

# FIFI-LS

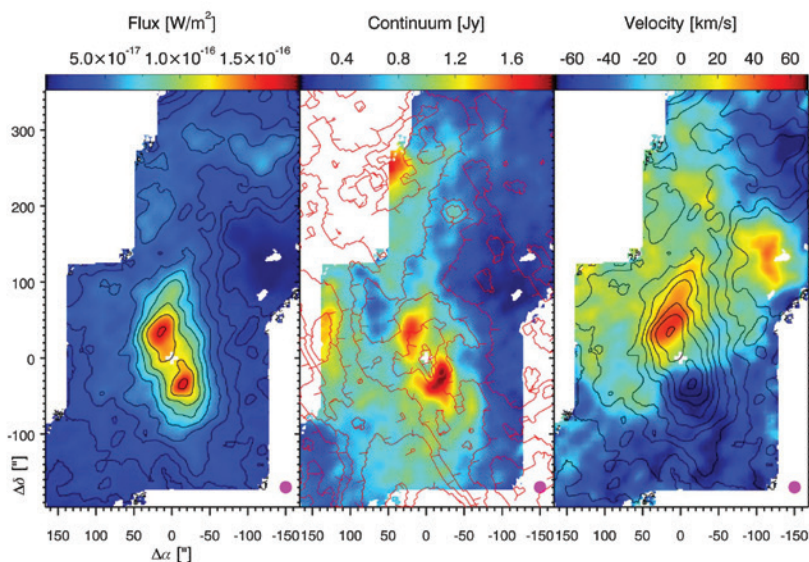
## FIFI-LS: Field Imaging Far-Infrared Line Spectrometer

Facility Class, Integral Field, Far-Infrared Spectrometer

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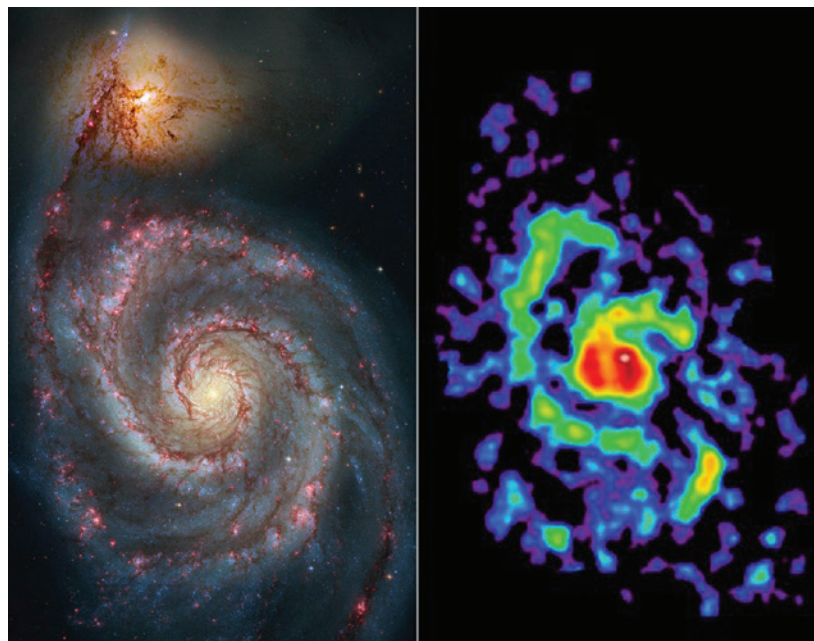
### The Circumnuclear Ring in the Galactic Center

[CII] emission line flux (*left*), continuum with H<sub>2</sub> shown by red contours (*center*), and [CII] velocity maps with [CII] line flux shown by black contours (*right*) from fits to FIFI-LS data. The velocity map in the inner 100" shows a rotation-like pattern around Sgr A\* with redshifted emission to the north–northeast and blueshifted emission to the south–southwest, aligned with the [CII] emission peaks and the continuum peaks. (*Iserlohe et al. 2019, ApJ, 885, 169.*)



### The Whirlpool Galaxy, M51

Optical image from the HST (*left*) and [CII] line flux from FIFI-LS (*right*) showing how the [CII] traces the star formation in the spiral arms of the galaxy with a good correlation seen between star formation surface density and [CII] flux in the central, spiral arm, and inter-arm regions. M51b, at the top of both images, is much fainter in [CII]; this is thought to be a result of suppressed star formation in that galaxy, whose high IR continuum flux is believed to be due to mechanisms other than star formation. (*HST image: NASA, Hubble Heritage Team, (STScI/AURA), ESA, S. Beckwith (STScI). Additional Processing: Robert Gendler. SOFIA image: J.L. Pineda et al. 2018 ApJL, 839, L30; C. Fischer/DSI*)



