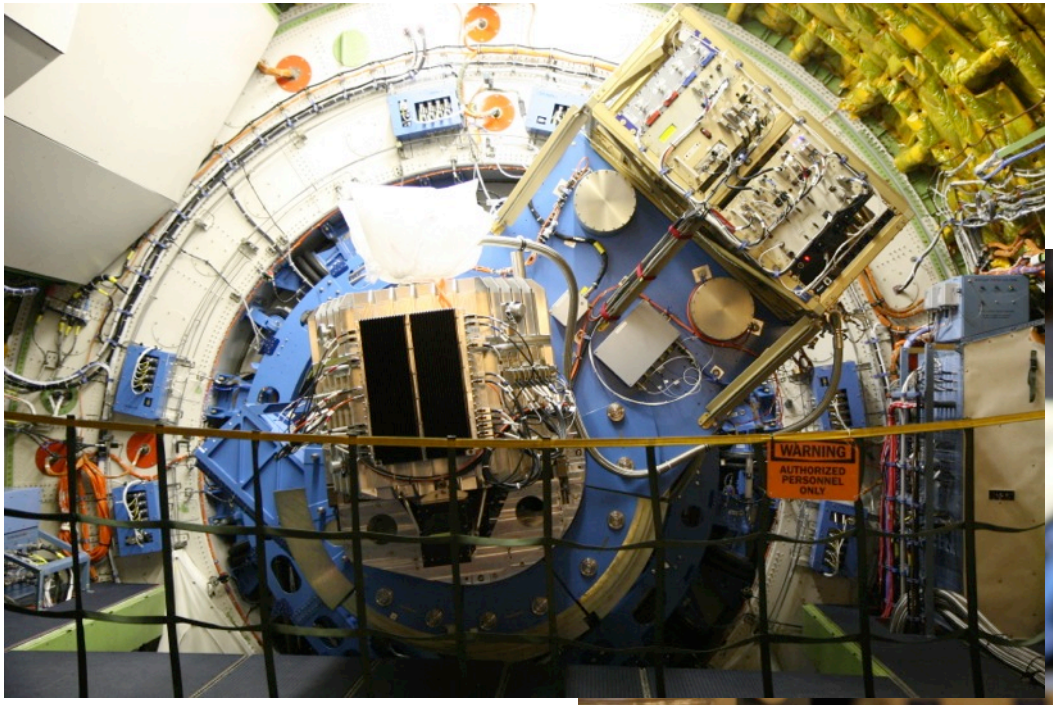
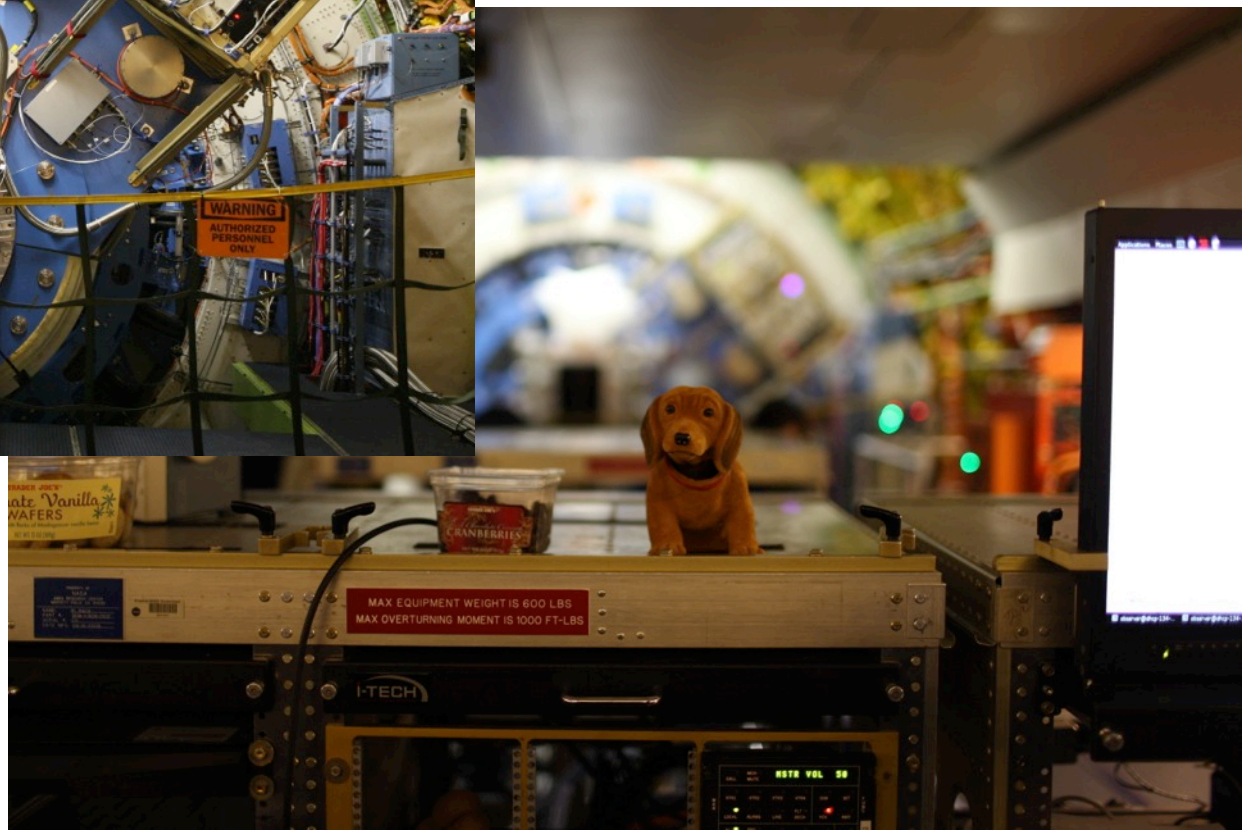
FIFI-LS Commissioning



