

# HCN/HNC intensity ratio: a new chemical thermometer for the molecular ISM

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We have investigated the molecular emission around the Integral Shape Filament in Orion using using large-scale, broad-band IRAM30m observations of both HCN (1-0) and HNC (1-0) transitions at 3mm (see Hacar, Bosman, & van Dishoeck 2019). In combination with ancillary gas and dust temperature measurements, we find a systematic temperature dependence of the observed  $I(\text{HCN})/I(\text{HNC})$  total integrated intensity ratio across our maps. Additional comparisons with chemical models demonstrate that the observed  $I(\text{HCN})/I(\text{HNC})$  variations are driven by the effective destruction and isomerization mechanisms of HNC under low energy barriers. Our results demonstrate that the observed  $I(\text{HCN})/I(\text{HNC})$  line ratio can be effectively used as direct proxy of the gas kinetic temperature under standard ISM conditions. Since these lines are easily obtained in observations of local and extragalactic sources, our results highlight the potential use of this observable as new chemical thermometer for the ISM.

**References:** Hacar, Bosman, & van Dishoeck, 2019, accepted by A&A, arXiv191013754H

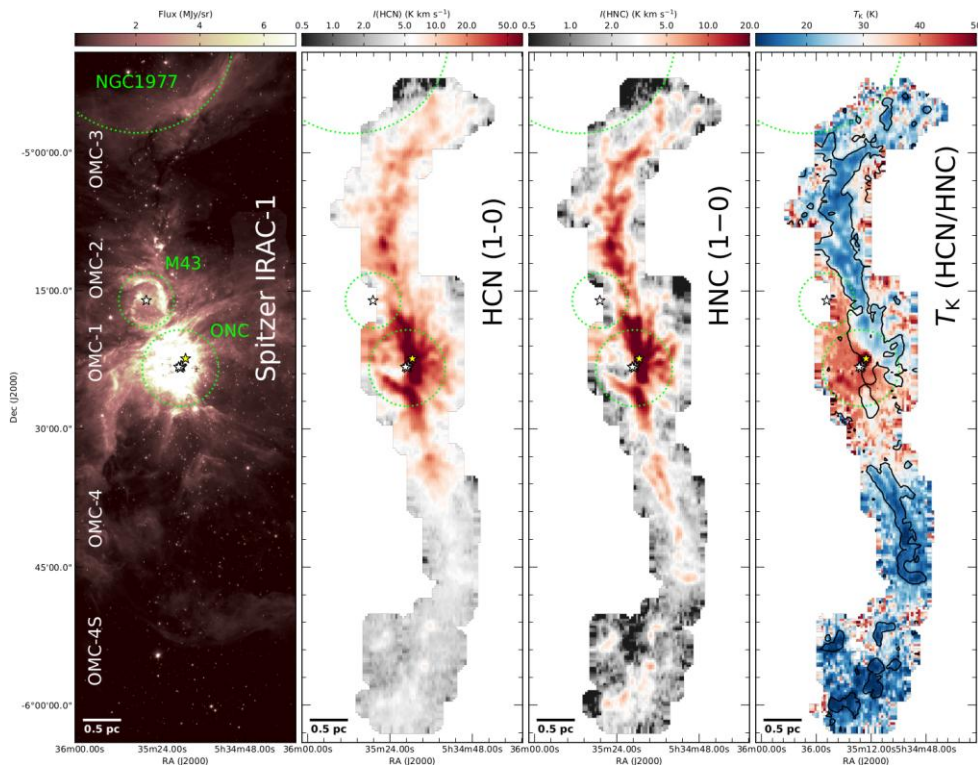


Figure: HCN/HNC as temperature tracer in the ONC region.