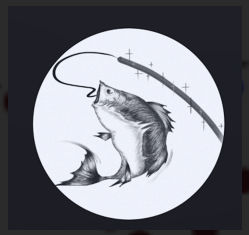
BASS workshop 2019 on February 5, 2019 at UF

Project Proposal [not started yet…]
AGN/Host properties of IR-pure AGN



Kohei Ichikawa (市川幸平)

happy peaceful

FRIS fellow, Tohoku Univ. (from Oct 2018-)

TOHOKU UNIVERSITY

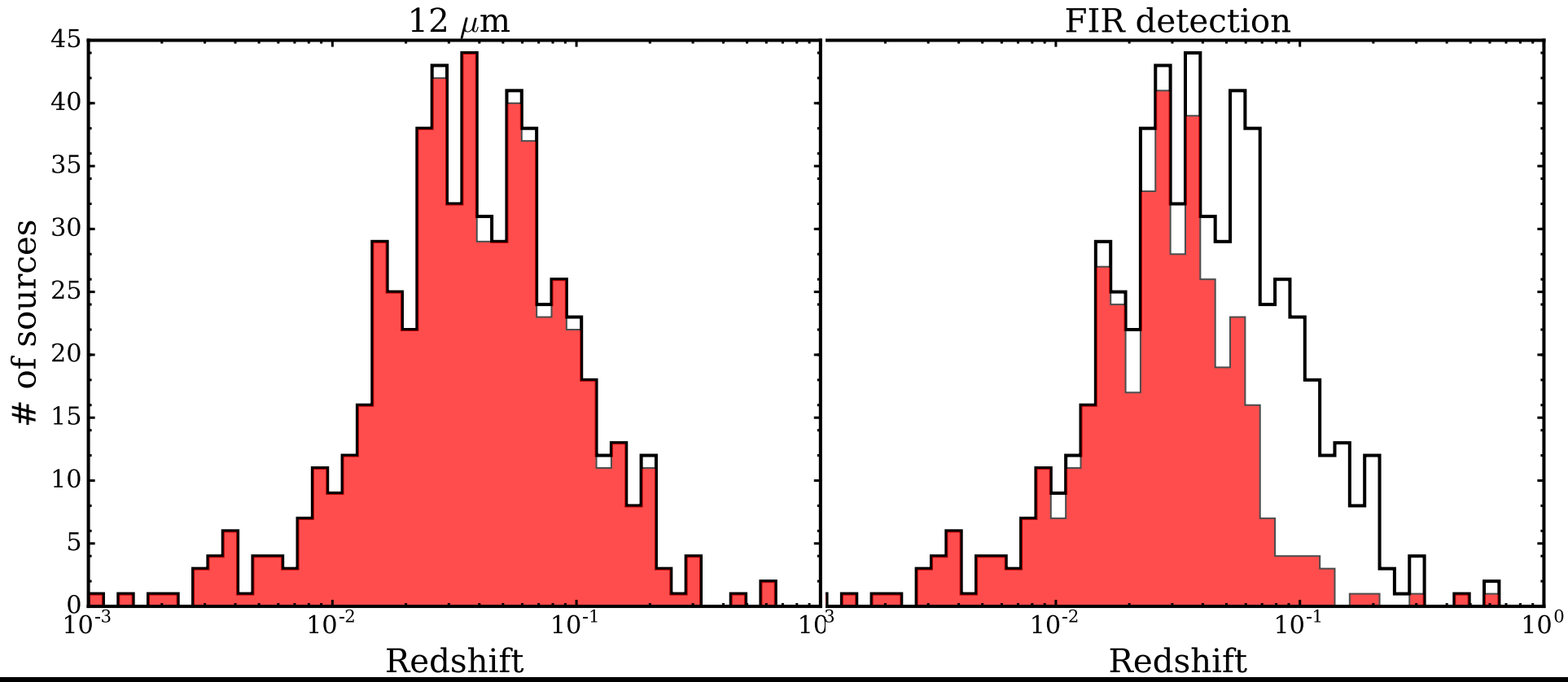
In collaboration with

C. Ricci, T. Kawamuro, and friends

IR counterparts of BAT AGN

☑ 3-500 um IR data from WISE, AKARI, IRAS, and Herschel

(see Ichikawa+17 for more details)



☑ 601/606 MIR (, NIR) and 402/606 FIR counterparts

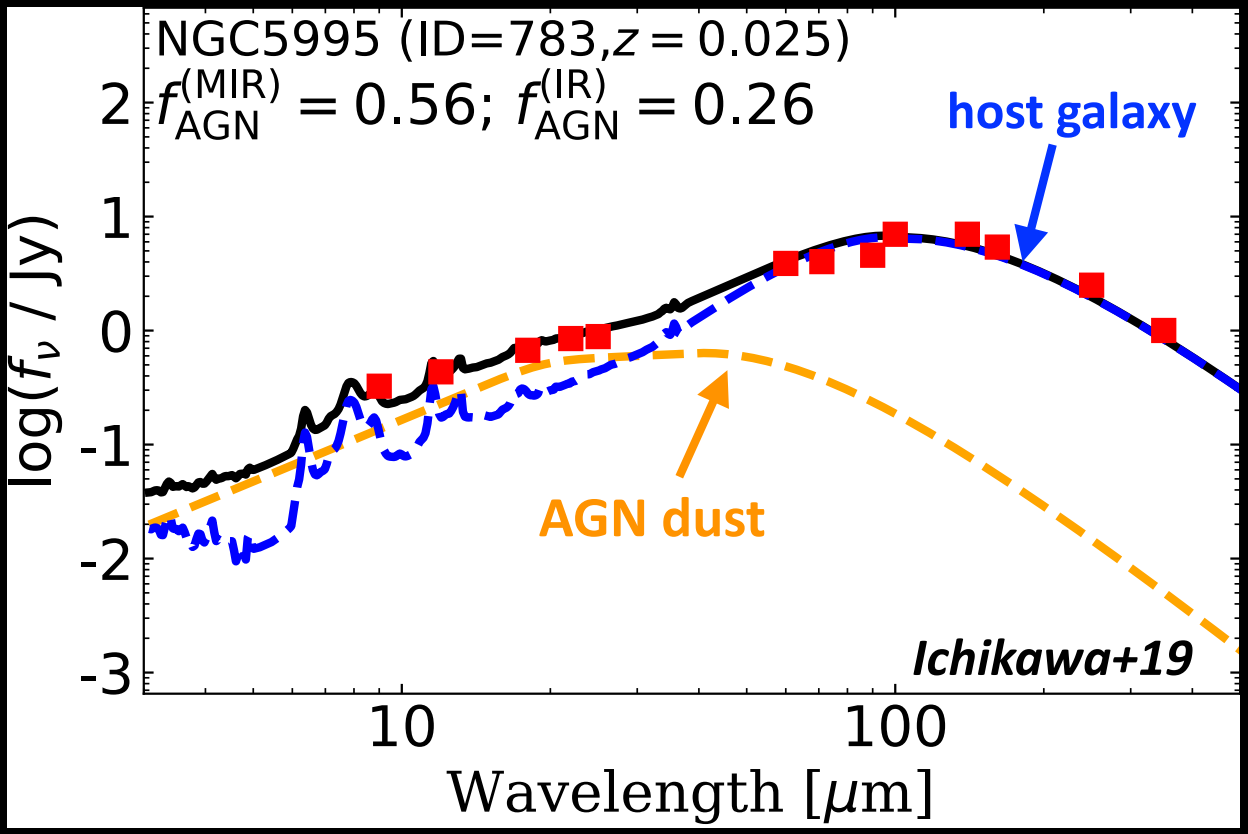
☑ suitable for the AGN dust/host galaxy studies

☑ IR Data is already public. http://iopscience.iop.org/0004-637X/835/1/74/suppdata/apjaa5154t1_mrt.txt

SED Decomposition in IR bands

☑ **SED Decomposition is done using simple AGN/(SB+stellar) templates**

(see Mullaney+11 and Ichikawa+19 for more details)



