Preparing a FIFI-LS Observation

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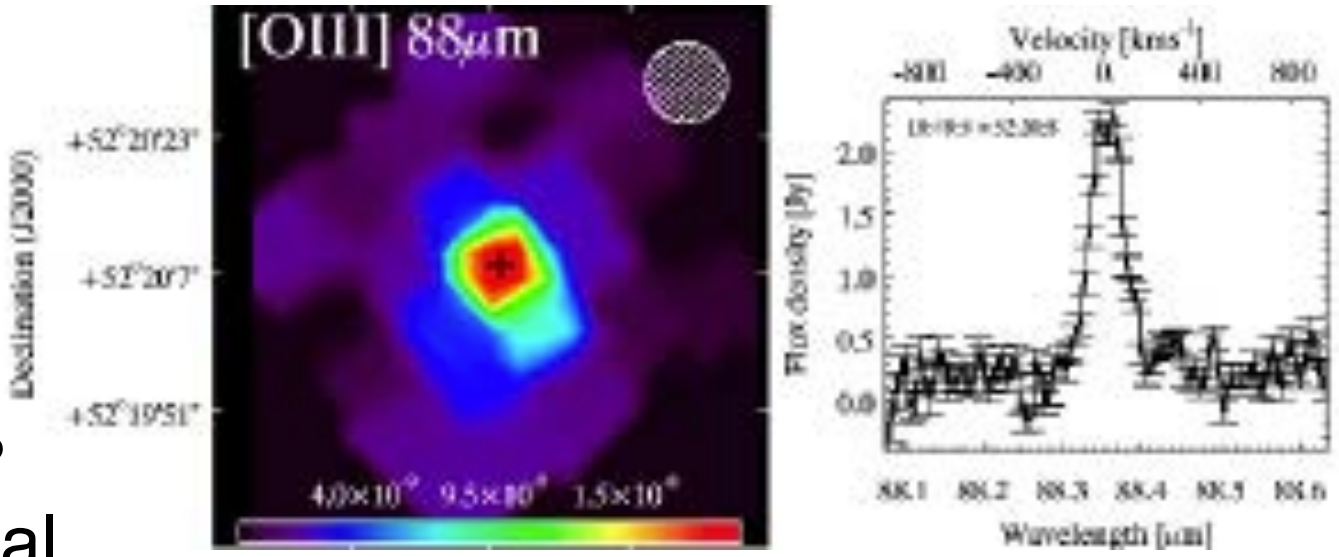
Flux Estimates

- Your proposal must include an explanation of how you estimated the expected flux
- If we want to look at the [OIII] 52μm flux, for example, we could use pre-existing [OIII] 88μm flux measurements from *SOFIA* or *Herschel* observations. If those aren't available, we could use FIR continuum measurements or some other measure.
- We will take an example from the *Herschel* Dwarf Galaxy Survey – Mrk 153

Flux Estimates: Mrk 153

- Cormier et al. (2015) measured an [OIII] 88μm flux of 98.90 ± 3.80 × 10^{-18} W m^{-2} over a 3 × 3 spaxel area
- We take this as a lower bound on the total flux at 52μm
- This is clearly a compact object, so we can calculate the flux expected within the central spaxel from the total flux
- At 52μm this should be 55%
- This gives a flux in the central spaxel of 5.44 × 10^{-17} W m^{-2}



Mrk 153 from Cormier et al. 2015

Time Estimates

- We can now take this value and enter it into SITE
- The other number we need is the redshift of the galaxy, which NED tells us is 2389 km s^{-1}
- We will calculate the time estimate to reach an SNR of 5 at the default altitude of 41,000 ft and the default elevation of 40°

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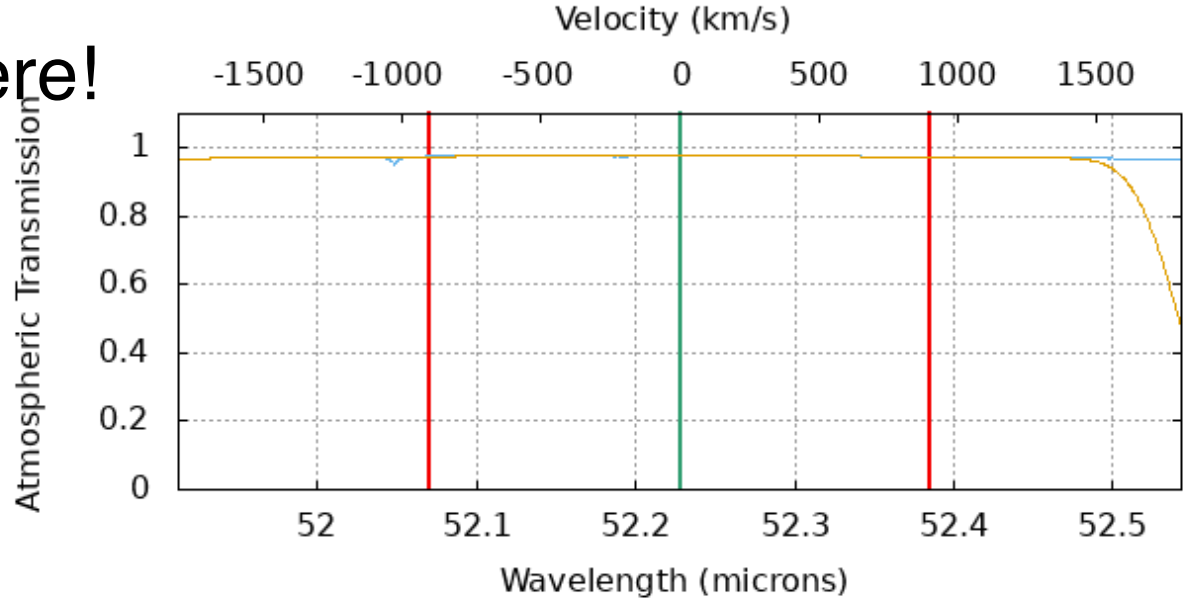
- What a beautiful atmosphere!
- We will need 36 minutes on-source to reach 5σ
- We now go to USPOT



