Water in Space: from interstellar clouds to planet-forming disks

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Water is a key molecule in the physics and chemistry of regions in which new stars and planets are born. In the 'Water in Star-forming Regions with Herschel (WISH) Key Program, we are obtaining a comprehensive set of water data toward a large sample of well-characterized protostars, covering a wide range of masses and luminosities - from the lowest to the highest mass protostars -, as well as evolutionary stages - from the first stages represented by pre-stellar cores to the late stages represented by the pre-main sequence stars surrounded only by disks. Lines of both ortho- and para-H2O and their isotopologues, as well as chemically related hydrides, are observed with the HIFI and PACS instruments. The data elucidate the physical processes responsible for the warm gas, probe dynamical processes associated with forming stars and planets (outflow, infall, expansion), test basic gas-phase and gas-grain chemical processes, and reveal the chemical evolution of water and the oxygen-reservoir into planet-forming disks. The importance of close interaction between astronomy and laboratory experiments will be emphasized.

This talk is presented on behalf of the entire WISH team. More details can be found at http://www.strw.leidenuniv.nl/WISH.