March – April 2014



Dr. Randolf Klein
FIFI-LS Instrument Scientist
USRA

The Team

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R. Klein A. Krabbe L. Looney A. Poglitsch
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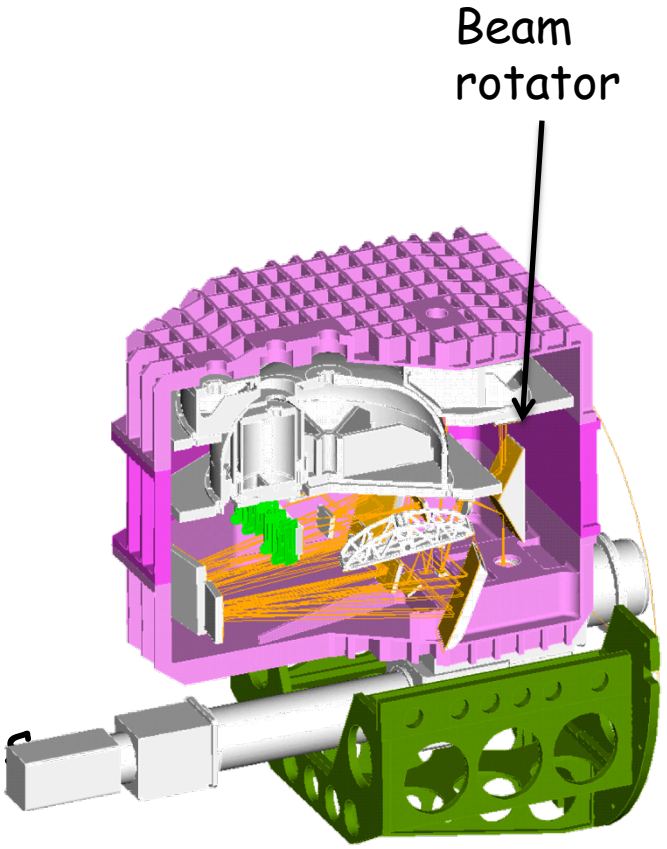
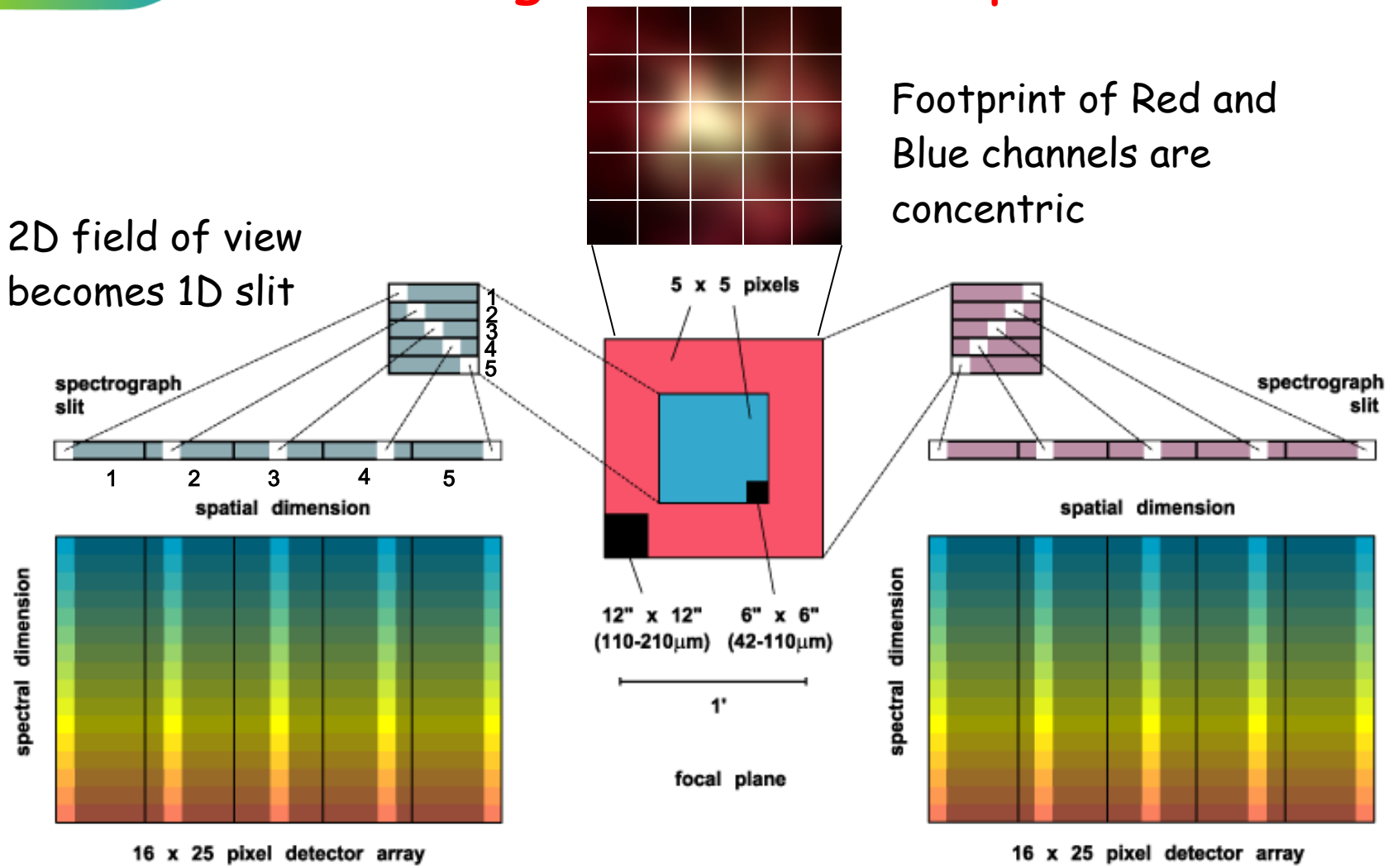
FIFI LS: the Field-Imgaging Far-Infrared Line Spectrometer

