

P134a **High-resolution observations of G191.51-0.76**

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Infrared Dark Clouds (IRDCs), seen in extinction against the mid-IR Galactic background, are thought to be the sites of intermediate and massive star formation. The IRDC samples are however very biased by the detection method, which requires a bright background such as the inner Galaxy. Herschel and Planck observatories, which operated in the far-IR and sub-mm, detected massive clouds in emission throughout the Galaxy. We have investigated the Planck cold clumps in the Galactic Plane based on Herschel Hi-GAL observations and characterized their physical properties as a function of location within the Galaxy (Zahorecz et al. 2016, A&A, 591, 105). G191.51-0.76 is one of the cold clumps detected with Planck in the outer Galaxy. It has a network of filaments converging into a central massive clump (hub-filament system), and it does not show 70 micron sources making it a precursor of previously reported hub-filament systems such as IRDC SDC13.

As part of our follow-up study on selected Planck clumps we successfully observed the  $^{13}\text{CO}$ ,  $\text{C}^{18}\text{O}$ ,  $\text{N}_2\text{H}^+$ , HNC and  $^{13}\text{CS}$  emission toward G191.51-0.76 with the APEX 12 m telescope and the ALMA interferometer in Band 3 to determine its physical properties, fragmentation and gas dynamics. I will present our results of the two dense fragments in G191.51-0.76, which show different evolutionary stage.