¹²C¹³C¹²C and ¹³C¹²C¹²C) for $0 \leq J \leq 20$ and $0 \leq K \leq 15$. Partition functions and cross-sections have been deduced for temperatures $\leq 20\text{K}$ and made available for absorption line studies at interstellar conditions. These results can be compared with the astronomical observations of Giessen *et al.* [1] Second, a MARVEL (measured vibration rotation energy levels) study has been completed: transition data covering both the ground ($X^1\Sigma_g^+$) and first singlet excited ($A^1\Pi_u$) states were extracted from 13 sources giving a set of 4773 transitions from which 1687 energy levels covering both the *X* and *A* state were extracted. The recent work of Martin-Drumel *et al.* [2] provided a particularly useful starting point for this study. Results of both studies will be reported at the conference.

[1] T.F. Giesen *et al.*, *Astron. Astrophys.*, 633, A120 (2020).

[2] M.-A. Martin-Drumel *et al.*, *J. Molec. Spectrosc.* 391, 111734 (2023).