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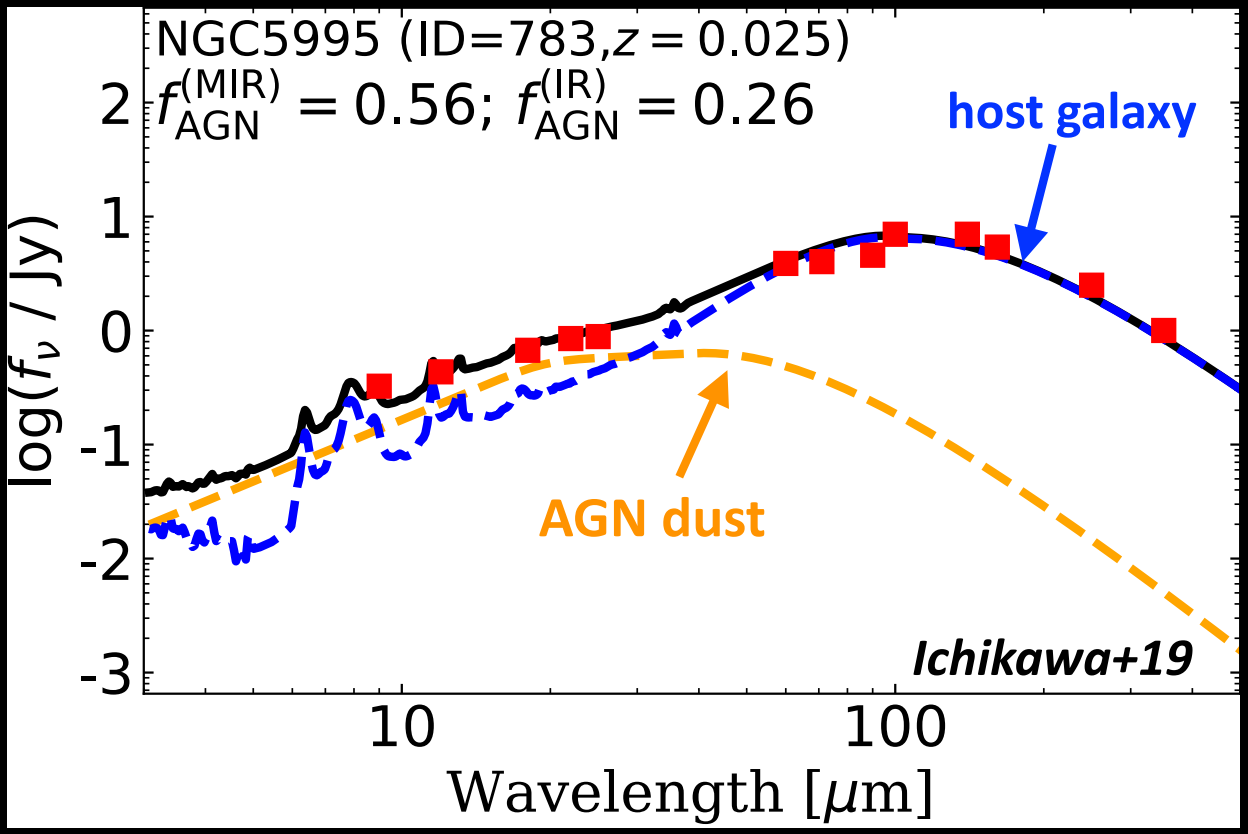


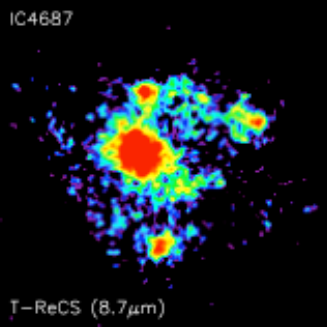
☑ **SED decomposition: 587/606 sources**

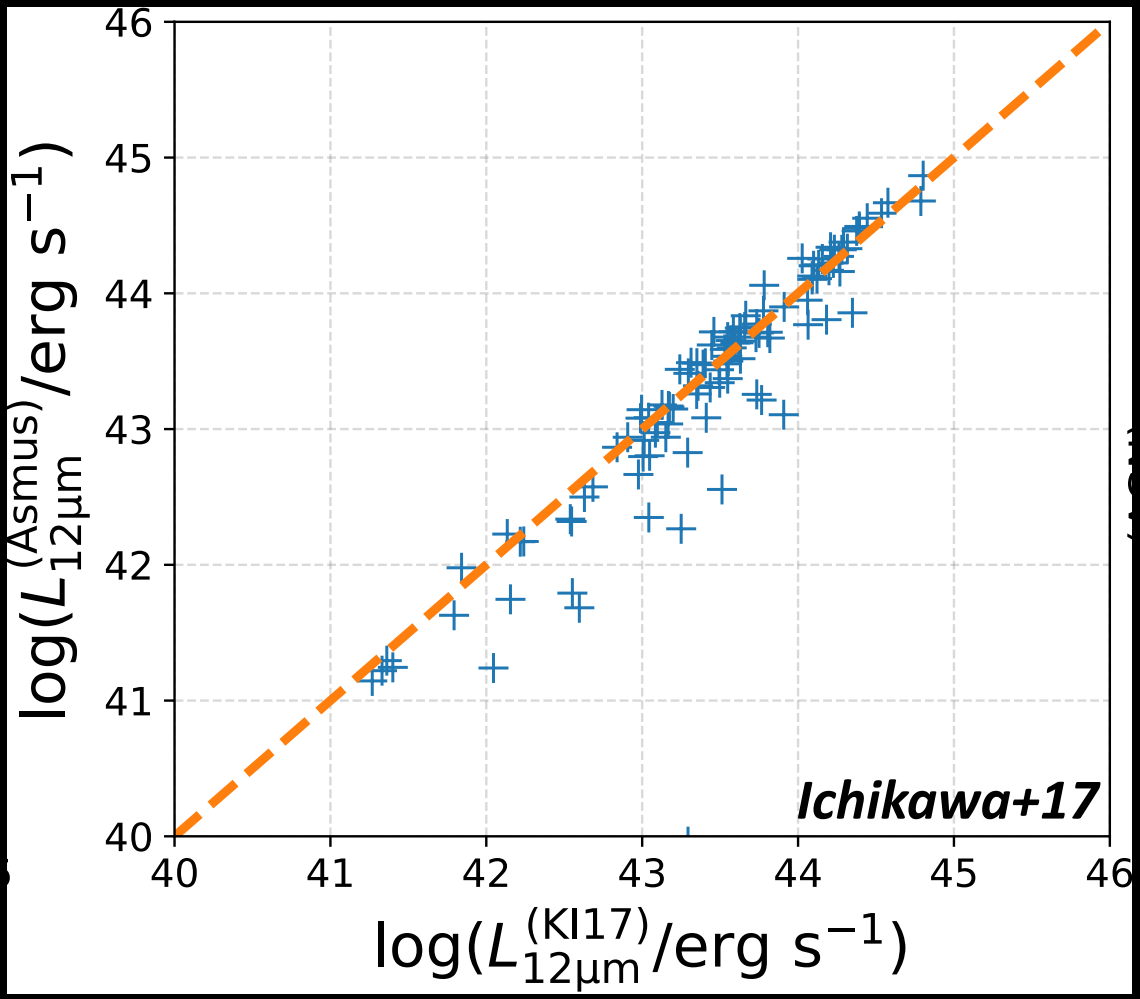
☑ **Disentangling AGN/host galaxy (SB+stellar) component**

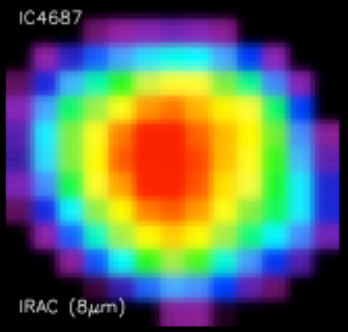
=> AGN IR emission w/o host galaxy contamination

Comparison with high-spatial resolution observations

High spatial. resol. obs. (Asmus+14,+15)







