Q38a Measuring the ionisation fraction across the Galaxy using Planck cold clumps

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Cosmic rays play an important role in the dense interstellar medium as they are the primary source of ionization in dense environments. The cosmic ray ionization rate is generally taken to be $\sim 10^{-17}\,\mathrm{s}^{-1}$ (Spitzer & Tomasko 1968), although large variations have been observed toward different sources across the Galaxy. The cosmic ray ionization fraction influences the star-forming process in two ways: i) it influences the fragmentation of clumps and filaments through ambipolar diffusion; and ii) it has a significant impact on the chemistry. With the IRAM 30m telescope we observed the (1-0) transition of HCO^+, DCO^+ and $H^{13}CO^+$ toward 18 dense Planck Galactic cold clumps in different evolutionary stages with peak H_2 column density above $10^{22}\,\mathrm{cm}^{-2}$. This sample allowed us to investigate the ionization fraction across the whole Galaxy. We derived the ionization fraction and the cosmic ray ionization rate of the gas in this sample of Planck clumps to study the influence of the degree of ionization in clump fragmentation and level of star formation.