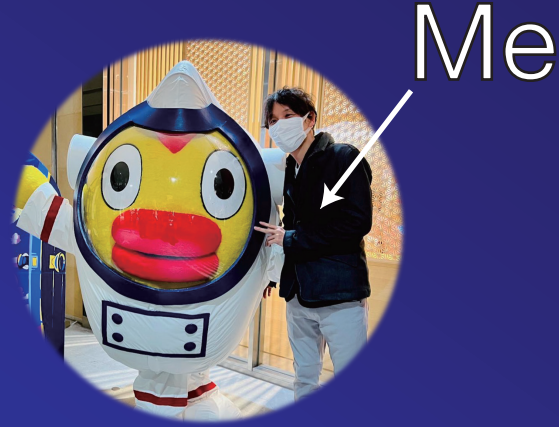


PFS-SSP preparation: AGN sciences with cosmology and galaxy evolution surveys

Your participation is very welcome.
Let's get PFS-AGN science going together!

Yoshiki Toba (NAOJ)
on behalf of PFS-GE AGN sub-WG



PFS-SSP is planned to begin in S24B!

IMPORTANT

Understanding when and how supermassive black holes (SMBHs) have formed and evolved in the history of the universe is one of the most critical issues in astronomy. To tackle this issue, it is essential to examine active galactic nuclei (AGN) in various evolutionary stages in all epochs without any selection bias and to reveal their physical and statistical properties by comparing them with theoretical models. From an observational point of view, a complete sample of AGN selected with multi-wavelength data is required. The PFS Subaru Strategic Program (PFS-SSP) will provide a unique opportunity to establish such a sample and achieve the above science goal. Since the science operation of PFS-SSP is getting closer to the beginning, we have been discussing what kinds of AGN sciences are doable. In this poster, we present the current status of AGN sciences with PFS-SSP, particularly focusing on those in the Galaxy Evolution (GE) field.

