March 27 Bamberg

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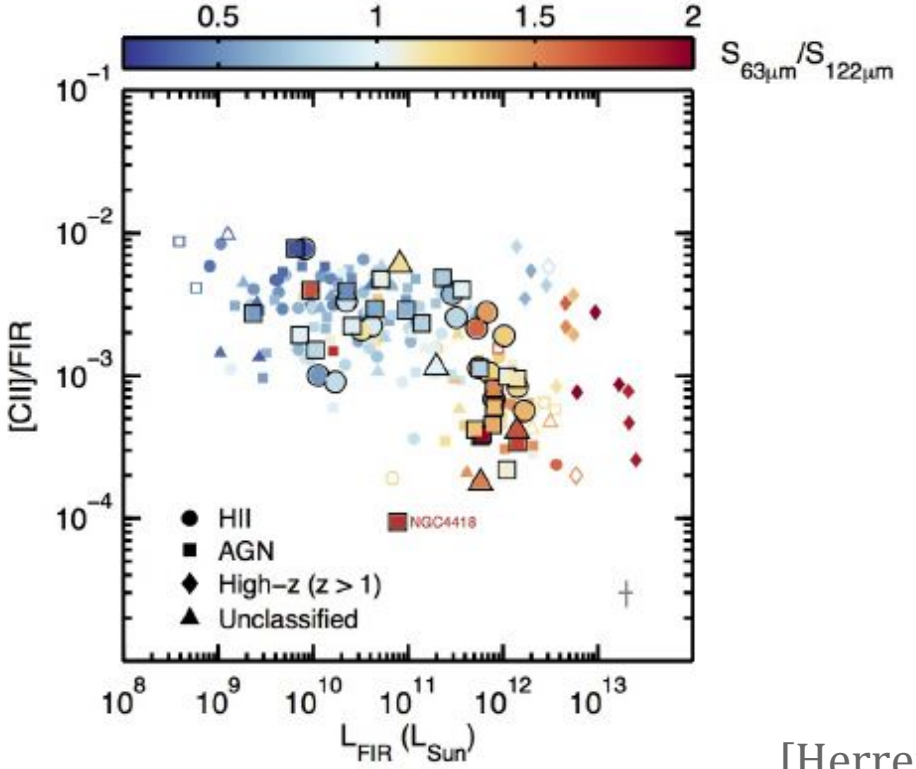
# Identifying the AGN contribution to [CII] ionization in luminous local AGN

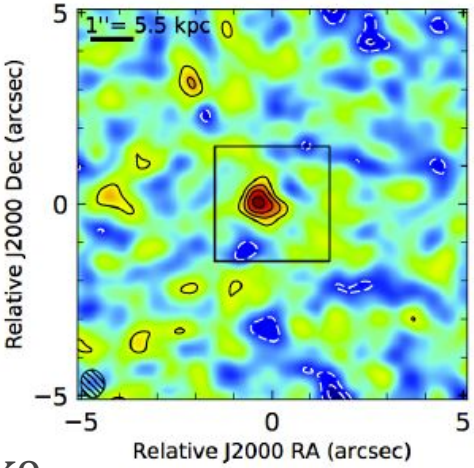
# [CII] line as a SFR tracer




[Herrera-Camus+ 2018]

# [CII] line as a SFR tracer

## Star Formation?



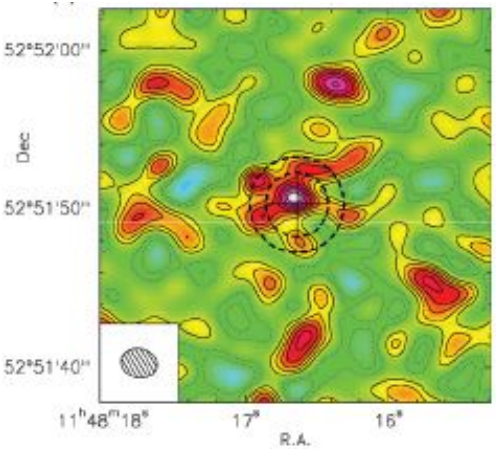

Himiko

ALMA

z ~ 6.6

[Carniani+ 2018]

## AGN outflows?




SDSS J114816.64+525150.3

NOEMA

z ~ 6.4

[Maiolino+ 2012]

# What is the origin of [CII] ionization?

- luminous AGN
- low-redshift galaxies
- large enough

## Herschel

Space Observatory

14 May 2009 - 17 June 2013


## SOFIA

Flying Observatory

26 May 2010 - now

What is the origin of [CII] ionization?

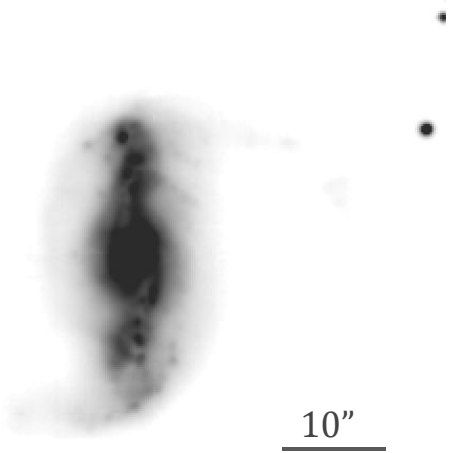
Close AGN Reference Survey


- 40 unobscured AGN
- local $0.01 < z < 0.06$
- multiwavelength observations

Subsample:

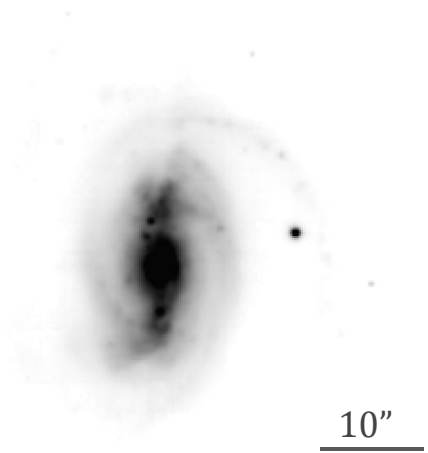
| | |
|---|---|
| HE 0108-4743 | HE 1029-1831 |
| HE 0232-0900 | HE 1108-2813 |
| HE 0433-1028 | HE 1353-1917 |
| HE 1017-0305 | HE 2211-3903 |

HE 0433-1028



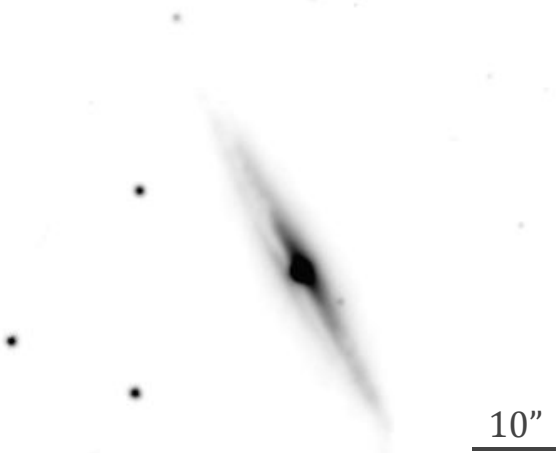

- z = 0.036
- 149 Mpc

HE 1108-2813



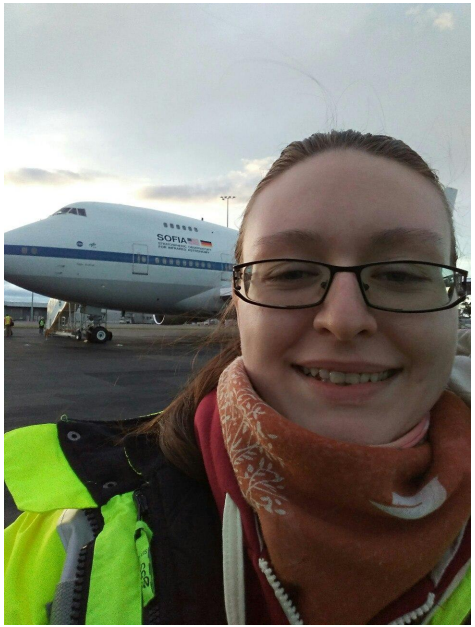

- z = 0.024
- 105 Mpc

HE 1353-1917




- z = 0.035
- 152 Mpc

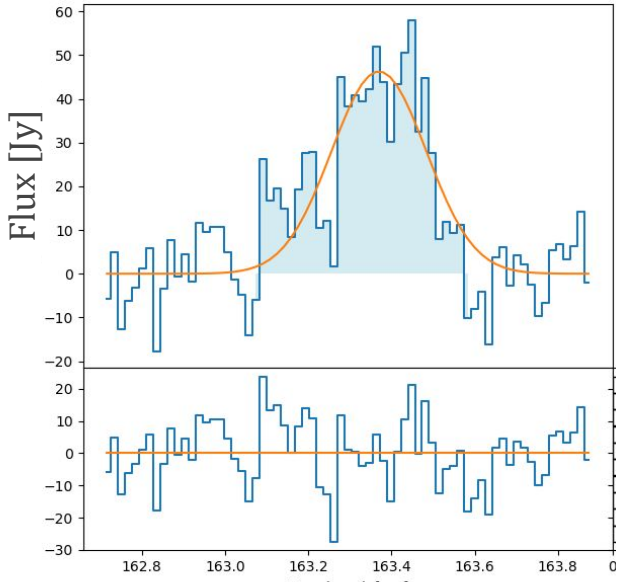
# SOFIA flights, July 2017, Christchurch, New Zealand