- Far-infrared spectrometer employing two parallel channels:
  - Blue 50-110 μm
    5x5 pixel field of view: 6″ per spatial pixel
  - Red 110-200 μm
    5x5 pixel field of view: 12″ per spatial pixel
- Imaging spectrometer concept
  - Each channel: 5x5 spatial pixels
  - 16 spectral pixels per spatial pixels
- Spectral resolution: R=1000-3000



Integral Field Concept



Footprint of Red and Blue channels are concentric

2D field of view becomes 1D slit

2D detector contains 3D data cube

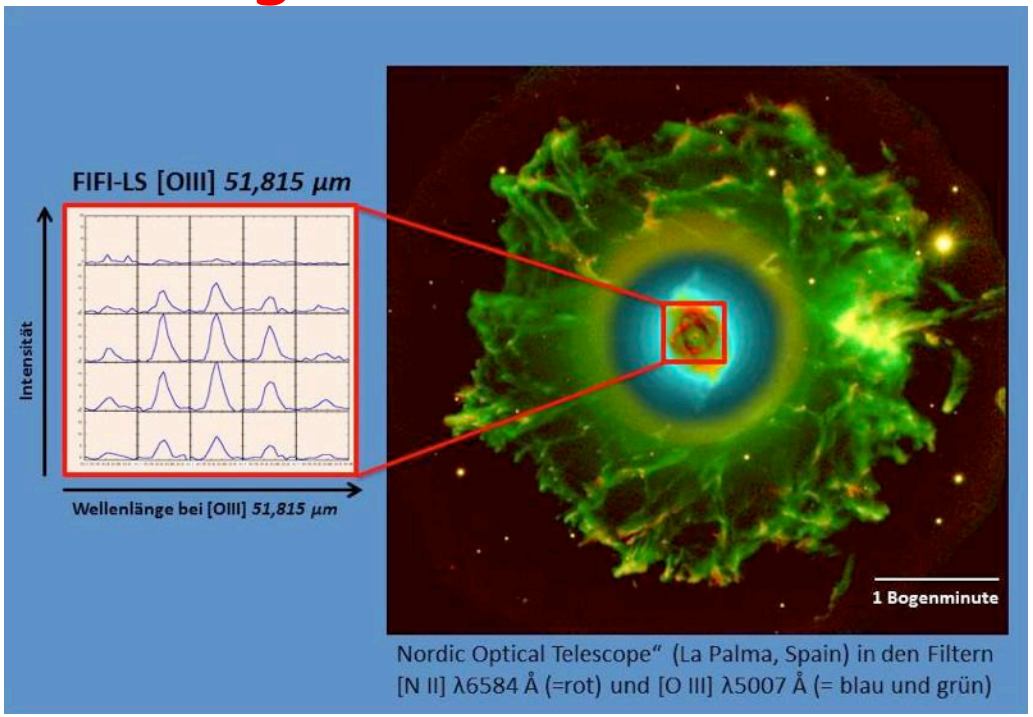
1st Commissioning Series

March:

- 1st Installation
- 2 nights of Line Ops
- 3 flights

Results:

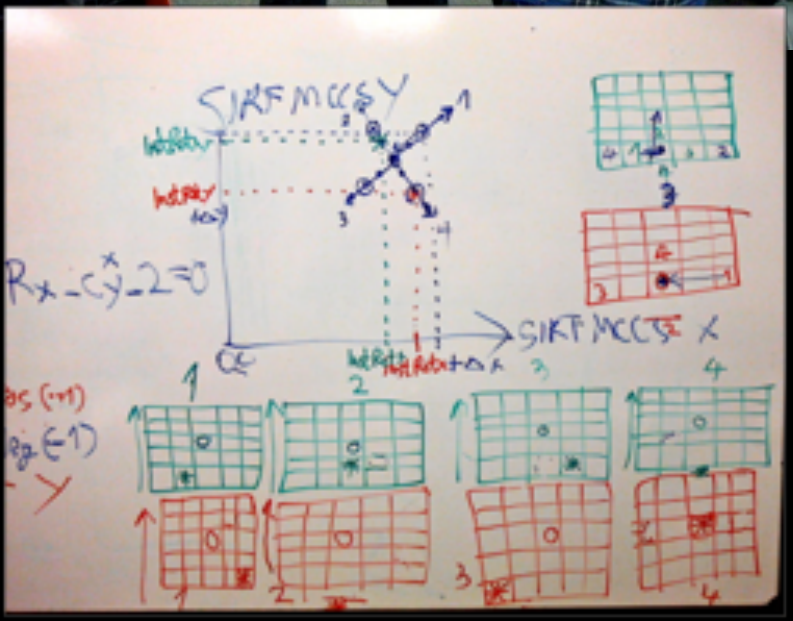
- 1st view of Mars was right on boresight



Nordic Optical Telescope" (La Palma, Spain) in den Filtern [N II] λ6584 Å (=rot) und [O III] λ5007 Å (= blau und grün)

- Boresight established for all beam rotator positions
- Spectral lines detected, spectral calibration verified
- Adjusting the field rotation did not work

Discussions



2nd Commissioning Series

One month later after discussions, SIL-Tests, software updates, and more SIL-Tests

April:

- 2nd Installation
- 1 night of Line Ops
- 5 flights: commissioning and science

Boresight and field rotation established and verified on first flight.

Testing and developing observing modes: interleaving of nodding, spectral scanning, and mapping.

Demonstration Science – some preliminary results:

Targets

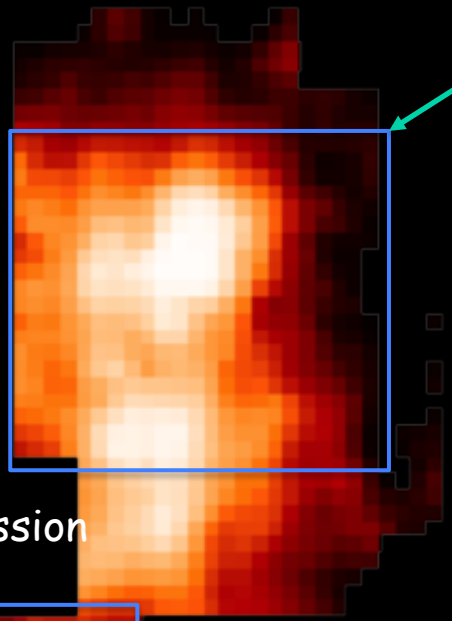
Team:

- Orion
- M82
- NGC 1569
- Galactic Center

Community Proposals

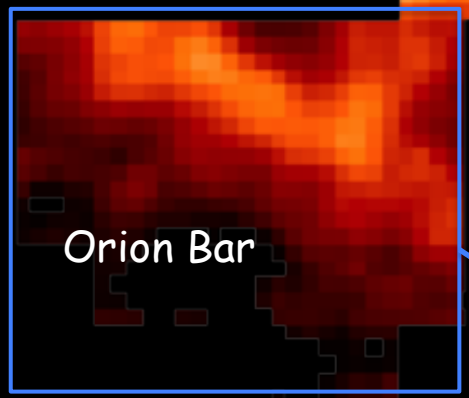
- Dark Clouds (also Team)
- Massive YSO w/ jet
- SNR
- Binary merger