1 Broad-line AGN (PI: Y.Matsuoka)

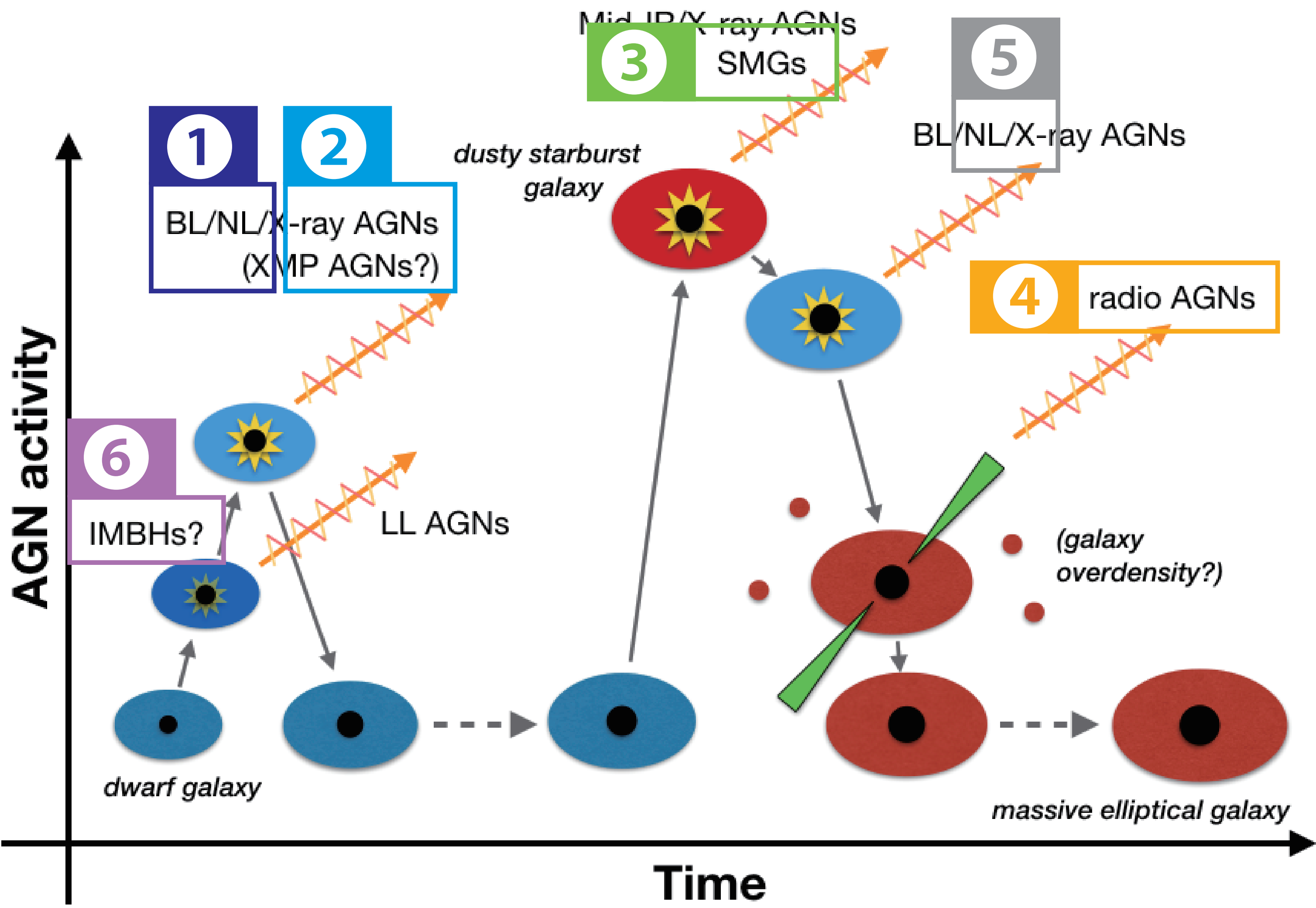
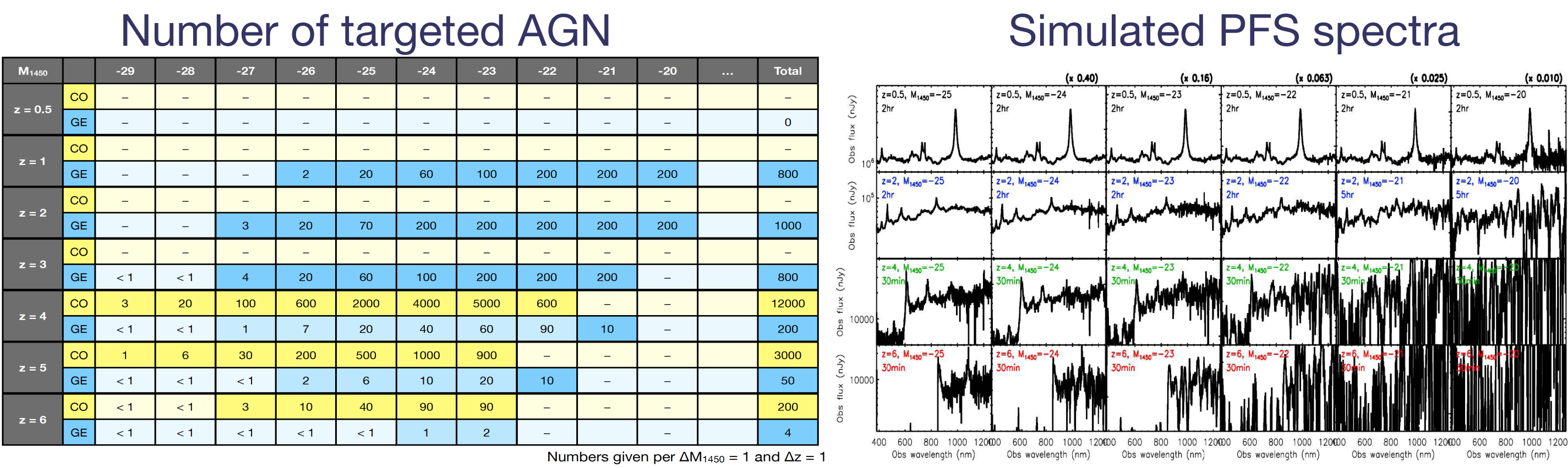


Science goal

- To reveal statistical properties (e.g., luminosity/BH-mass functions and clustering properties) of broad-line AGN at $0 < z < 7$.

