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The Need for Oscillator Strengths to Study the Molecular Universe¹

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Oscillator strengths, or equivalently absorption cross sections, are needed to convert the amount of absorption seen in spectra into abundances and to determine dissociation rates in photochemical models of astronomical environments. In turn, the measurements provide important information on molecular structure. I will focus on CO, which is observed in planetary atmospheres and comets, in interstellar clouds and disks surrounding newly formed stars, and in gas associated with the late stages of stellar evolution. Its photodissociation involves line absorption, and oscillator strengths are needed for calculating the amount of self shielding, where optically thick absorption drastically lowers the photodissociation rate.

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