

Physikalisches Kolloquium



Thursday, 15.01.15, 17:15, HS 100
Reception with coffee & cookies 16:45

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Molecular astro-spectroscopy; bridging gas phase and solid state processes in space

Abstract

Today, astrochemists explain the chemical complexity in space as the cumulative outcome of reactions in the gas phase, on the surfaces of interstellar grains, and in icy grain mantles. Gas phase models explain the observed abundances of molecules like the linear carbon chain radicals C_6H and $HC_{11}N$, but fail to explain the observed abundances of several stable species, e.g., water, methanol and acetonitrile; a closely related molecule for the simplest amino acid glycine; as well as larger compounds such as glycolaldehyde, dimethylether and ethyleneglycol. Evidence has been found that these and other complex, organic compounds form on icy dust grains that act as catalytic sites for molecule formation. External triggers are provided upon (non)energetic processing, such as irradiation by vacuum UV light, interaction with particles (atoms, electrons and cosmic rays), or heating. This talk summarizes the outcome of recent spectroscopic work, focusing on both gas phase and solid state spectra of molecules of astronomical interests, and bridging the grain-gas-gap. New cavity based techniques are introduced as highly sensitive spectroscopic tools to study astrophysically relevant transients that are hard to generate in large abundances. It also shows how spectroscopy can be used to characterize in situ and in real time chemical processes in interstellar ice analogues, e.g. upon atom addition reactions and vacuum UV induced photoprocessing, and how this explains astronomical observations or guides observational surveys investigating the molecular inventory of the inter- and circumstellar medium.



All of you interested in physics are cordially invited!