OBSERVATIONS OF OH^+ AND H_2O^+ ACROSS THE GALAXY WITH HERSCHEL

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The launch of the Herschel Space Observatory in 2009 opened up the possibility for high resolution spectroscopic astronomical observations at THz frequencies. This has led to the detection of several new species in the interstellar medium, including OH^+ and H_2O^+. Both of these molecules were observed as part of the PRISMAS[a] key programme, and are detected in absorption in eight sight lines that probe material up to distances of 12 kpc away. From these observations we derive column densities of both species, which are then used to determine the molecular hydrogen fraction in multiple velocity components along each line of sight. Additionally, we estimate the ionization rate of atomic hydrogen due to cosmic rays. Finally, we compare molecular hydrogen fractions and cosmic-ray ionization rates inferred for different clouds and sight lines with each other, and with other tracers of both parameters with the intent of searching for variations across the Galaxy.

[a] PRobing InterStellar Molecules with Absorption line Studies