
The warm ionised medium: hotter and denser than you thought

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Abstract

The warm ionised medium (WIM) is usually thought of as a low density, photoionised gas. However, Herschel far infrared observations of N+ spectral lines show that dense plasma is ubiquitous in the inner Galaxy. Bringing together various diagnostics of the ionised medium, we find that although the dense-WIM forms a thin disk in the inner Galaxy, it is likely the source of much of the free-free emission and line emission seen all over the sky. This same model is responsible for pulsar dispersion measures in the Galactic plane, and can provide a natural explanation for extreme scattering phenomena as observed in some radio quasars. Our spectral modelling suggests that the dense-WIM is too hot to be photoionised, and that cosmic-rays could be responsible instead.

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