SOFIA & FIFI-LS



BN-KL

[OI] 63μm line emission

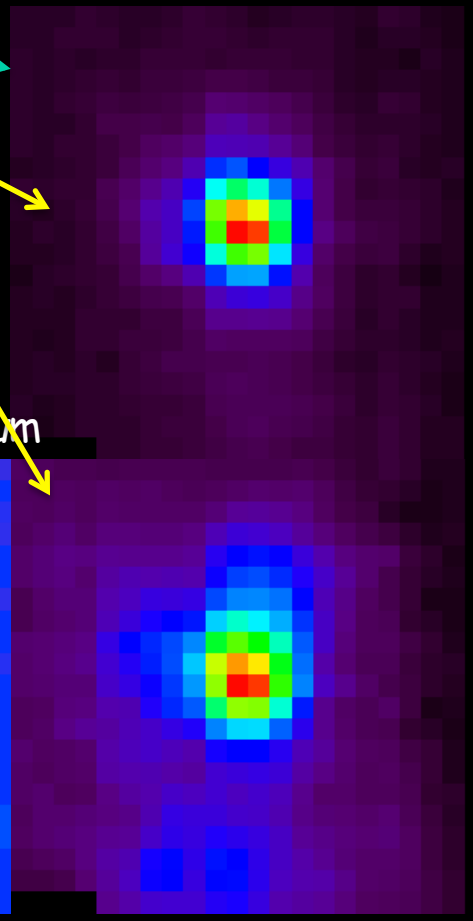


Orion Bar

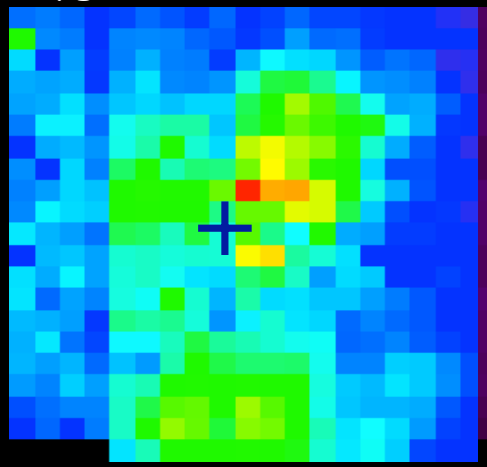
BN-KL Position

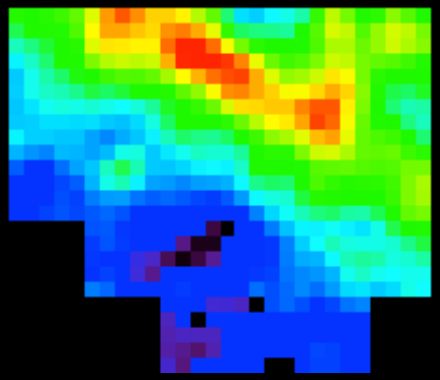
Continuum@ 63 μm