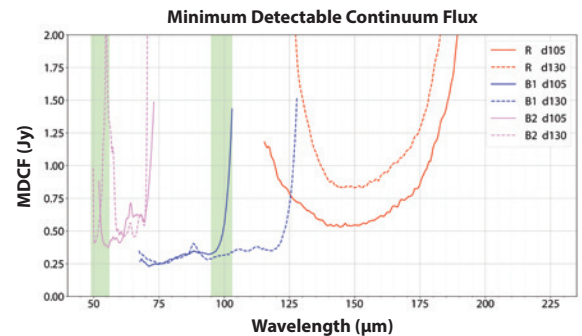
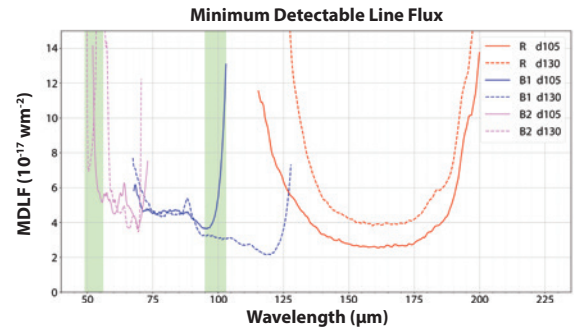
## Specifications

FIFI-LS is an integral field, far-infrared spectrometer consisting of two independent grating spectrometers. Each spectrometer has a detector consisting of 400 pixels of Gallium-doped Germanium photoconductors. The projection onto the sky of the 5x5-pixel FOVs of the blue channel and the red channel is nearly concentric (10" offset), but the angular coverage differs. The spectral resolution channels vary between 500 and 2000, depending on the observed wavelength, with higher values reached towards the long wavelength ends of each spectrometer.

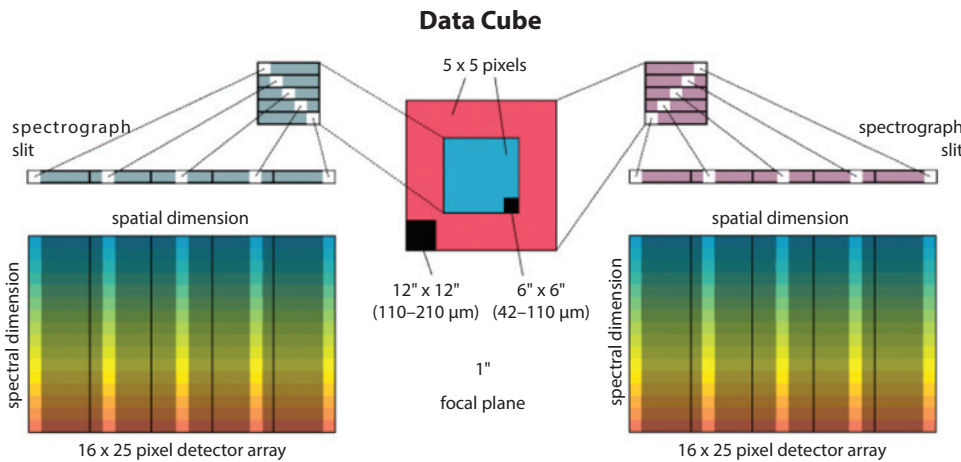
**Channel Parameters**

Channel	Field of View	Pixel Size	$\lambda$ Range
Blue	30" x 30"	6" x 6"	51–120 $\mu\text{m}$
Red	1' x 1'	12" x 12"	115–200 $\mu\text{m}$

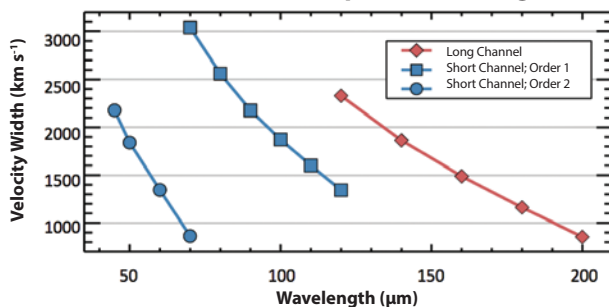
**Predicted Sensitivity for SNR = 4 in 900 s**



*Left:* The integral field unit for each channel consists of 15 specialized mirrors to slice the two dimensional 5x5 pixel FOV into five slices that are each five pixels long, which are then reorganized along a one dimensional line (25x1 pixel), forming the spectrometer entrance slit. The diffraction grating disperses the incoming light, which reaches the 16x25 pixel detector array. The result is a "data cube" with 5x5 spatial pixels and 16 pixels in the spectral dimension.



**Instantaneous Spectral Coverage**



**Spectral Resolution**