Target selection

- Multi-colors and magnitudes cuts with CLAUDS + HSC + public NIR (H-SC-joint-data) + other imaging data



Schematic diagram of SMBH evolution, which is intimately linked to the evolution of the host galaxy. We aim to probe every stage of this SMBH/galaxy evolution, by selecting AGNs at various wavelengths in a comprehensive way. This figure is made by Yoshiki Matsuoka.

6 IMBH candidates (PI: M.Kokubo)

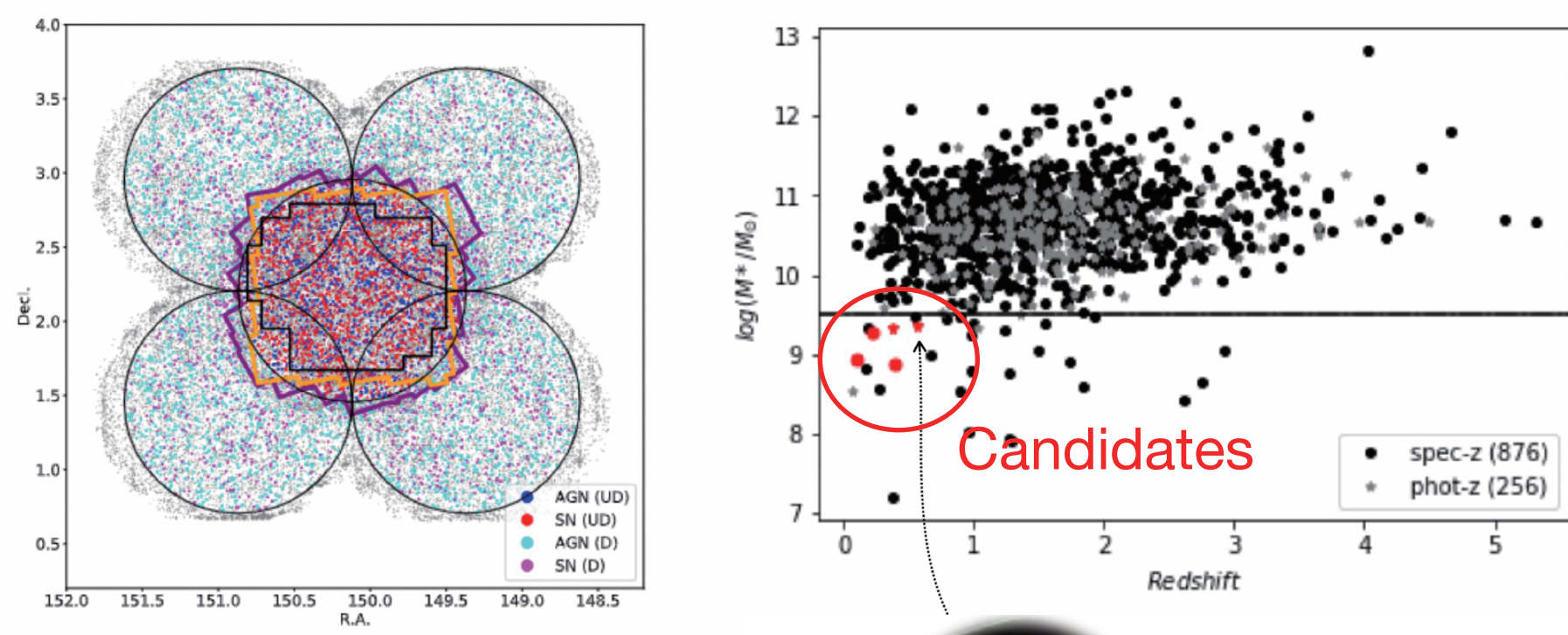


Science goal

- To discover low-mass ($M_{BH} < 2 \times 10^6 M_{\odot}$) active BH systems and measure AGN occupation fraction in low-mass galaxies.