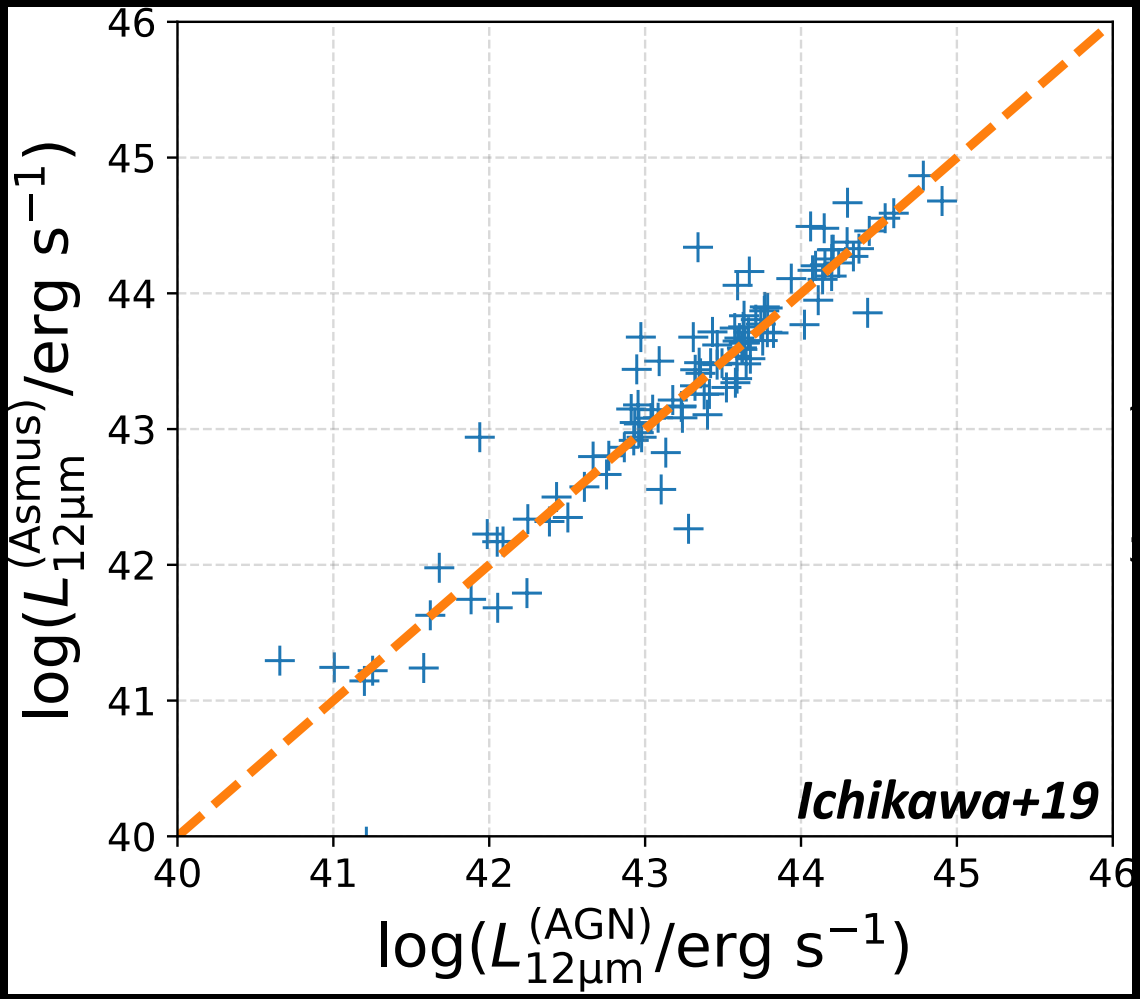
L_{12um} "Before" SED decomposition

☑ **$L_{12um}^{(KI17)}$ >= $L_{12um}^{(Asmus)}$**

Comparison with high-spatial resolution observations

☑ **SED Decomposition works well!**

High spatial. resol. obs.



L_{12um} *"after"* SED decomposition

☑ **SED decomposition reproduces L_{12um} of 0."3-0."7 scale high spatial resolution observations (Asmus+14;15)**

IR-Pure AGN candidates

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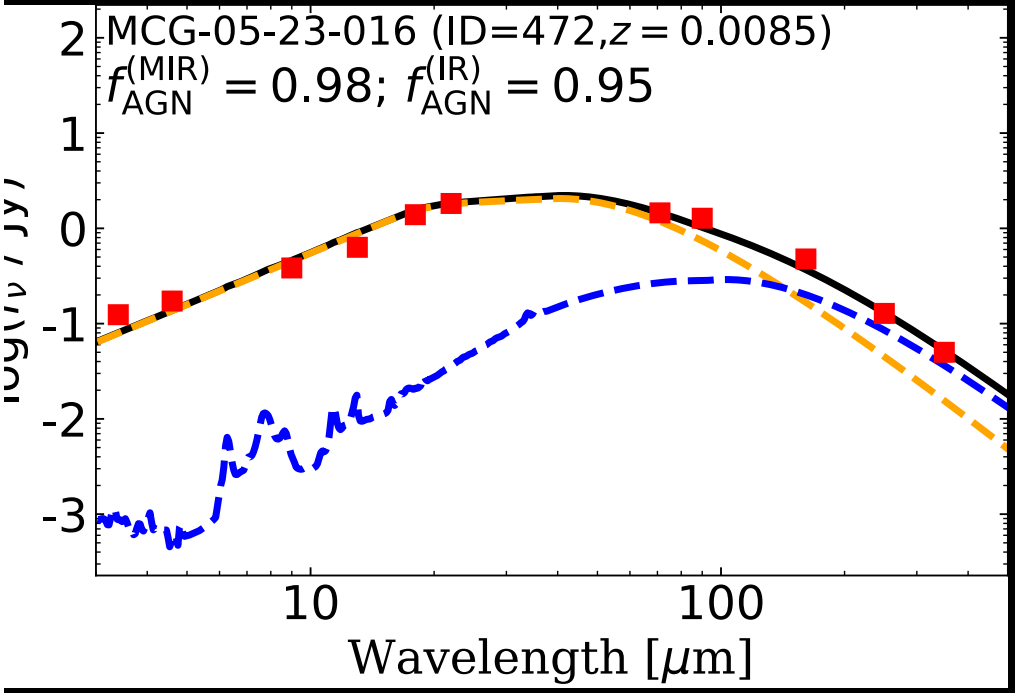
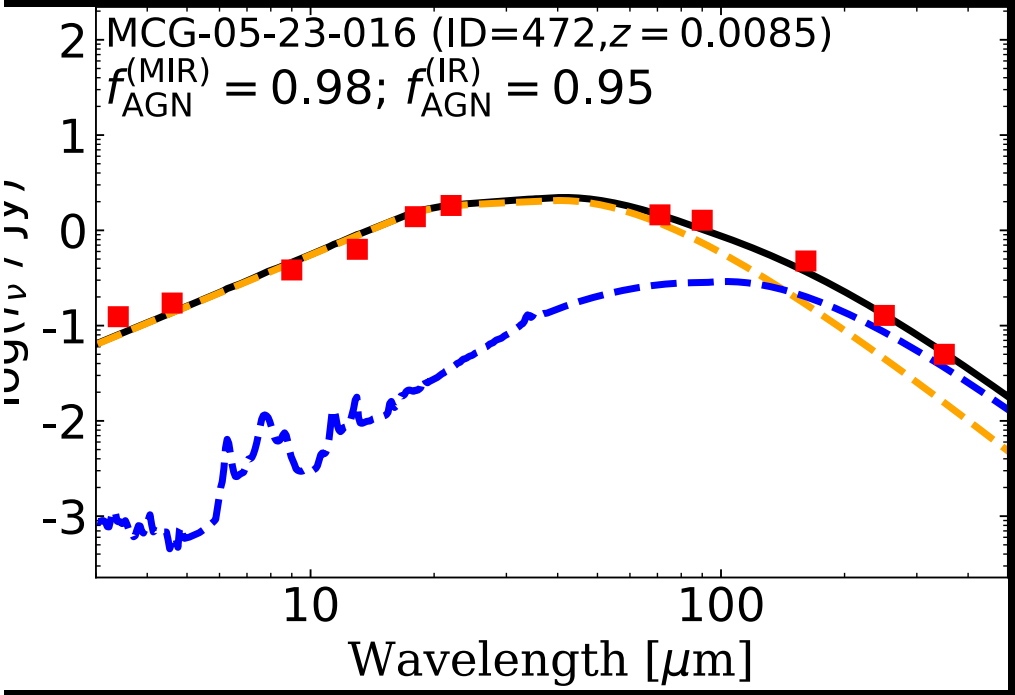
We found 9 “IR-pure AGN” candidates

