Do you miss Herschel? - Use SOFIA!

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Do you still have questions from the Herschel data?
– SOFIA (the Stratospheric Observatory for Infrared Astronomy) might have more answers than you think!
Learn more about the flying IR observatory, check how to apply for observations, fly on SOFIA and enjoy your new data.

Figure 1: SOFIA © NASA/USRA

The *Herschel* spectroscopic view toward Sgr A*

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Herschel made possible to study the properties of the, not so well constrained, warm molecular gas and dust inside the cavity of the circumnuclear disk (CND; gas in the inner central parsec of the Galaxy). In this communication, we summarize the results of a far-IR spectral scan toward Sgr A* taken with PACS and SPIRE-FTS spectrometers [1], and a velocity-resolved scan (~480-1250 GHz) and [CII] 158 μm line observations carried out with HIFI. The very high spectral resolution ($R>10^6$) achieved by HIFI allowed us to resolve the velocity structure in the line-of-sight toward the Galactic Center and, for the first time at far-IR wavelengths, the intrinsic molecular emission from the central cavity. We report the presence of high positive-velocity emission (up to about +300 km s^{-1}) detected in the wings of the ^{12}CO J=5-4 to 10-9 lines [2]. This wing component is also seen in H_2O ($1_{1,0}$-$1_{0,1}$), a tracer of hot molecular gas; and in [CII] 158 μm, an univocal tracer of the FUV radiation (~ 6 - 13.6 eV). However, the high velocity wings are not detected in [CI] 492, 806 μm. Later, ALMA images have spatially resolved a collection of ^{12}CO J=3-2 molecular "cloudlets" emitting at high positive velocities ($\upsilon_{LSR}\simeq$+150 to +300 km s^{-1}) inside the central cavity [3]. This work emphasizes the strong synergy between far-IR observations from space and (sub)mm observations with ALMA. Our study adds more quantitative evidence to the existence of high-velocity, warm molecular gas ($T_k\simeq$400-2000 K) inside the cavity of the CND and close to Sgr A* (<1pc), the supermassive black hole of the Milky Way.

[1] Goicoechea, J.R., Etxaluze, M., Cernicharo, J. et al. 2013 ApJ 769 L13
[2] Goicoechea, J. R., Santa-Maria, M. G., Teyssier, D., et al. 2018 A&A 616 L1
[3] Goicoechea, J. R., Pety, J., Chapillon, E., et al. 2018 A&A 618 A35