Target selection

- (1) UV/optical stochastic variability for sources in COSMOS and SXDS.
- (2) Time-domain info. + multi-band SED.



Other ideas

(e.g., X.Chen)

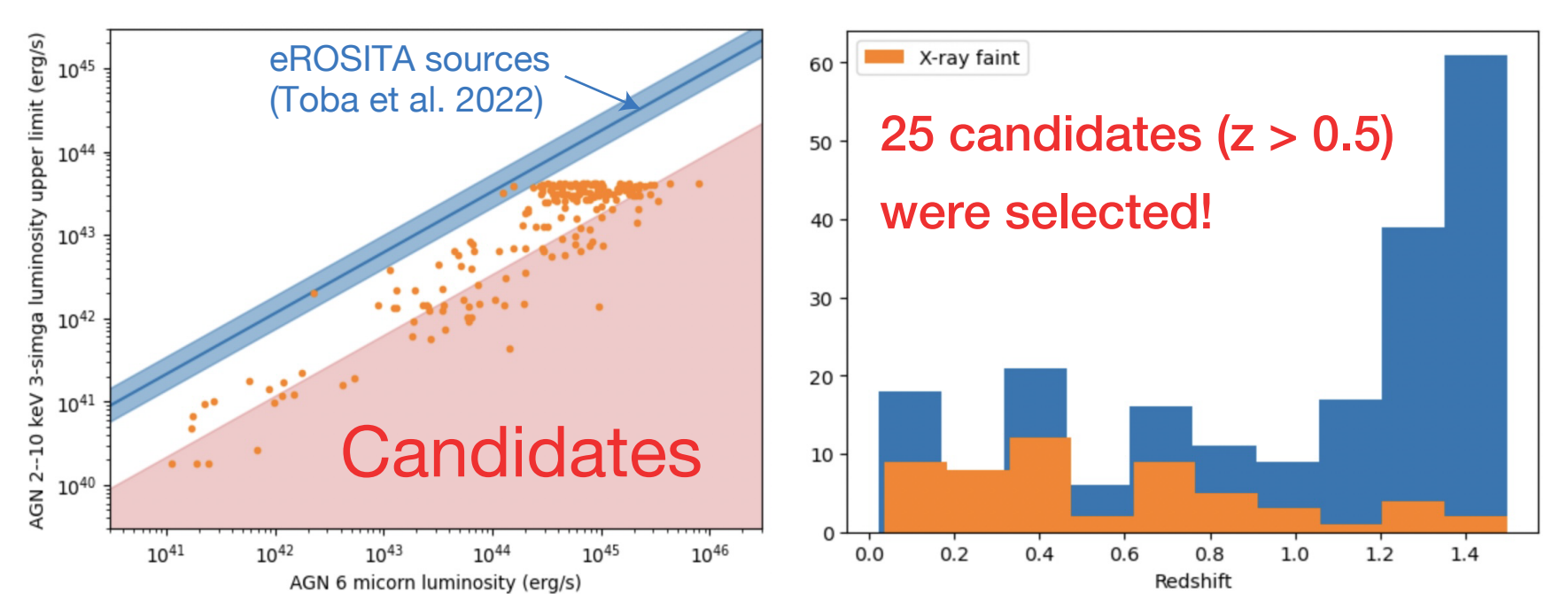


Science goal

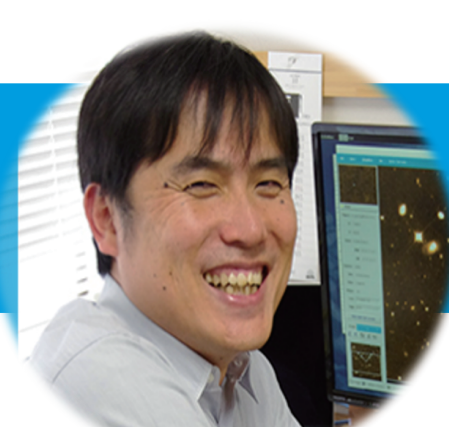
- A search for "fading AGN" from mid-IR bright, X-ray faint sources through the deep spectroscopic observations with PFS.