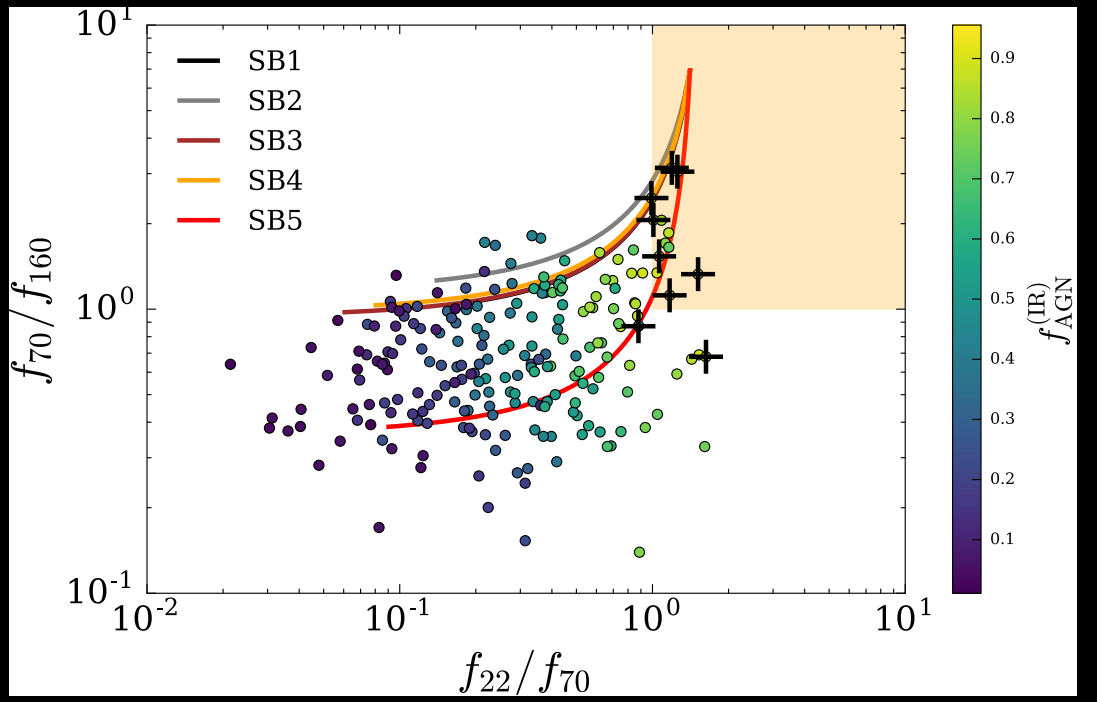


IR-Pure AGN candidates

We found 9(+4) "IR-pure AGN" candidates

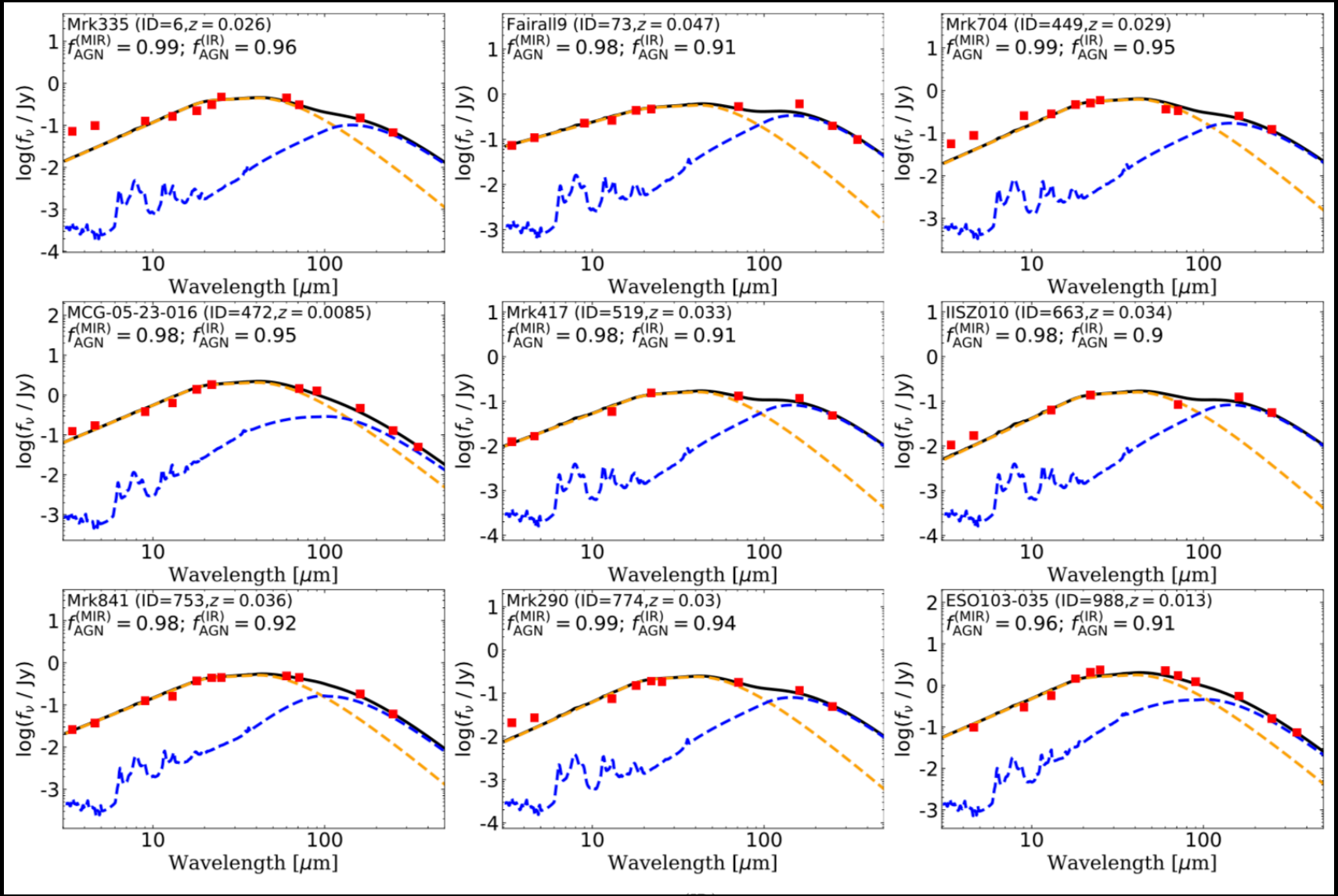
Ichikawa+19





- ☑ FIR (up to ~100um) is dominated by AGN torus emission
- ☑ IR-pure AGN shows the SED w/ $f_{22um} > f_{70um} > f_{160um}$

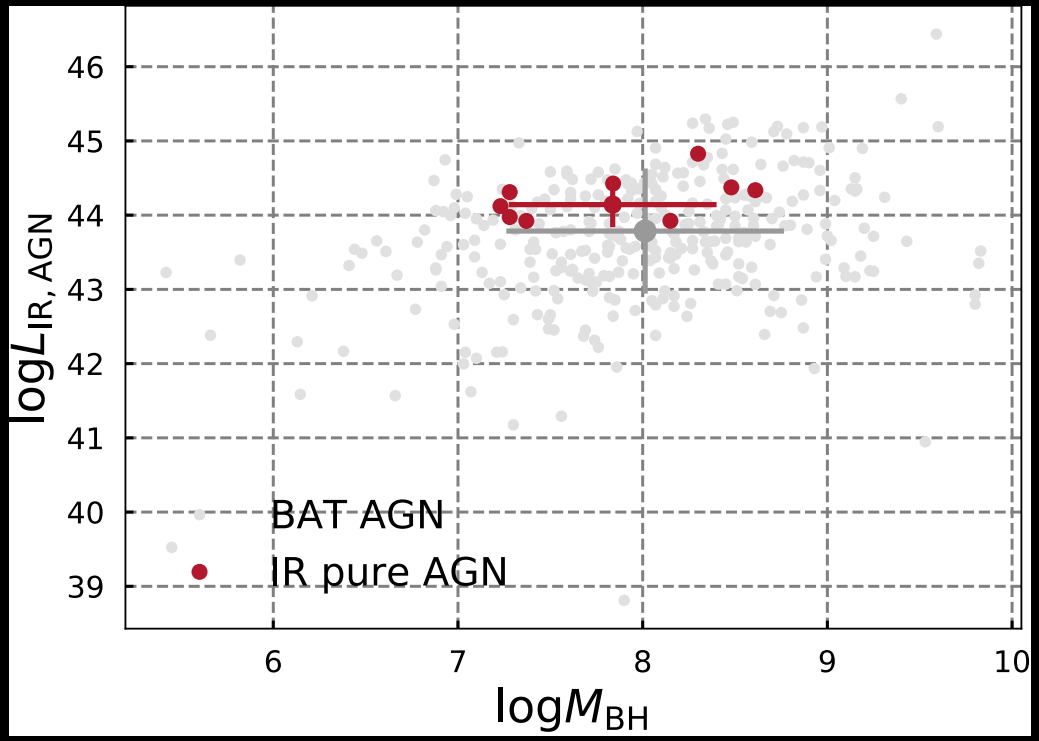
9 IR-Pure AGN candidates

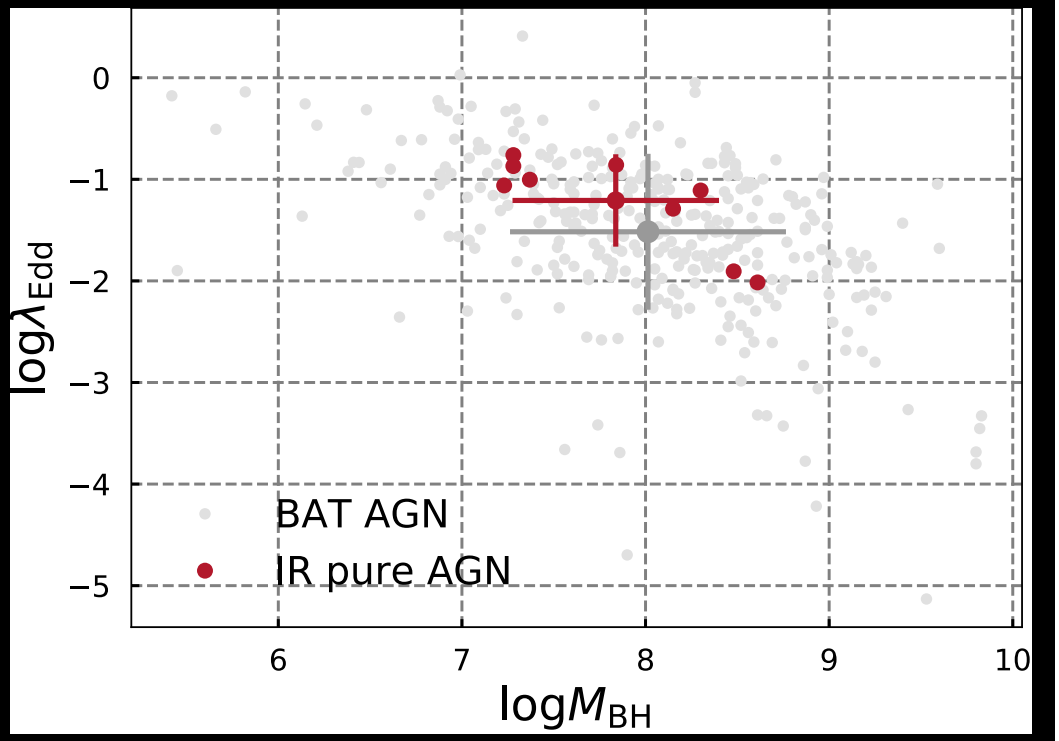


AGN properties of IR pure-AGN

Some QSOs show similar SED. Are IR pure-AGN very bright?