USPOT

- For the proposal we only need to fill in the items with red stars; the other items can be left until Phase II
- Each cycle of a symmetric-chop observations gives 30s of on-source time
  - To reach 36 minutes, we therefore need 72 cycles
  - This gives a total time of 5,772s = 1.6 hours
- Observing modes: Symmetric, Asymmetric or Total Power
  - We want Symmetric (the default), which means we observe the target in both nod positions.
  - We will check that our chop positions are clear of the galaxy in the visualization

Will we see the [CII]?

- The [CII] flux, from *Herschel*, is $53.10 \pm 1.43 \times 10^{-18}$ W m^{-2}
- Assuming it is compact, we expect 40% of this flux in the central spaxel
- This gives 2.124×10^{-17} W m^{-2}
- Going back to SITE…

Wavelength	Flux in central pixel
52µm	55%
63µm	45%
88µm	33%
158µm	40%

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- Going back to SITE we find that we expect a 4σ detection

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- But there's another catch – for observations at 52μm we will use the D130 dichroic for the best sensitivity, but this decreases our sensitivity at 158μm.

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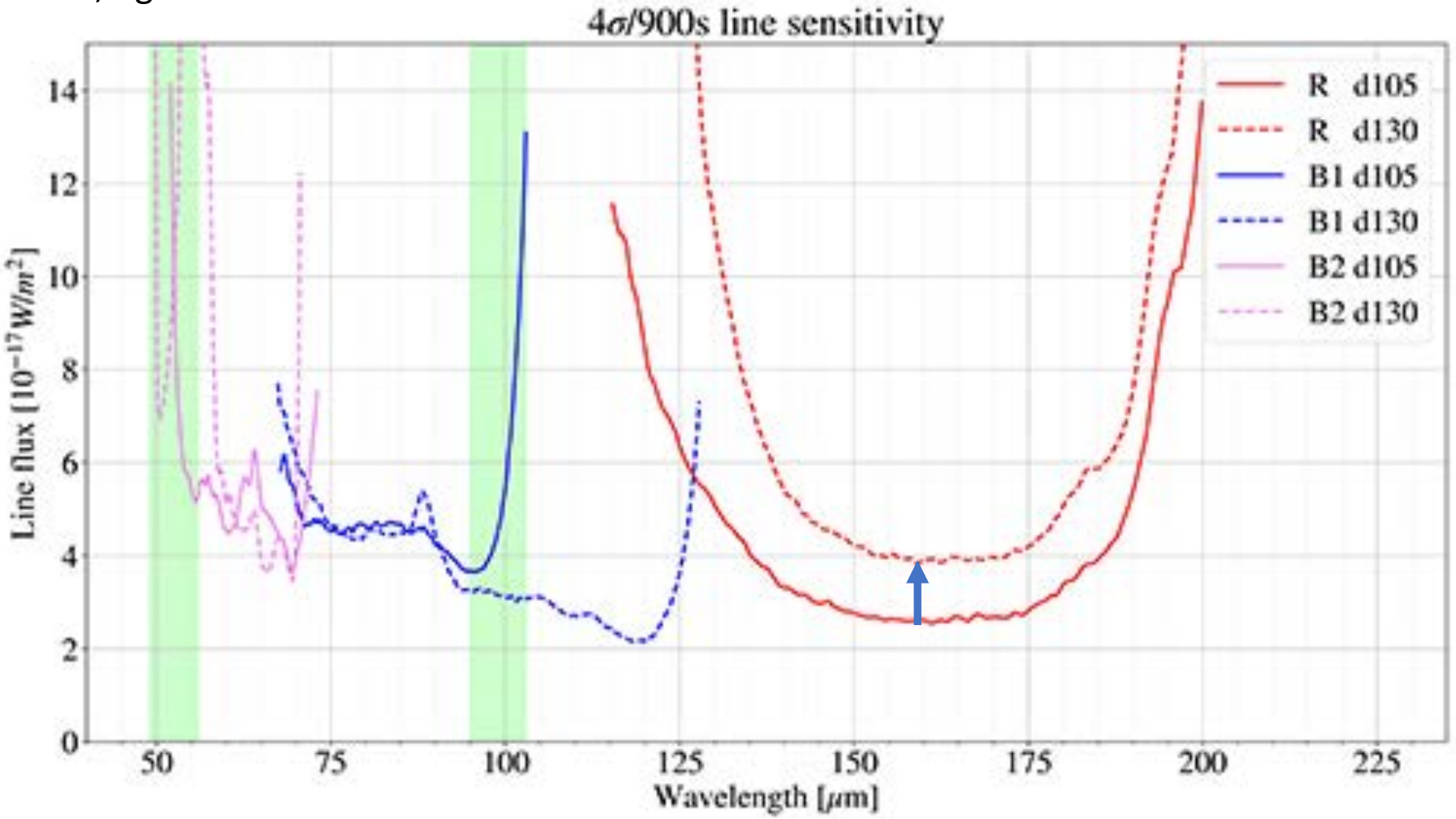
Cycle 9 handbook, figure 3-4