Target selection

- Based on Spitzer and Chandra data in COSMOS, mid-IR bright, but X-ray undetected objects are selected as candidates of "fading AGN."



2 X-ray AGN (PI: M.Akiyama)



Science goal

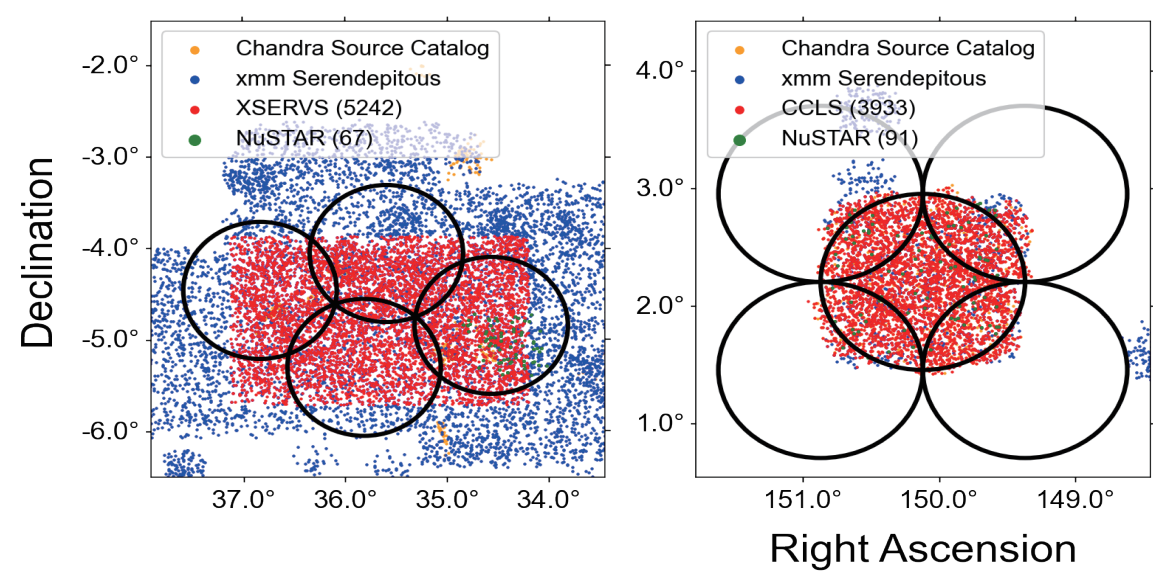
- To reveal statistical properties (e.g., luminosity/BH-mass functions and clustering properties) of X-ray selected AGN.

Target selection

- XMM and/or Chandra data.

Possible science cases with PFS

	Area	z	BL	HaBL	[OIII]	host
X-ray AGN LF	○	○				
Black hole mass distribution (mildly obscured)	○	○	○			
X-ray obscured fraction	○	○				
Obscuration in optical vs. X-ray			○	○		
Compton-thick AGNs (large L _[OIII] /L _x)	(○)	○			○	
Outflow properties			○		○	
Host galaxy spectral properties			○			○
X-ray-Bright Optically-Normal Galaxies			○			○
Clustering of X-ray AGNs and galaxies	(○)	○				



3 sub-mm AGN (PI: H.Umehata)