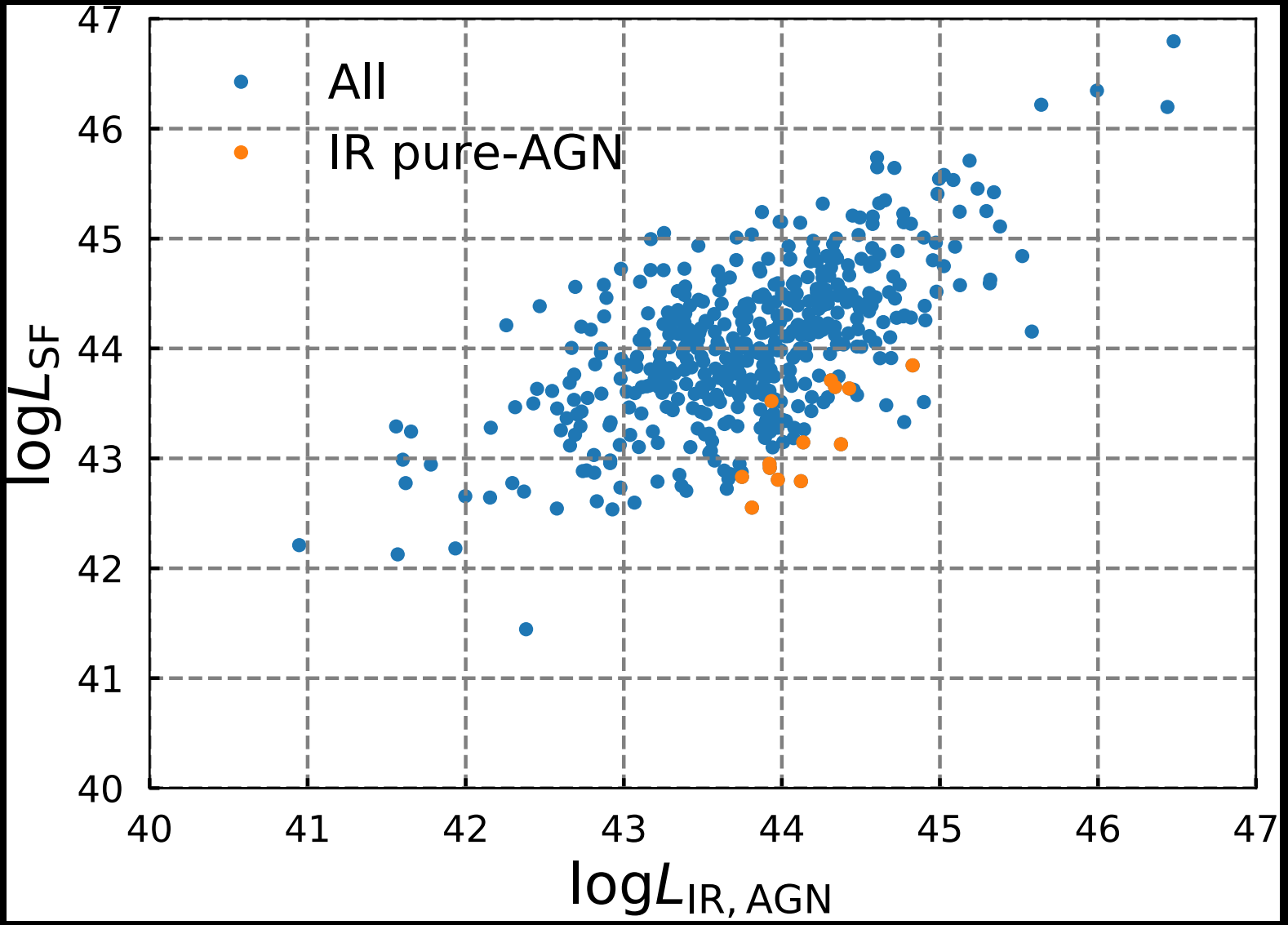
☑ $L_{IR,AGN}$, λ_{Edd} vs. M_{BH} of IR pure-AGN





☑ Almost similar distribution w/ the parent sample

L_{SF} vs. $L_{IR,AGN}$ of IR pure-AGN

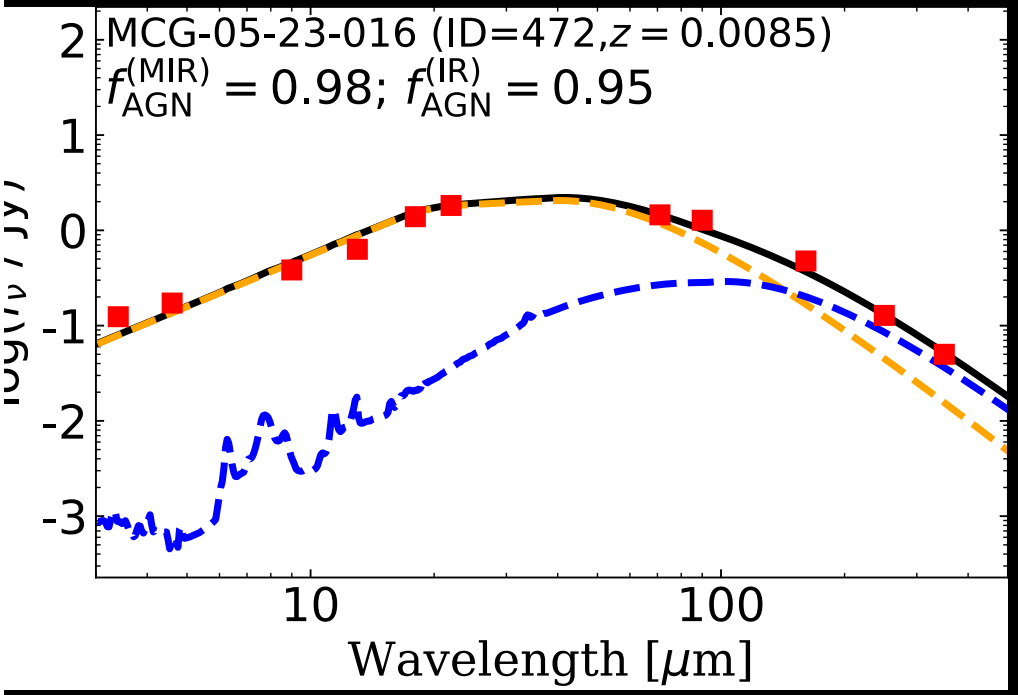


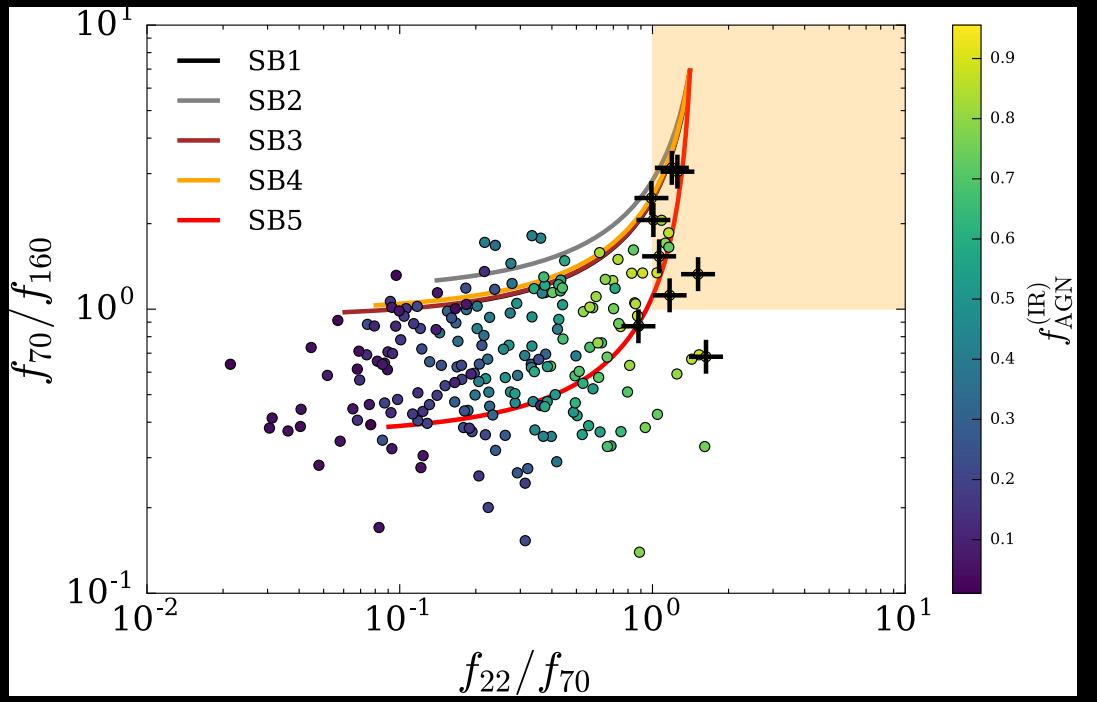
☑ **Their SF luminosity is smaller than the average**

IR-Pure AGN candidates

We found 9(+4) "IR-pure AGN" candidates

Ichikawa+19





☑ FIR (up to ~100um) is dominated by AGN torus emission

☑ M_{BH}, $L_{14\text{-}150keV}$ distribution is similar with the parent sample (<log M_{BH}>=7.8, <log $L_{14\text{-}150}$>=43.7)

→ Suggesting **weaker SF activities in the host**

→ **good candidates of final stage AGN?**

What is the next step?