Alfred Krabbe
FIFI-LS PI

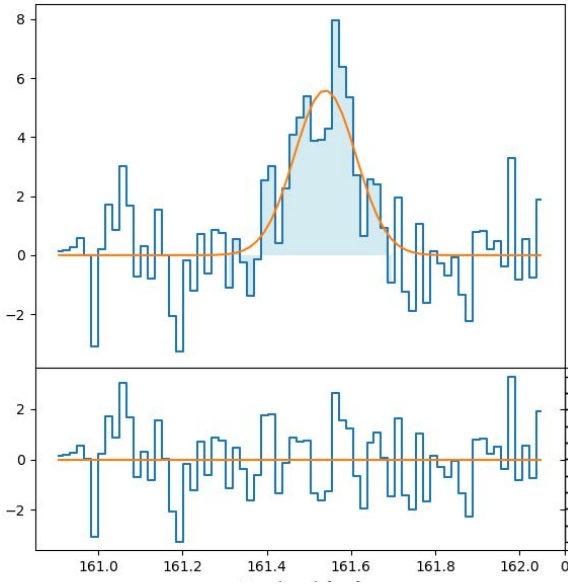
HE 0433-1028

50 min



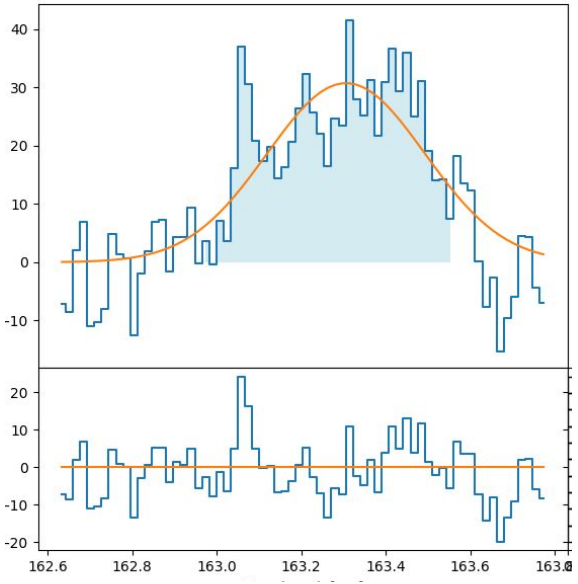

HE 1108-2813

68 min



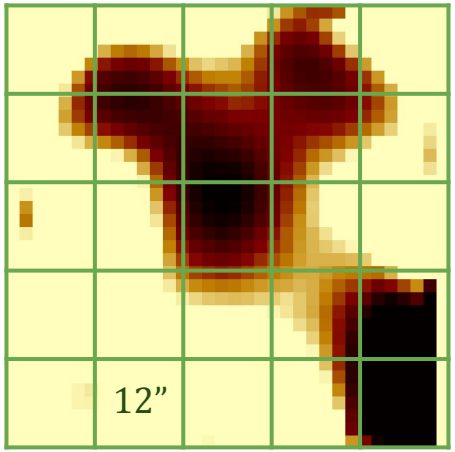

HE 1353-1917

72 min

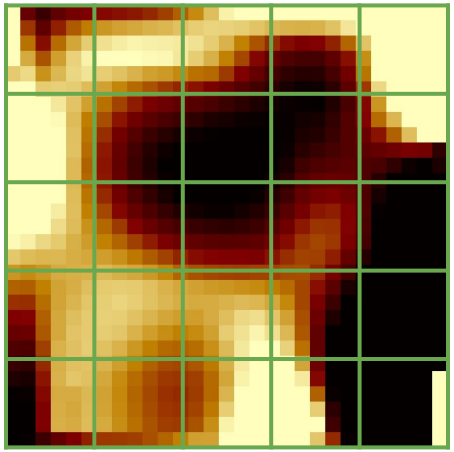


# Standart pipeline output

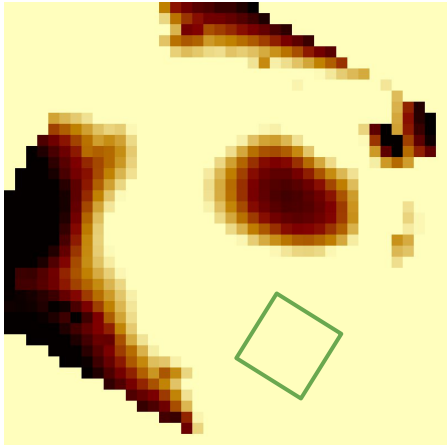
HE 0433-1028




HE 1108-2813

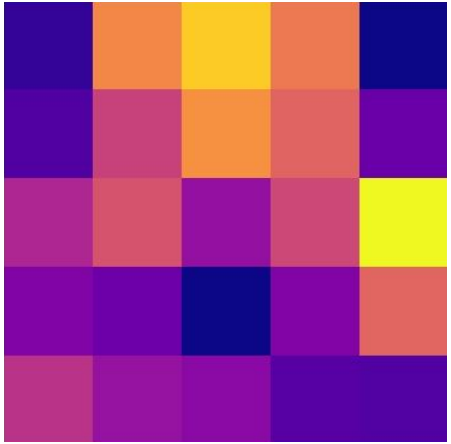


HE 1353-1917

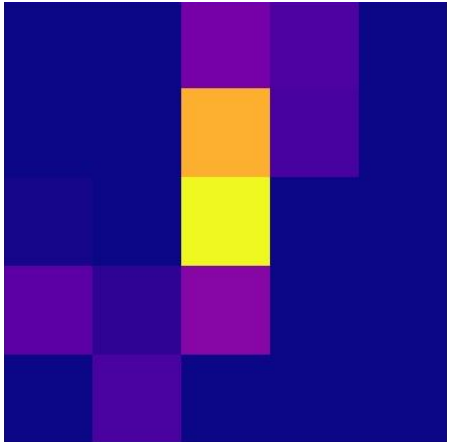


# Reconstructed [CII] maps

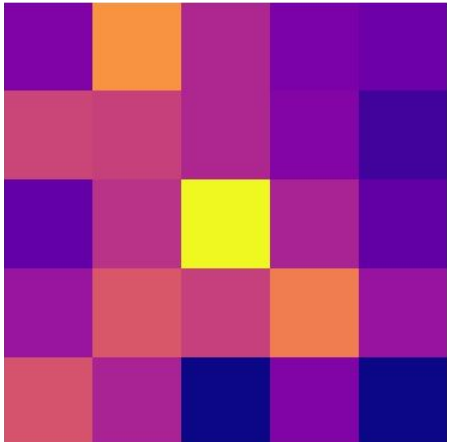
HE 0433-1028



HE 1108-2813



HE 1353-1917

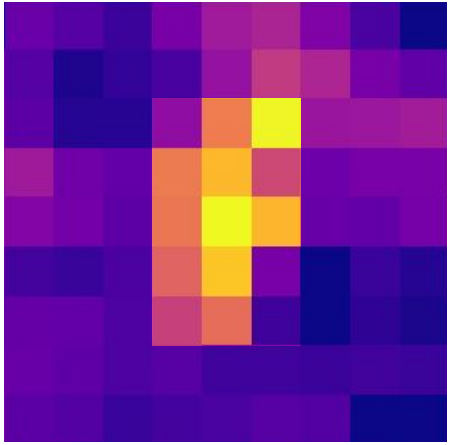


Pixel size = 12”