Continuum and oxygen emission @ 63 μm

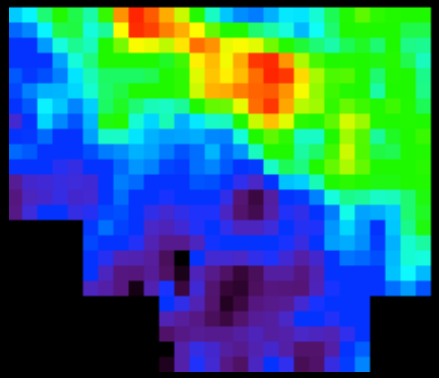


Oxygen emission @ 63 μm





Bar @ [OI] 63μm

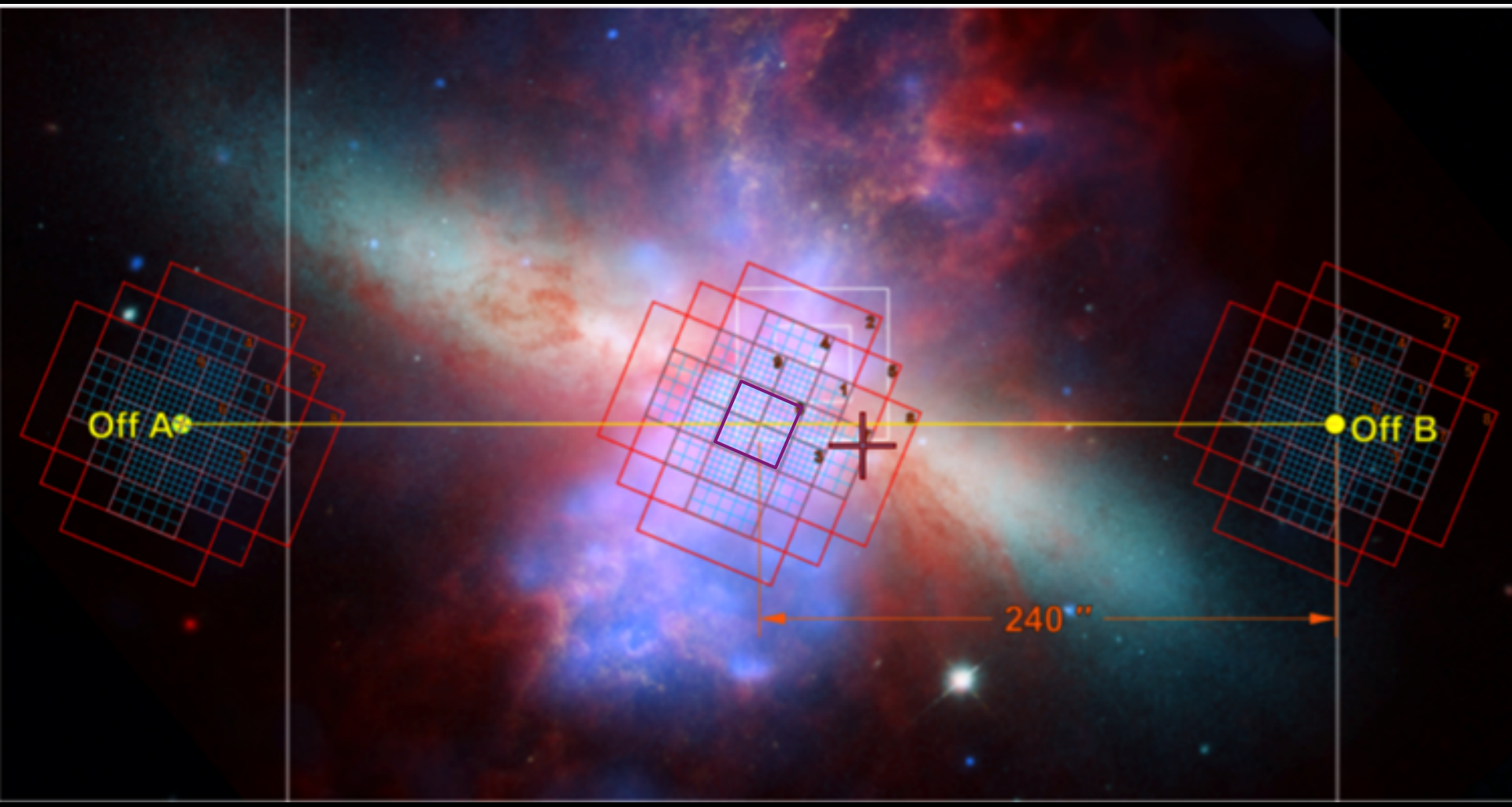


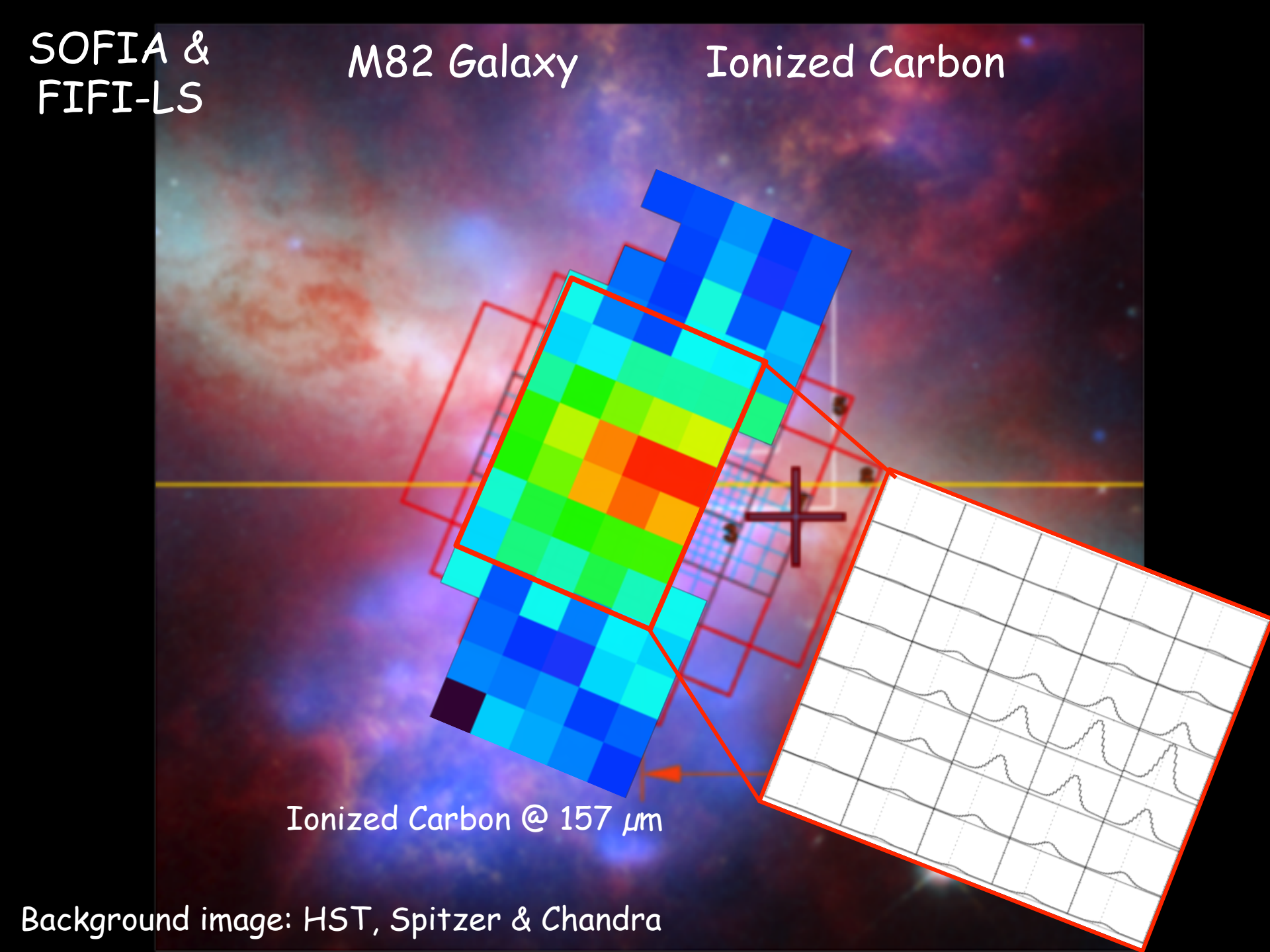