IR-pure AGN are interesting candidates in the phase where *AGN is (still) active, but the host is quenching*

☑ SF quenching is actually happening in IR pure AGN?

1. molecular gas reservoir (gas mass)

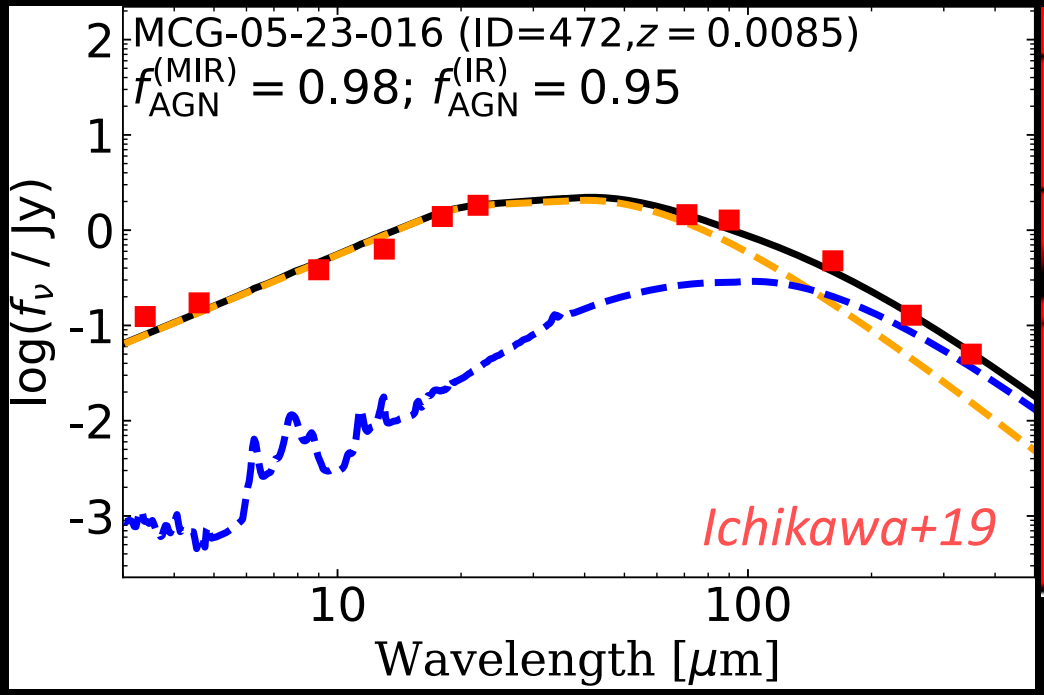
2. location in SFR vs. M_*

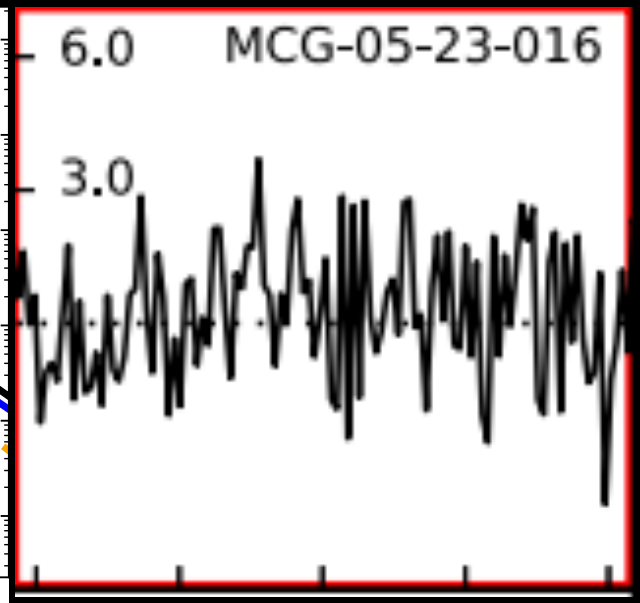
☑ Do IR-pure AGN have any feedback signatures?

1. optical spectral feature

IR-pure AGN contain low molecular gas?

CO (2-1) emission is non-detection for (at least one) IR-pure AGN



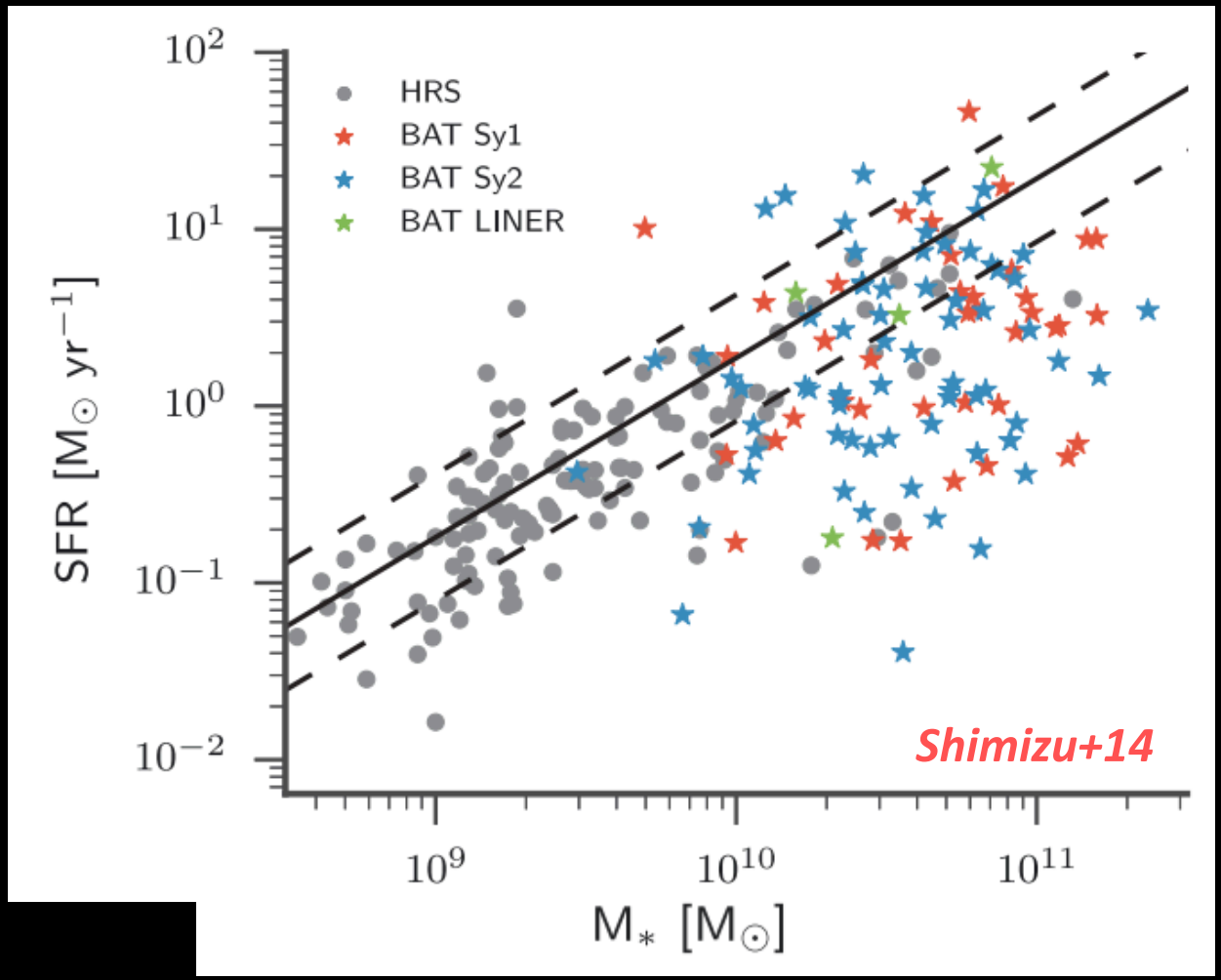


Rosario+18

- ☑ **BASS molecular gas sample could cover most of IR-pure AGN?**
- ☑ **Gas mass In BASS DR2? (Koss+ or Shimizu+?)**

Are IR-pure AGN in the main-sequence?