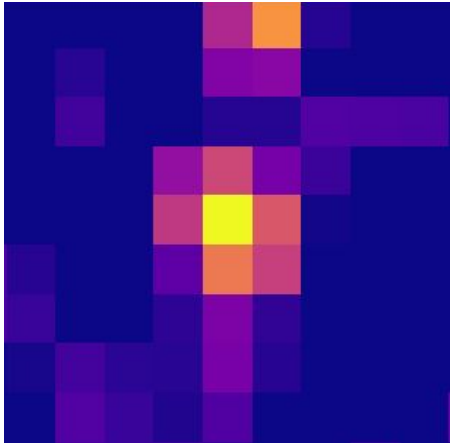
# Drizzle algorithm

# Drizzled [CII] maps

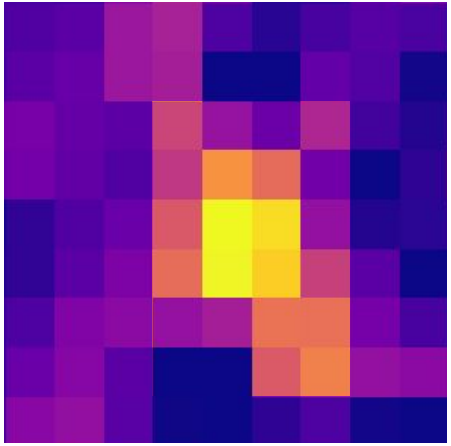
HE 0433-1028



HE 1108-2813



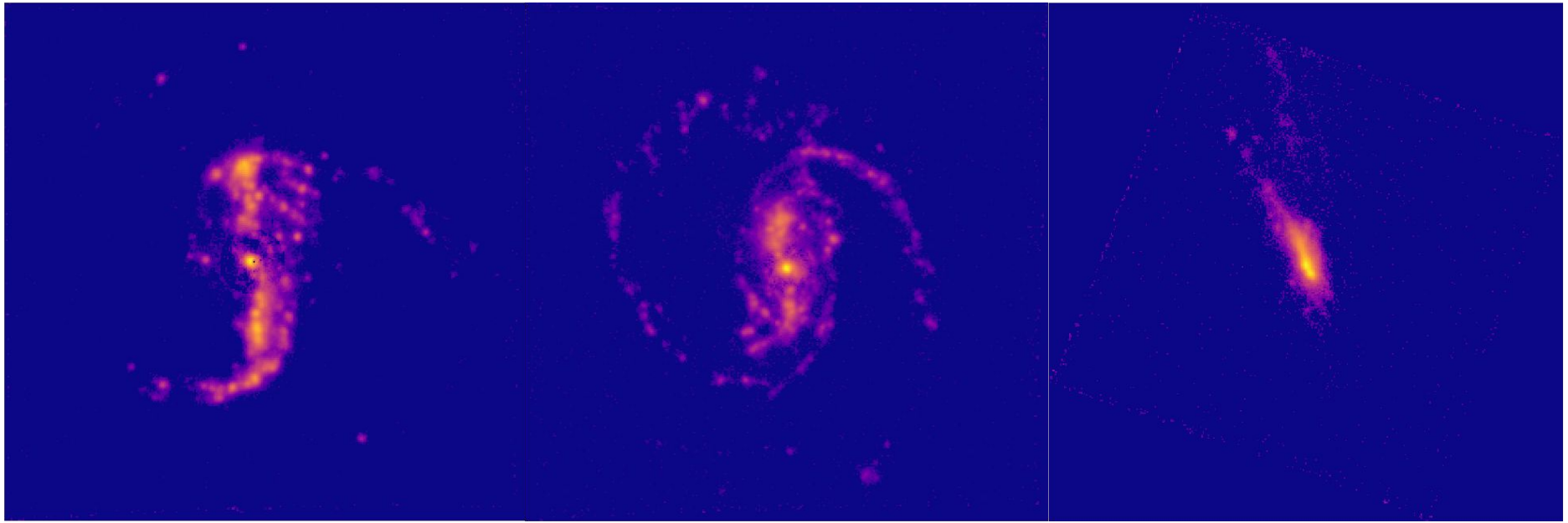
HE 1353-1917



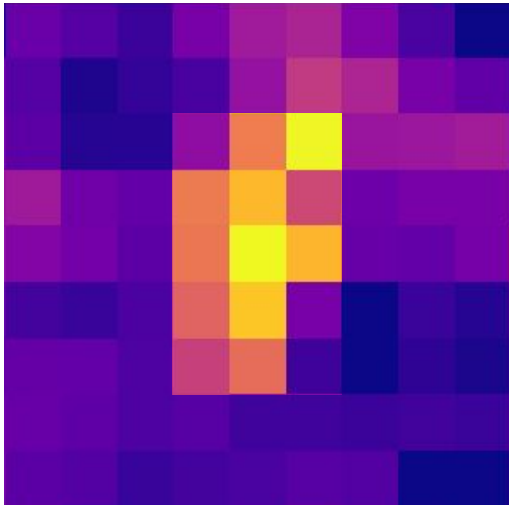
Pixel size = 6”