Bar @ [OI] 145 μm

SOFIA & FIFI-LS

M82 Galaxy

Ionized Oxygen

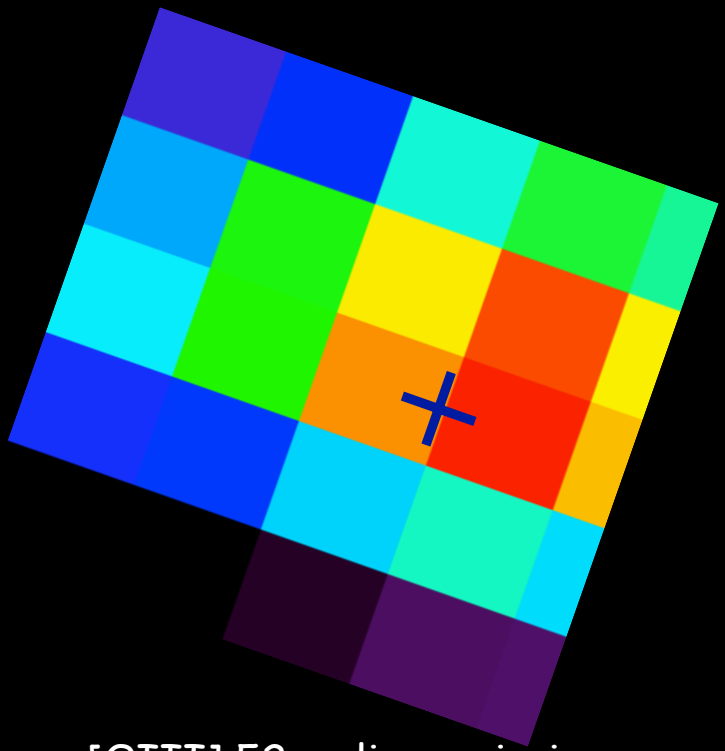



SOFIA &
FIFI-LS
M82 Galaxy
Ionized Carbon
Ionized Carbon @ 157 μm
Background image: HST, Spitzer & Chandra