Where are the location of IR-pure AGN in SFR vs M∗ sequence?



☑ **Small SFR/M∗ would be expected for IR-pure AGN**

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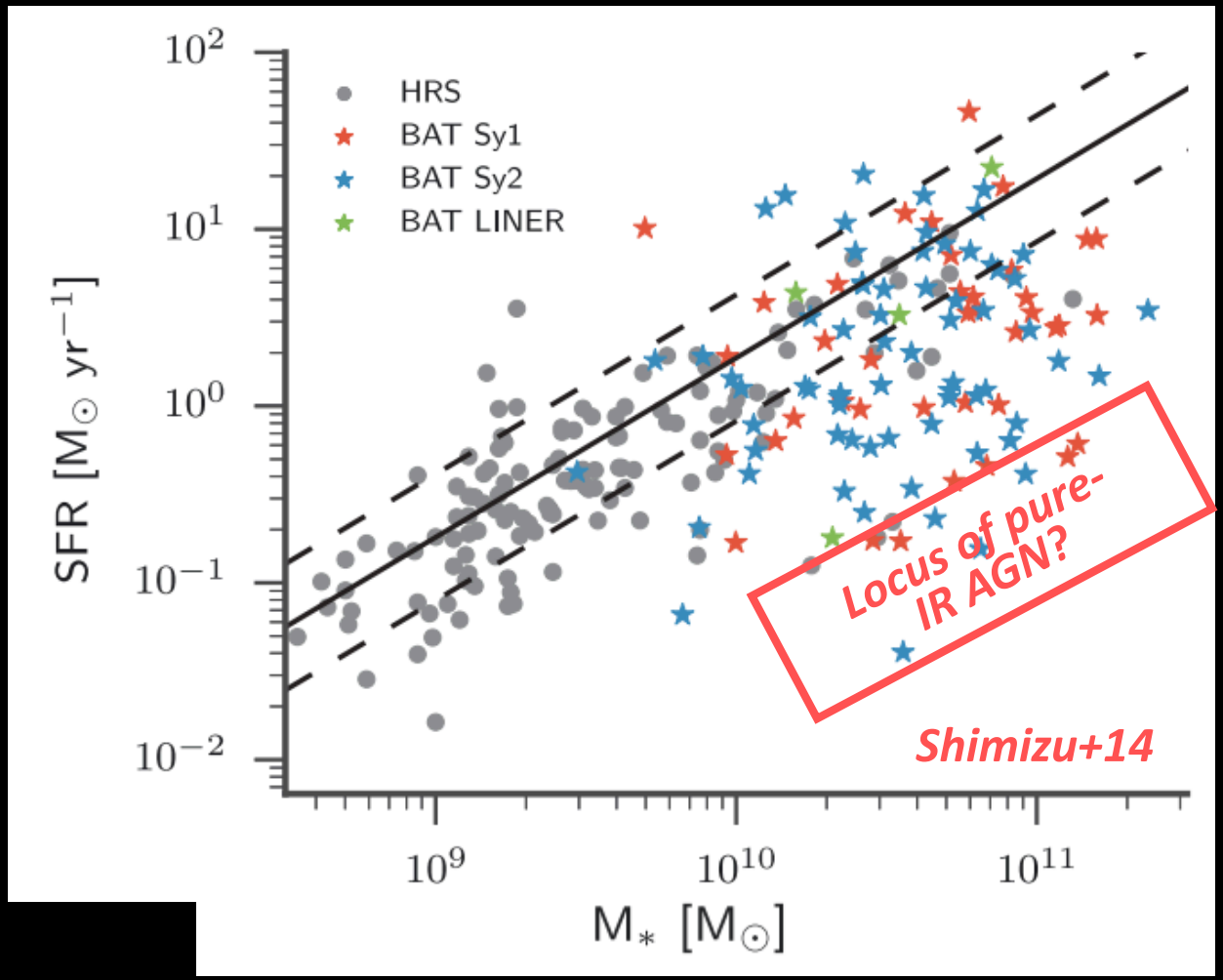
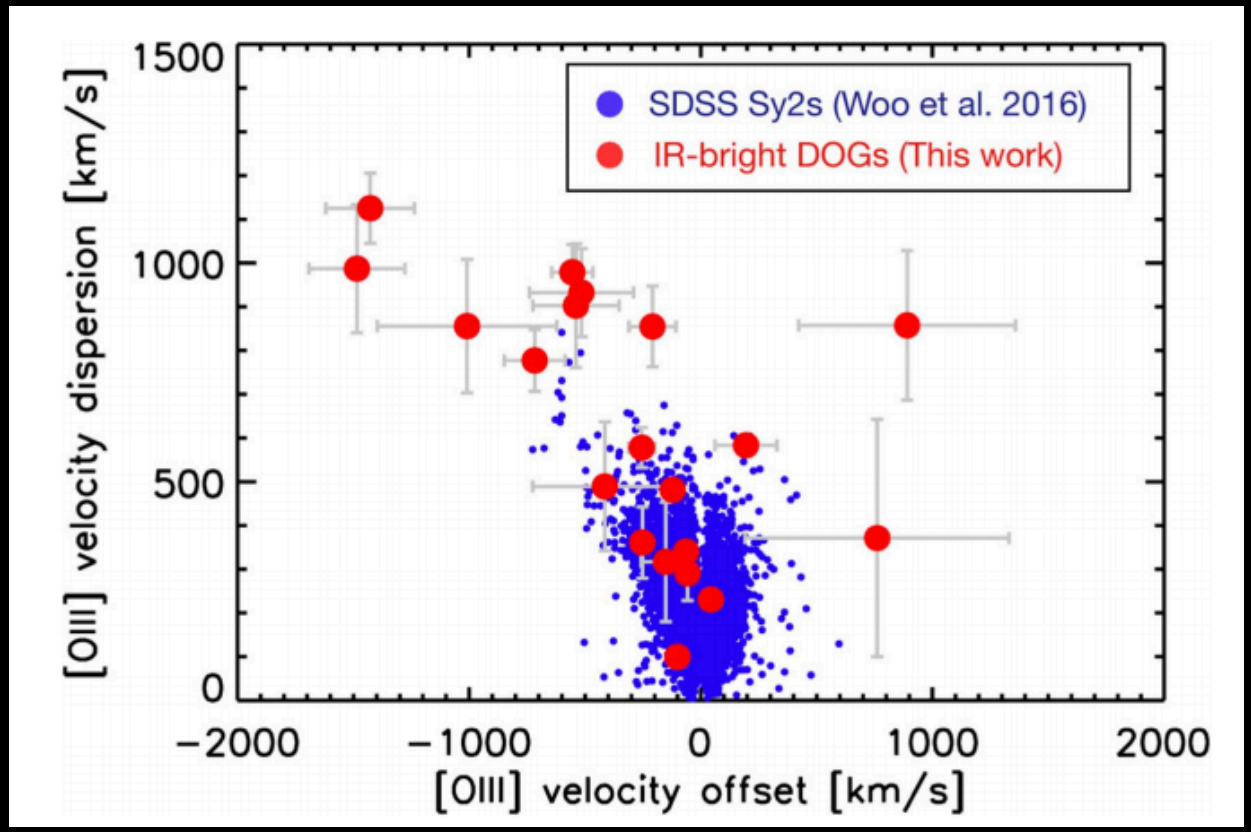


☑ **Small SFR/M∗ would be expected for IR-pure AGN**

Do IR-pure AGN have (ionized) outflow?