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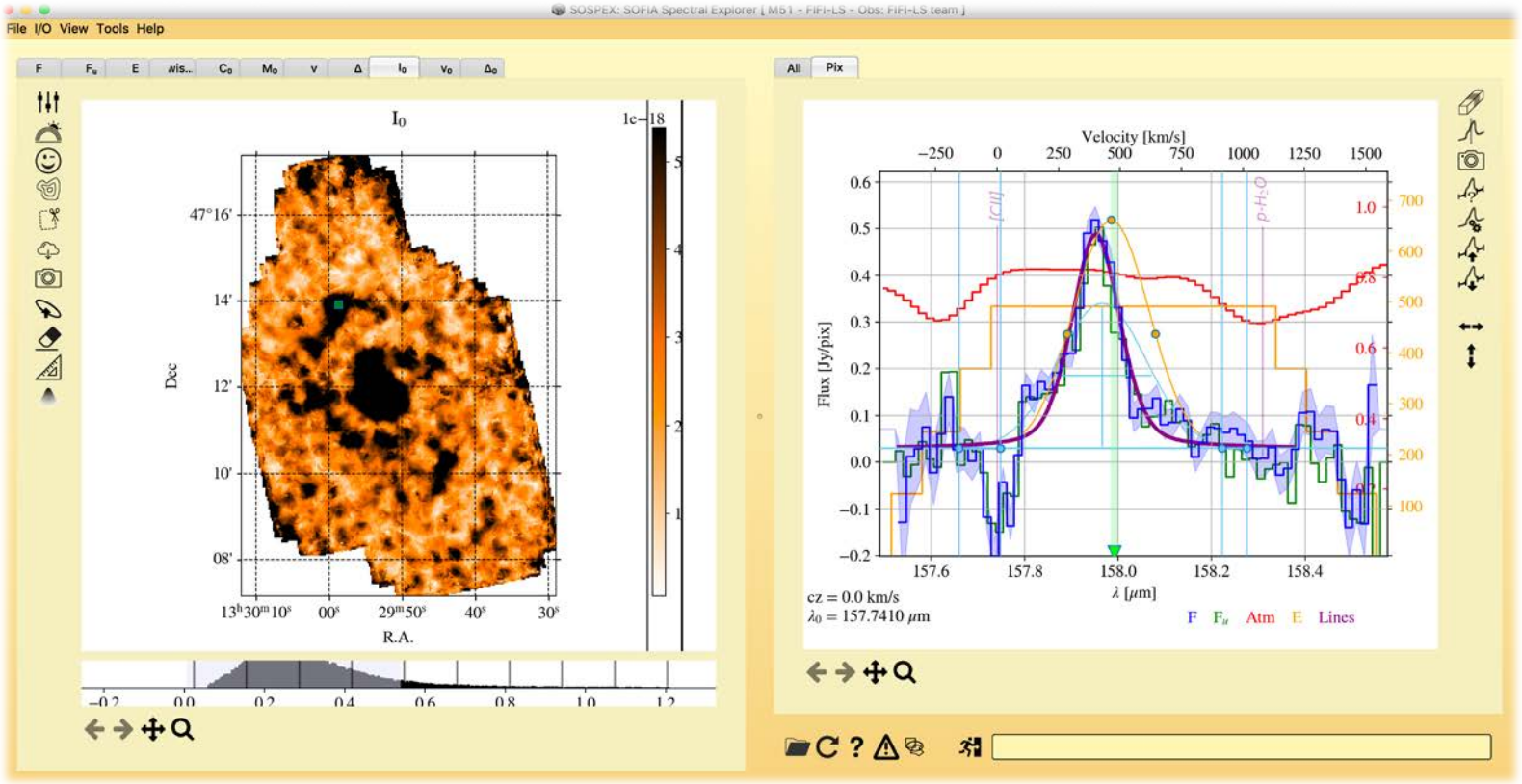
- So we probably only expect a ~2.5σ detection of [CII] in the central pixel

Thank you

- Any questions?
- If you think of questions later, please email the SOFIA helpdesk: sofia_help@sofia.usra.edu



FIFI-LS data on M51 (Pineda et al. 2018) in SOSPEX
Image c/o D. Fadda