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Sesión Científica: La via lactea y sus componentes

Titulo: Unraveling the contribution of jets and discs to far-infrared line emission

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Resumen:

Protoplanetary discs are ubiquitously found around young stars and are the sites where planets form. As part of \\textit{Herschels'} key programme “Gas in Protoplanetary Systems” (GASPS), we have analyzed far-IR (60—190 $\\rm \\mu m$) spectra of protoplanetary discs around 76 T Tauri stars located in Taurus. These stars are in different evolutionary states from Class I to Class III sources, and 27 show jet/outflow activity. We derived fluxes of all detected atomic and molecular lines — [OI], [CII], CO, H$_{2}$O and OH. Outflow sources are found to have the richest spectra and highest line fluxes, while non-outflow sources are rather poor in lines. We find that just from an observational perspective, the outflow rather than the disc dominate the emission at early evolutionary stages (Class I/II). We found correlations between several emission lines which suggests a common origin. To verify whether the line emission is associated with the protoplanetary disc or shocks, we compared the observed line fluxes and their ratios with disc and shock models. The atomic gas line ratios are compatible either with PDR (log$G_{\\rm 0}>$3, $n>$10$^{4} cm^{-3}) and fast ($V_{\\rm shock}$50 km/s) \\emph{CJ}-type shock emission with densities $\\sim$10^{3} cm${-3}$. The molecular emission is more compact and better explained with slow (V$_{\\rm shock}\\sim$15–40 km/s) \\emph{CJ}-type shocks involving densities between 10$^{\\rm 4}$ cm^{-3} and 10^{\\rm 6}$ cm^{-3}, depending on the particular line. The disc models fail to reproduce the high line fluxes. We compare dust tracers with the line fluxes, to understand how much emission can be associated with the disc at different evolutionary stages. We conclude that models taking into account jets, disc and their mutual interaction are needed to precisely interpret observations of young T Tauri stars.