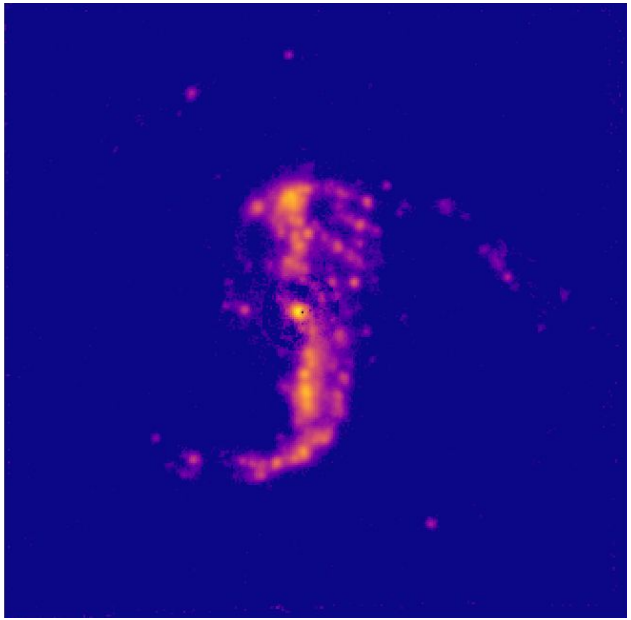
# Comparison with Hα MUSE/VLT

HE 0433-1028 HE 1108-2813 HE 1353-1917

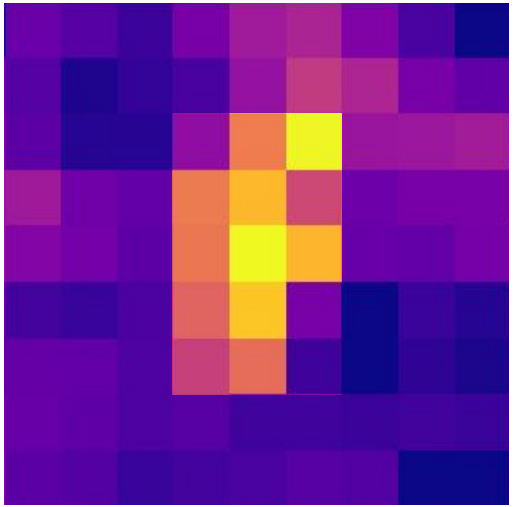


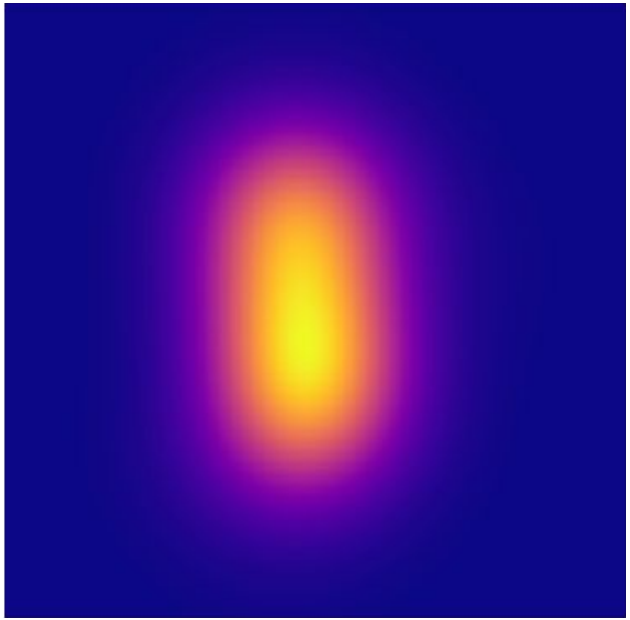
# Comparison with Hα MUSE/VLT



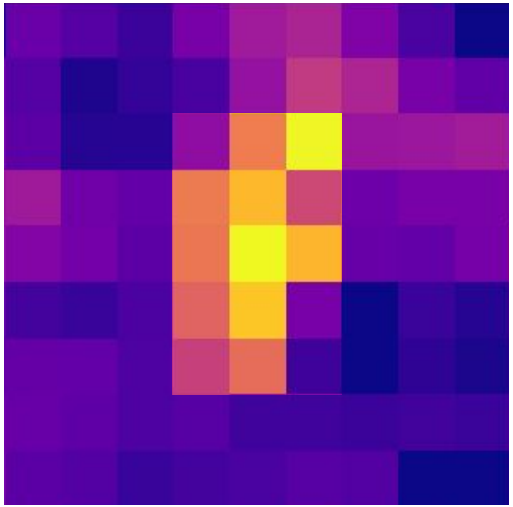


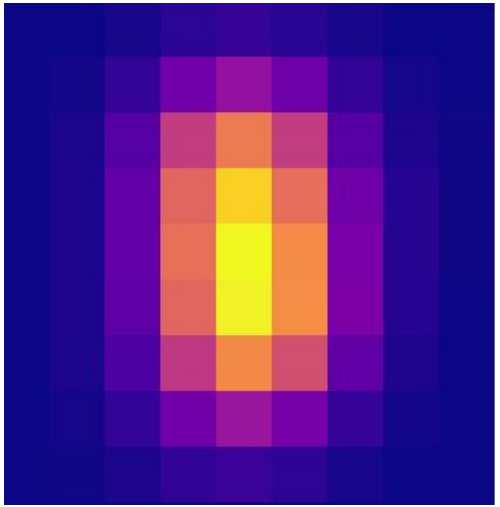
# Comparison with Hα MUSE/VLT





# Comparison with Hα MUSE/VLT

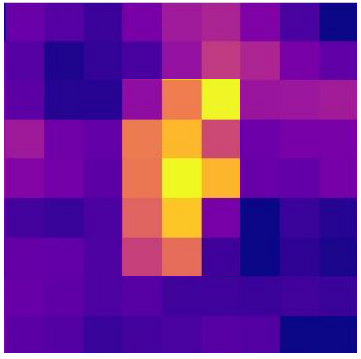
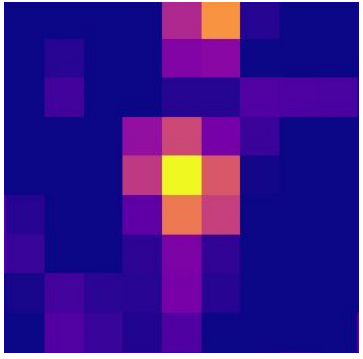
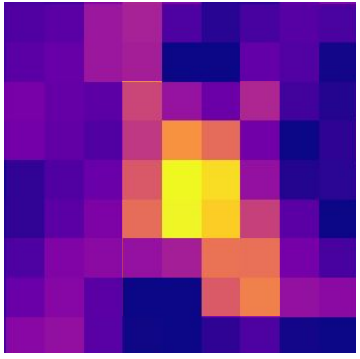