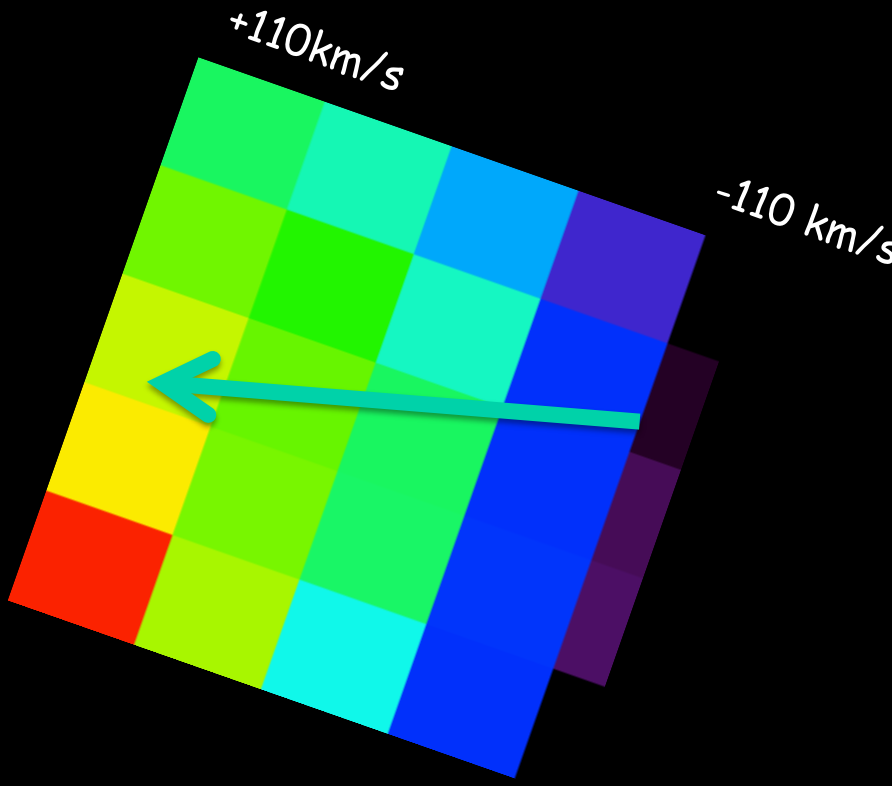
SOFIA & FIFI-LS

M82 Galaxy

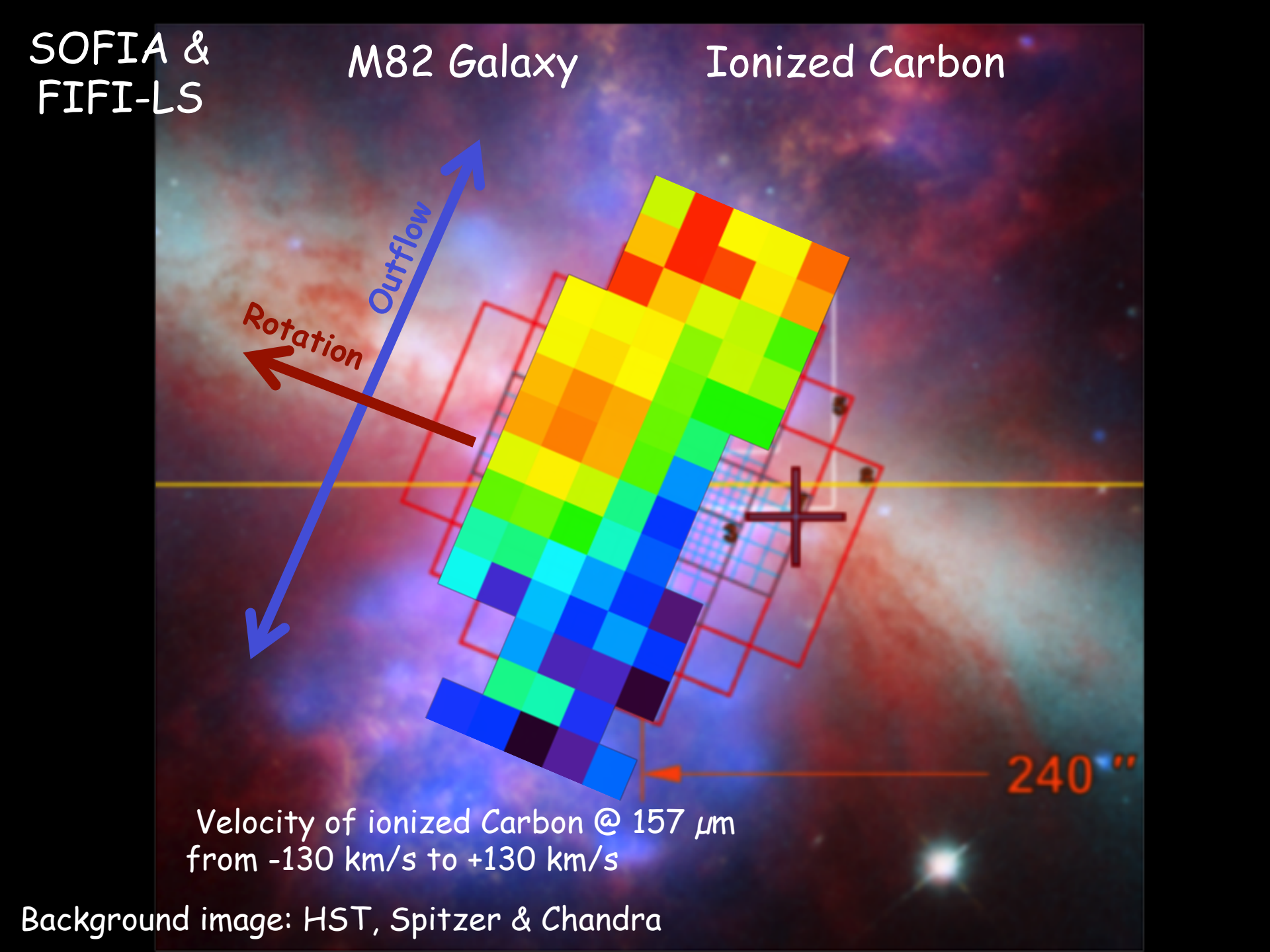
Ionized Oxygen



[OIII] 52μm line emission



[OIII] 52μm rotation speed


SOFIA &
FIFI-LS
M82 Galaxy
Ionized Carbon
Outflow
Rotation
240"
Velocity of ionized Carbon @ 157 μm
from -130 km/s to +130 km/s
Background image: HST, Spitzer & Chandra