INTERSTELLAR HYDRIDE SPECTROSCOPY WITH HERSCHEL

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The Herschel satellite is now giving access with unprecedented sensitivity to the THz spectral range. In particular ground state lines of simple neutral and ionized hydrides have been detected in a wide range of interstellar environments, leading to a renewed understanding of the formation processes of interstellar molecules in the diffuse interstellar medium.
In this talk, I will present recent results obtained with the Herschel HIFI and PACS instruments on the carbon, oxygen and nitrogen hydrides. I will discuss how CH and HF can be used as tracers of molecular hydrogen in the diffuse interstellar matter, the new diagnostic capabilities of the cosmic ray ionization rate opened by the OH^+ and H_2O^+ molecular ions, and the role of the dissipation of turbulence in the production of the CH^+ and SH^+ reactive ions.

Figure 1: Example of Herschel/HIFI spectra towards the massive star forming region G10.6–0.4. The diffuse interstellar matter along the line of sight towards this massive object is producing multiple absortion features from $\sim$ 6 to$\sim$ 50 km/s while the emission or absortion signals between -20 to 5 km/s are caused by the massive source itself.