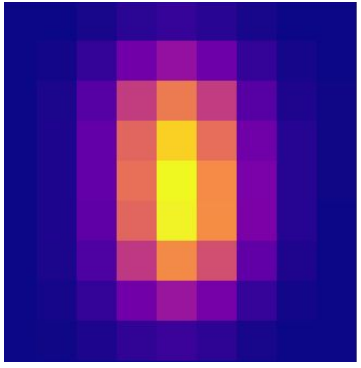
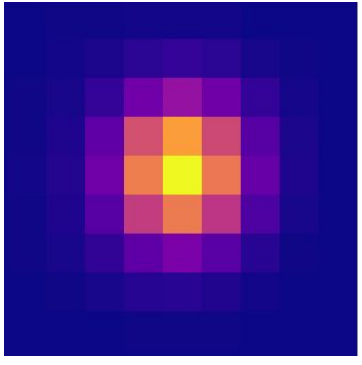
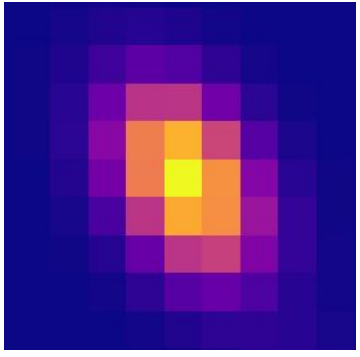
# Comparison with Hα MUSE/VLT

HE 0433-1028 | HE 1108-2813 | HE 1353-1917

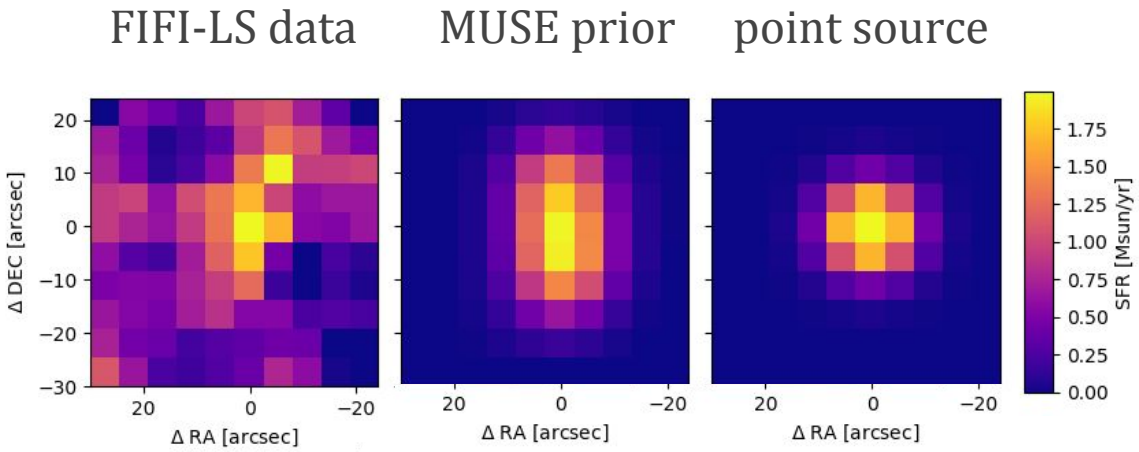
FIFI-LS [CII]