Optical spectra give us the (ionized) outflow through [OIII]5007



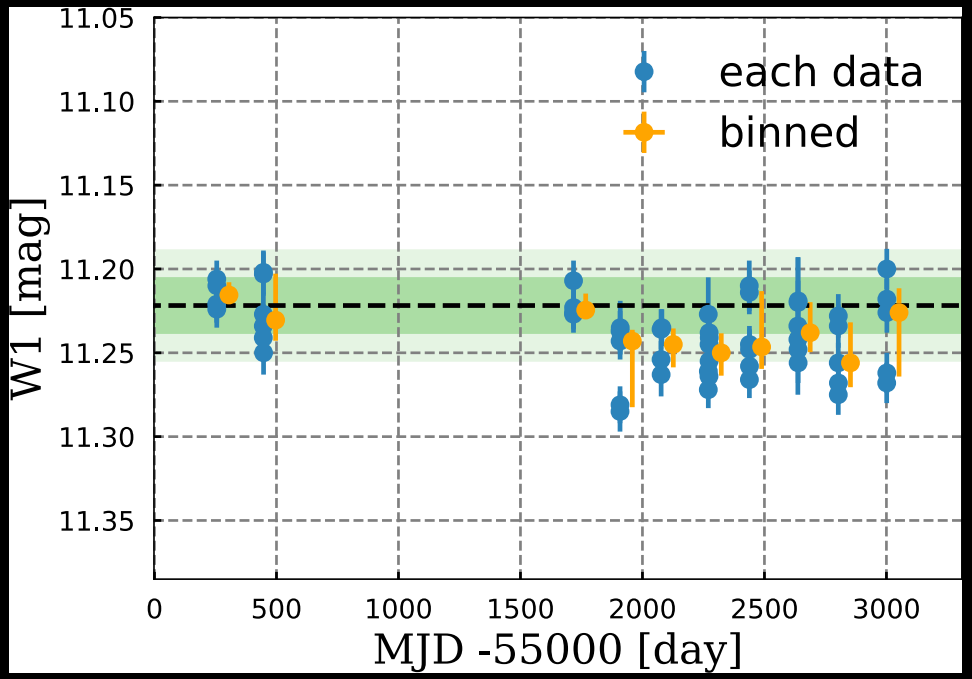
Woo+16; Toba+18

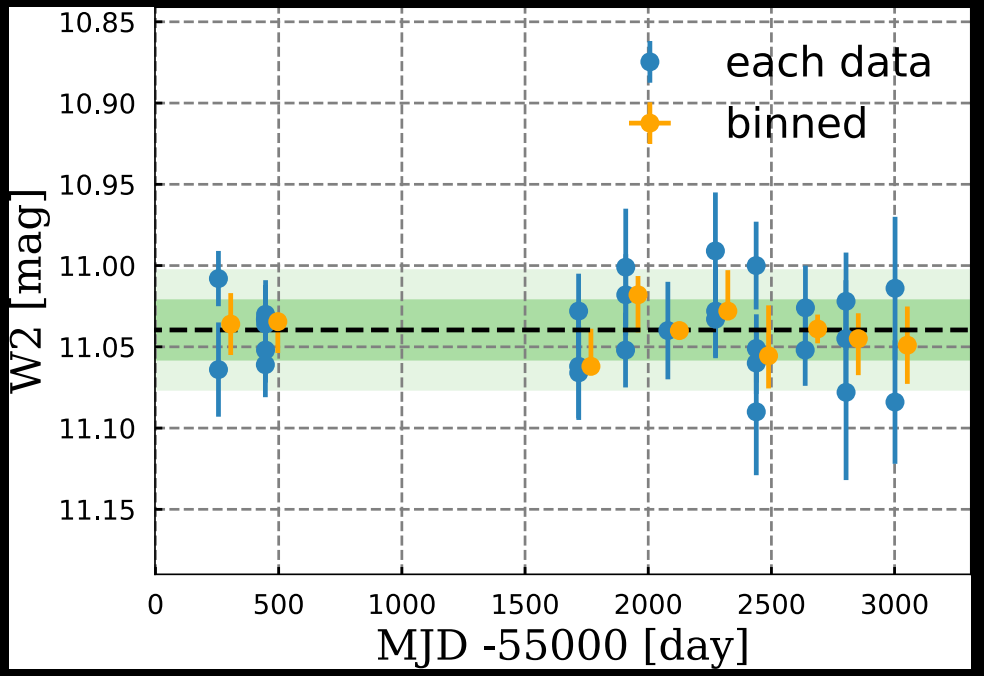
☑ **BASS already covers optical spectra, the outflow feature might be easily checked?**

Can we see some AGN luminosity decline?

ALLWISE+NEOWISE covers W1 (3.4um) and W2 in the last 8 yrs

Ichikawa+19b





- ☑ Do we see any variabilities for IR-pure AGN?
- ☑ Seems very ambitious, but worth to see…

What we will do

In order to work on the AGN/host properties of pure-IR AGN, we will check

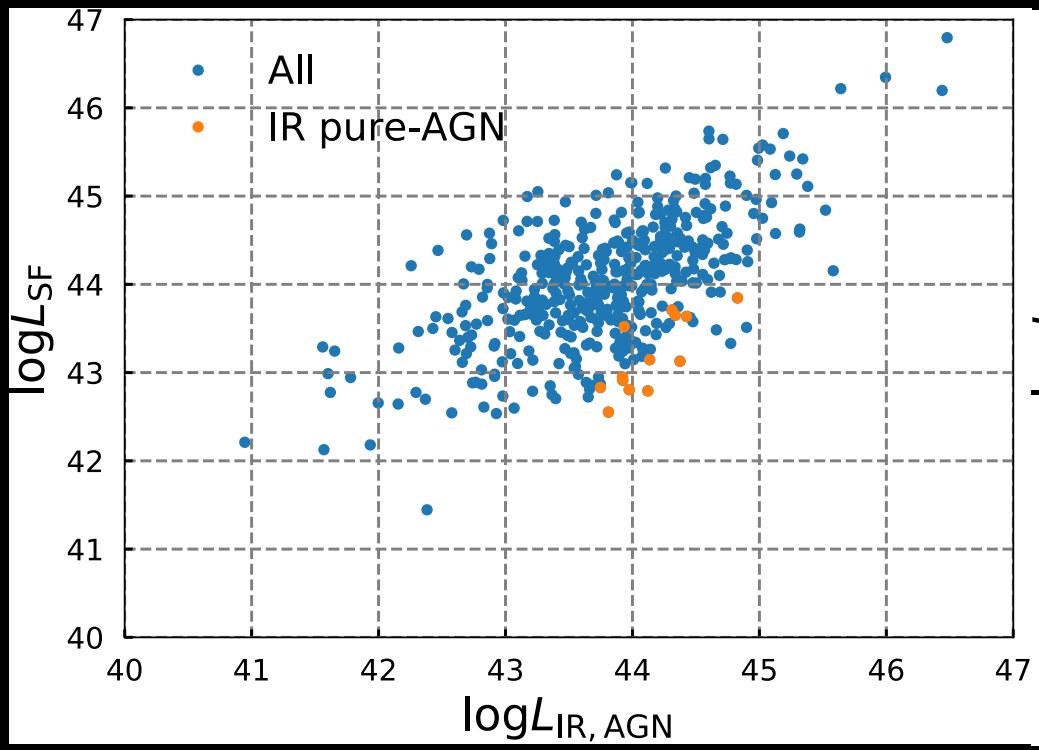
- ☑ SFR vs. M_*
- ☑ **molecular gass mass**
- ☑ **outflow properties**

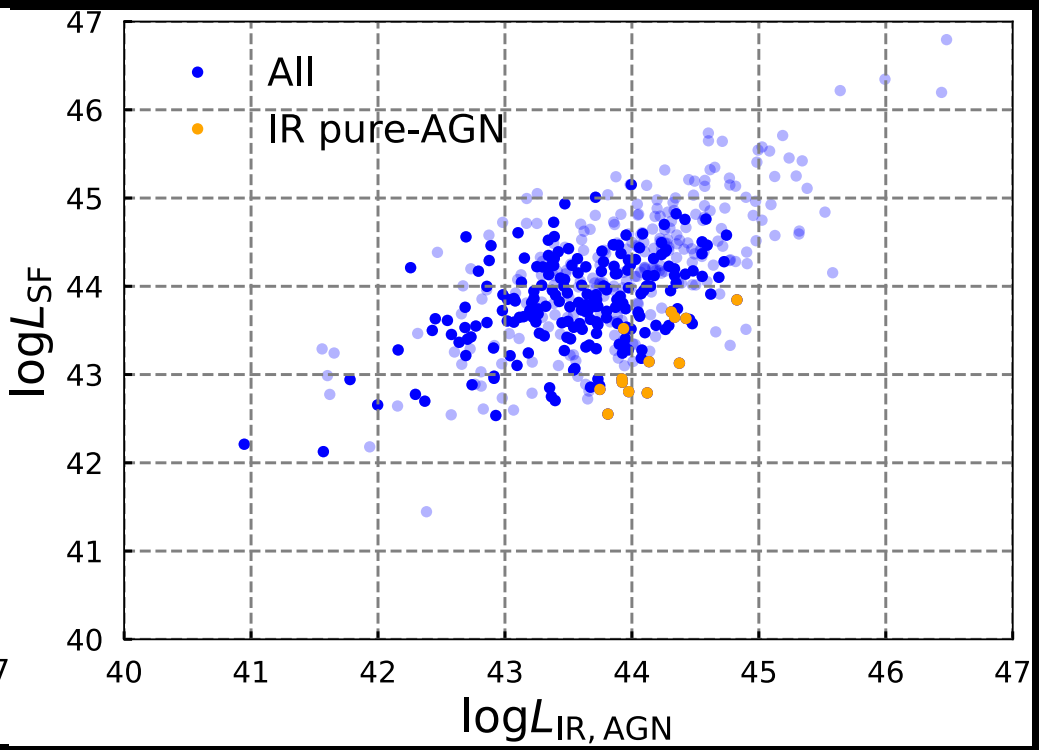
In order to achieve them, we need

- ☑ optical spectra with outflow feature
- ☑ M_*, molecular gas mass <= BASS team already has the dataset?

Appendix

L_{SF} vs. $L_{IR,AGN}$ of IR pure-AGN





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