



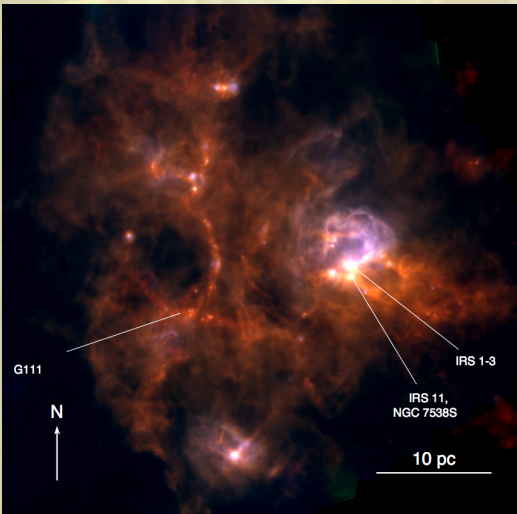
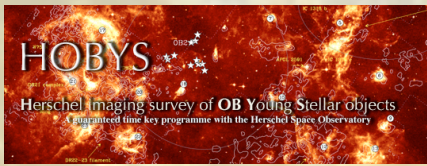
# HERSCHEL REVEALS MASSIVE COLD CLUMP CANDIDATES IN NGC 7538



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\*Fallscheer et al., 2013, ApJ, in press

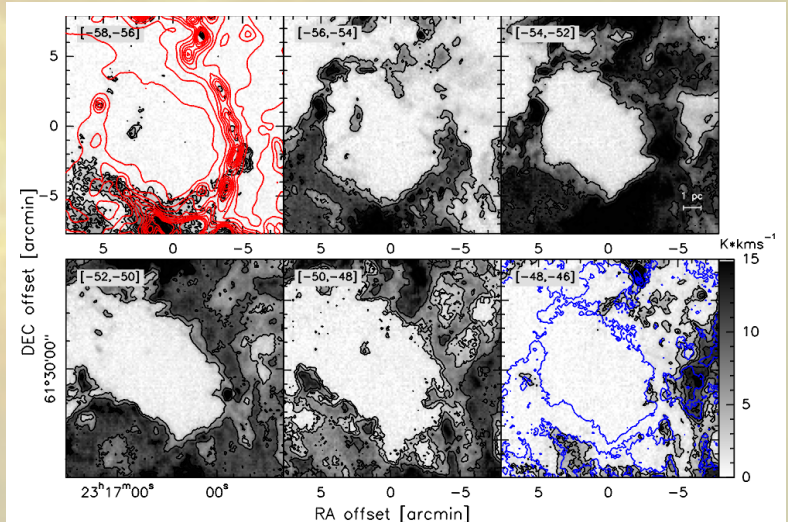
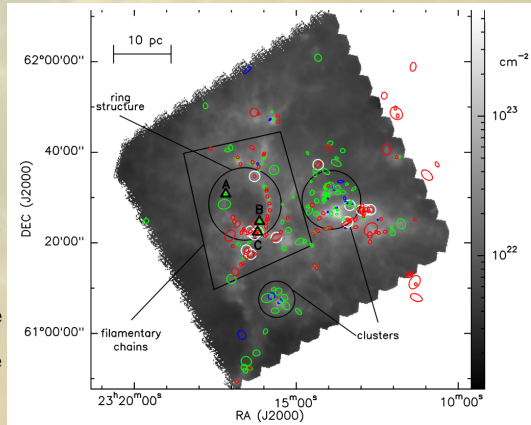
Observations of the high-mass star formation region NGC 7538 taken with the Herschel Space Observatory were made at 70, 160, 250, 350, and 500 micron as part of the Herschel imaging study of OB Young Stellar objects (HOBYS) Key Programme. Within the one square degree field, we identify 780 dense sources and classify 224 of those. With the intention of investigating the existence of cold massive starless or class 0-like clumps that would have the potential to form intermediate- to high-mass stars, we further isolate 13 clumps as the most likely candidates for follow-up studies. A peculiar feature in the observations is a large, nearly complete ring of material. The evacuated ring is of unknown origin and hosts a number of the detected sources.



Three-color image of a  $\sim 50' \times 50'$  region of NGC 7538 including SPIRE  $250 \mu\text{m}$  (red), PACS  $160 \mu\text{m}$  (green), and PACS  $70 \mu\text{m}$  (blue).

Integrated intensity maps of the ring region in JCMT CO(3-2) data. **Red contours:** column density from  $5 \times 10^{21} \text{ cm}^{-2}$  to  $5 \times 10^{22} \text{ cm}^{-2}$  in steps of  $5 \times 10^{21} \text{ cm}^{-2}$ . **Blue contours:** integrated intensity over the entire velocity range ( $-58 \text{ km s}^{-1}$  to  $-41 \text{ km s}^{-1}$ ) of emission.

Greyscale: Column density plot overlaid with 224 compact sources extracted from the Herschel maps using getsources. The colored ellipses represent the peak wavelength of each source's SED. Sources that are brightest at  $70 \mu\text{m}$  or  $160 \mu\text{m}$  are blue or green, respectively, and sources that are brighter at  $250 \mu\text{m}$  or longer are red. White circles indicate 13 candidate sites of high-mass star formation. Details about the sources labeled A, B, and C can be found in Fallscheer et al. (2013).



## Summary

\*The HOBYS Key Programme was designed to gain a better understanding of the formation of high-mass (O and B) stars. Within that project, NGC 7538 was mapped with Herschel's PACS and SPIRE instruments.

\*We find 13 massive dense clump candidates with masses in excess of  $40 M_{\odot}$  and temperatures below 15 K. They range in size from 0.4 pc to 2.5 pc and have densities between  $3 \times 10^3 \text{ cm}^{-3}$  to  $4 \times 10^4 \text{ cm}^{-3}$ .

\*We detect a ring of unknown origin that hosts many cold sources along its filamentary edge.



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