MUSE Hα

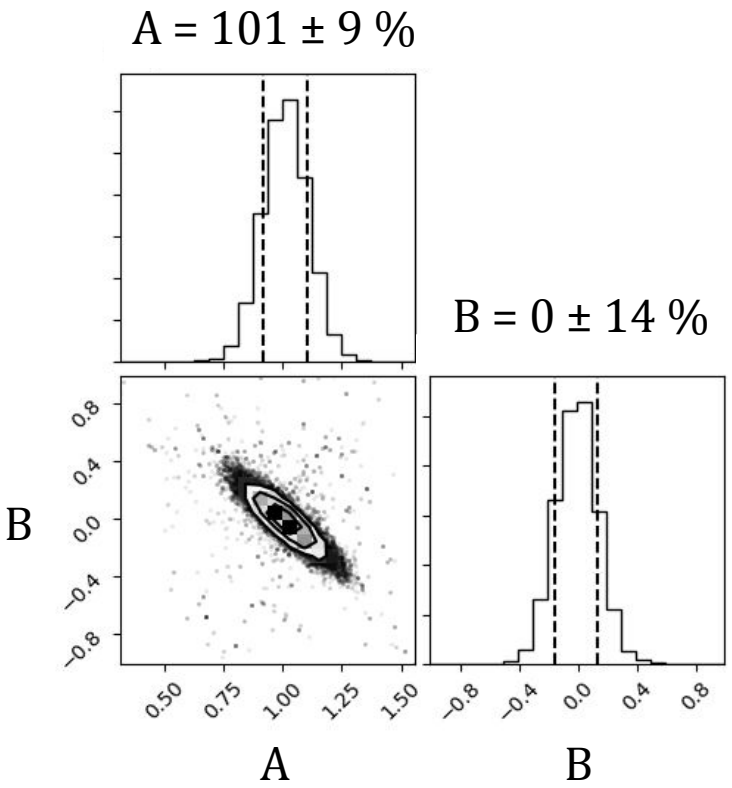




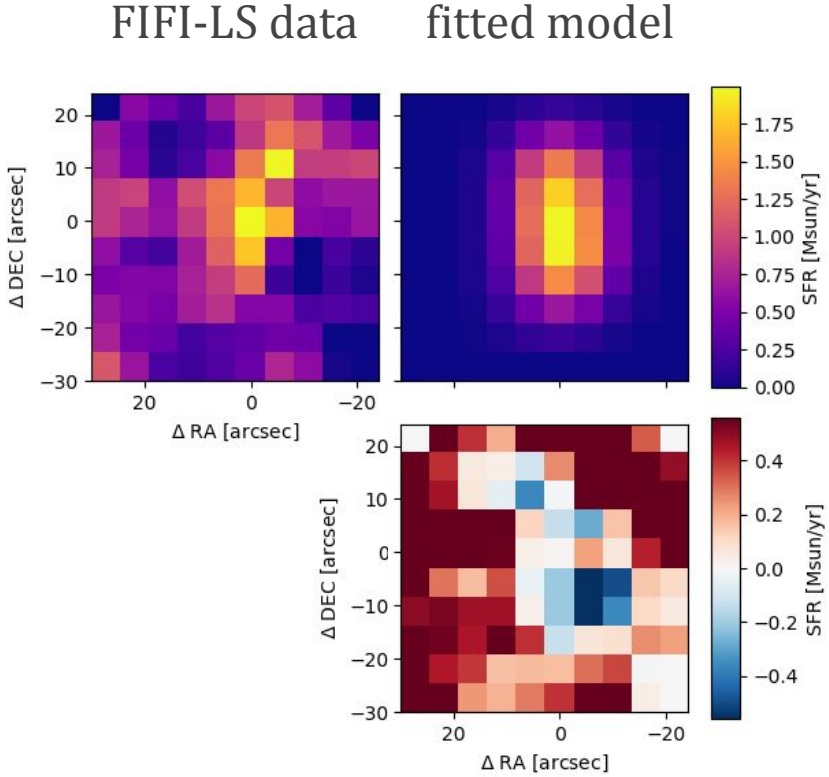
# Preliminary results HE 0433-1028



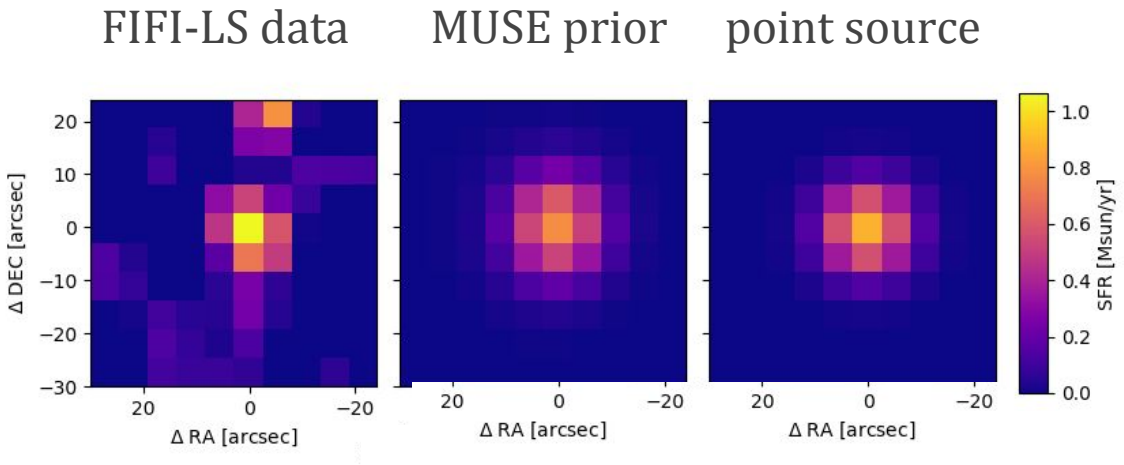

Model = A × MUSE prior + B × point source

# Preliminary results HE 0433-1028



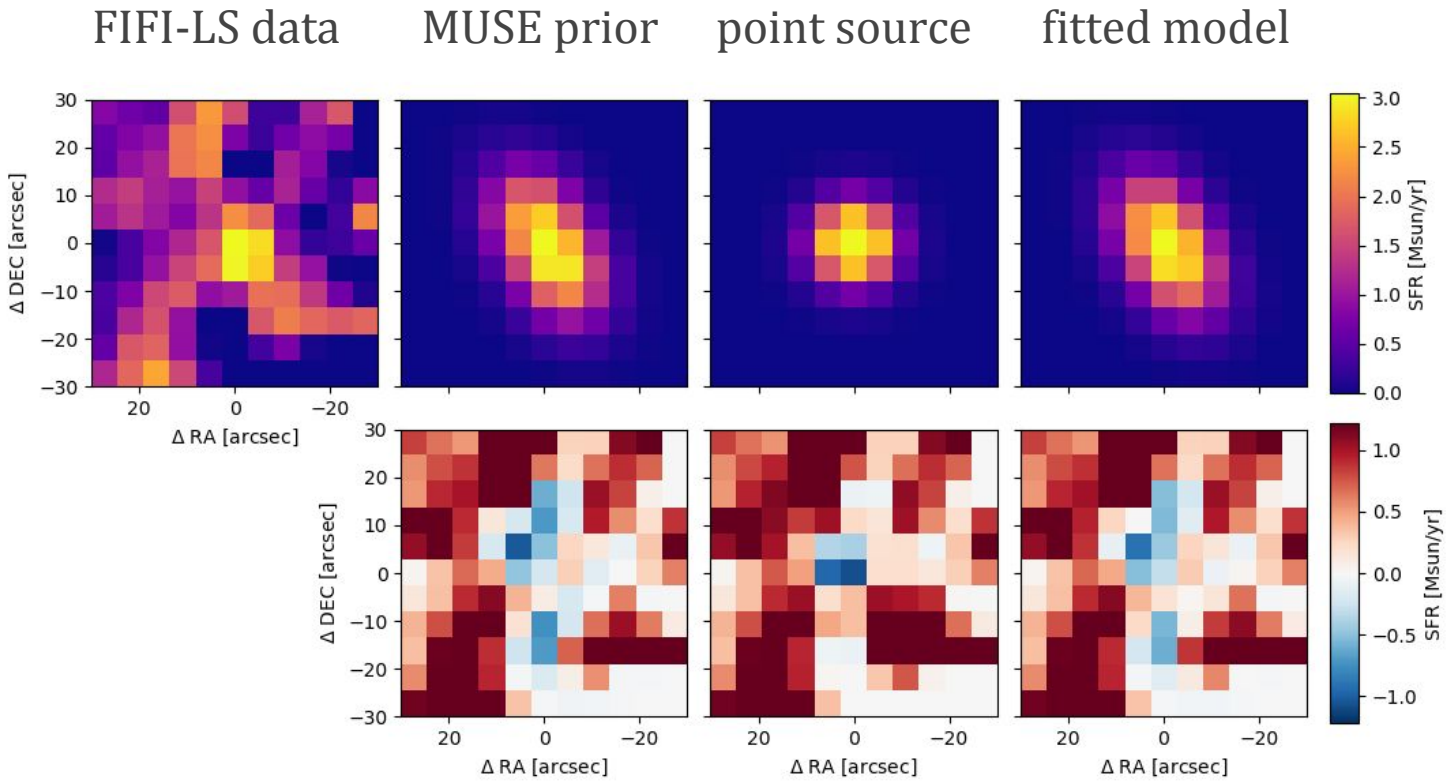



# Preliminary results HE 1108-2813

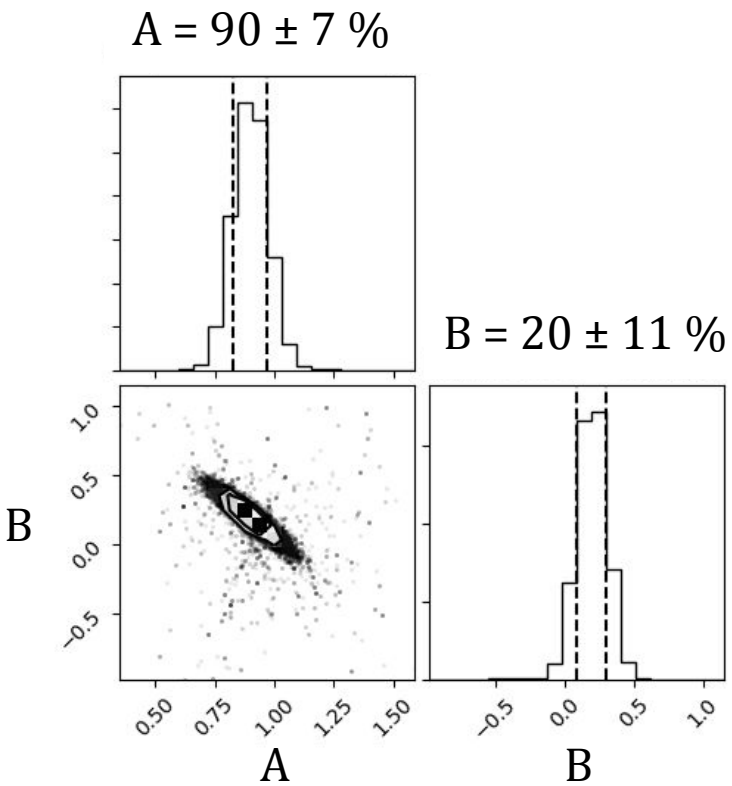



Model = A × MUSE prior + B × point source

