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# MOLECULAR LINE WIDTHS AT STELLAR ATMOSPHERE CONDITIONS

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Molecules are the dominant opacity source in the atmospheres of cool stars, brown dwarfs and planets. As with rapidly decreasing electron pressure at the temperatures of the lowest-mass stars almost no true continuum opacity sources remain, the pseudo-continuum of molecular bands obtains a decisive impact on radiative transfer, and thus thermal structure of the atmosphere. To correctly include molecular opacities in stellar atmosphere calculations, therefore both complete and reasonably accurate lists of line strengths and positions, and correct treatment of line broadening is required. Clearly the classical recipes for calculating Van der Waals broadening e.g. by Unsöld, and their extension to non-hydrogenic atoms, can at best give a crude estimate of molecular interactions. For a realistic treatment of collisional damping therefore measured widths or more sophisticated theoretical broadening constants of molecular lines are required.

In this contribution, an overview of the experimental and theoretical status of line widths for the most important species in ultracool atmospheres, $H_2O$, $CH_4$, CO and $NH_3$, is given. The main difficulty in finding realistic line widths for brown dwarf or stellar models is the paucity of measurements both for the temperature conditions, and for collisions with the dominant perturber in these atmospheres, $H_2$. Also, theoretical models still struggle to explain observed variations of the width with rotational and vibratonal quantum numbers. The effect of the uncertainty in the resulting Voigt profile widths is studied in model atmospheres computed with the `PHOENIX` code.