Laboratory Astrophysics for Cool Stars and Exoplanets

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Molecular opacities are based on line lists for small molecules and on absorption cross sections for larger molecules. In this talk research results from our laboratory will be surveyed on the preparation of line lists for diatomic molecules such as TiO, ZrO, ScO, C2, etc. using experimental measurements with a Fourier transform spectrometer for line positions and ab initio (transition) dipole moment functions for line strengths. Our measured line lists for high temperatures for small polyatomic molecules such as methane will also be presented as well as measurements of infrared absorption cross sections for hot hydrocarbons such as ethane. Precise laboratory measurements are needed to improve the predictions of ab initio line lists and are required for high resolution cross correlation spectroscopy of exoplanets.