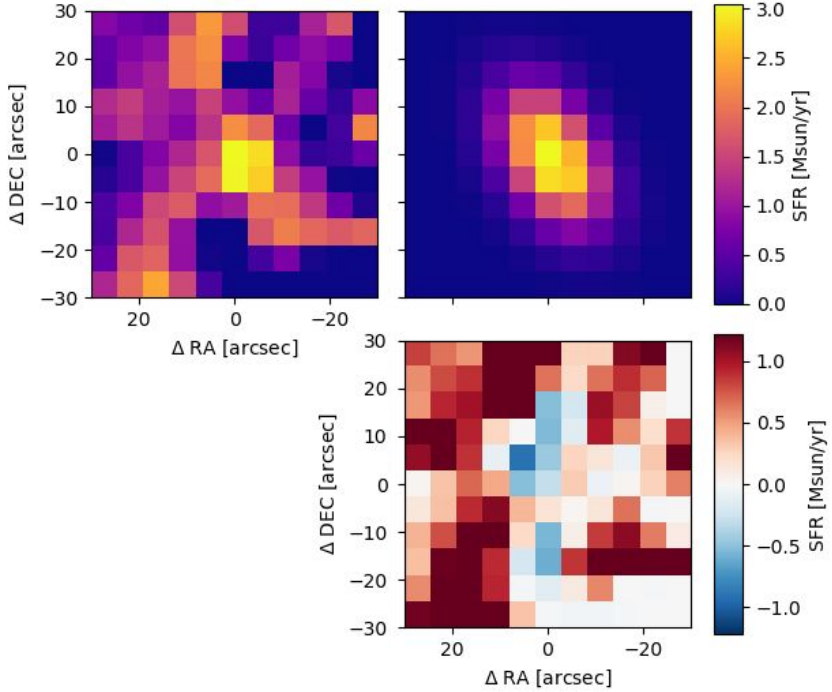
# Preliminary results HE 1353-1917



# Preliminary results HE 1353-1917




FIFI-LS data fitted model



## Take away messages

- SOFIA resolves galaxies at z ~ 0.03
- It is possible to distinguish AGN contribution to [CII] ionization
- L [CII] - SFR relation as a function of AGN luminosity

## Future goals

- [Busch et al.] in prep
- Increase the sample
- Herschel SHINING [Herrera-Camus+ 2018]

## Thank you!