Diagnostics of charge-exchange emission in the heliosphere and the interstellar medium

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Charge-exchange (CX) emission exhibits very distinct spectral characteristics with respect to thermal plasma emission. For instance, the line intensity ratios (forbidden, intercombination and resonance lines) in triplets of He-like ions (e.g., O VII, Ne IX) are very different and could be used as spectral diagnostics to separate the two mechanisms. While thermal emission has a very strong resonance line (574 eV), CX emission favours the forbidden transition (560.9 eV) of the O VII triplet. At CCD resolution and for diffuse sources the triplets are not resolved, and we cannot measure the individual line ratios. However, it is possible to use the apparent displacement in energy of the unresolved Gaussian centroid to estimate the relative contribution of the individual transitions and thus determine the dominant emission mechanism. I will discuss the use of spectral diagnostics, as well as spatial and temporal ones, in order to estimate the contribution of solar wind CX emission from the heliosphere to the local soft X-ray background, and the contribution of the CX mechanism to soft X-ray emission from hot-cold gas interfaces in the interstellar medium.