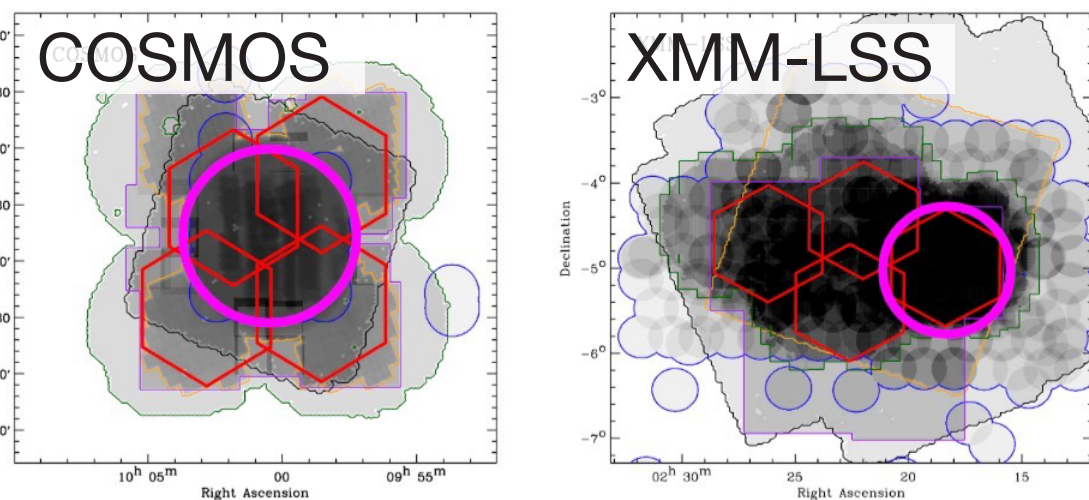


Science goal

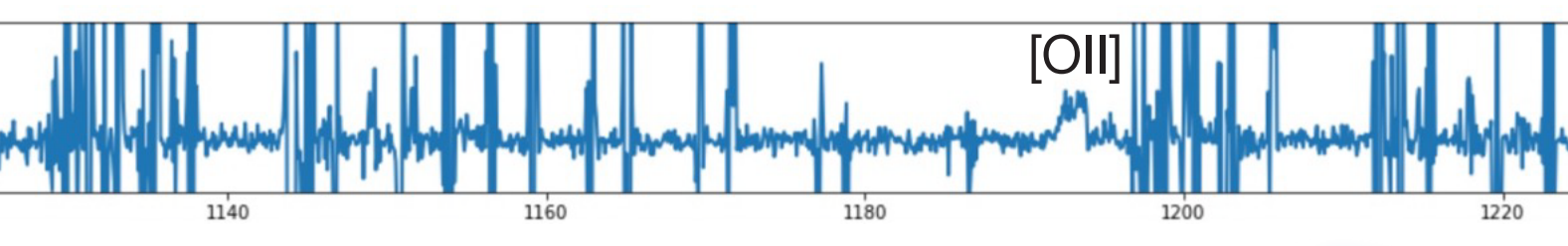
- To construct the largest sample of SMGs with spec-z, which provides fundamental gain for various studies (e.g., cosmic SFR density).

Target selection

- ~1000 ALMA-identified SMGs in COSMOS and XMM-LSS.



Simulated PFS spectrum for moderately obscured SMGs with 2 hours exposures.



4 Radio AGN (PI: T.Yamashita)

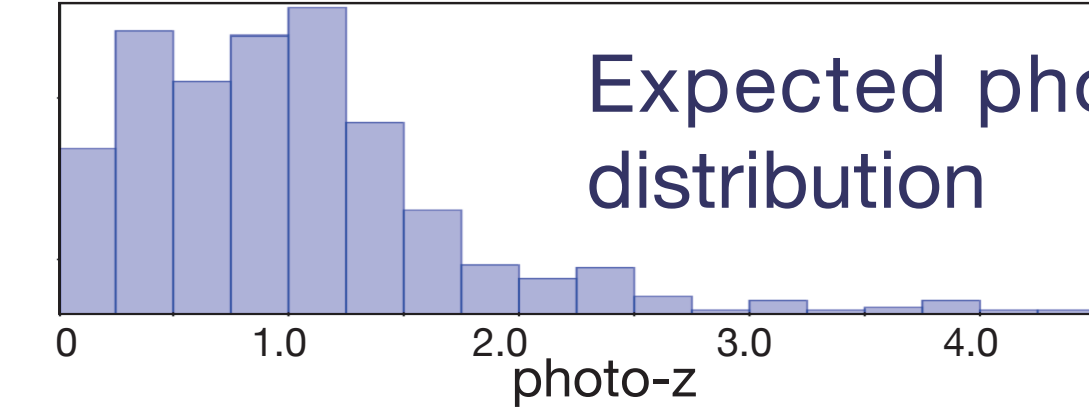


Science goal

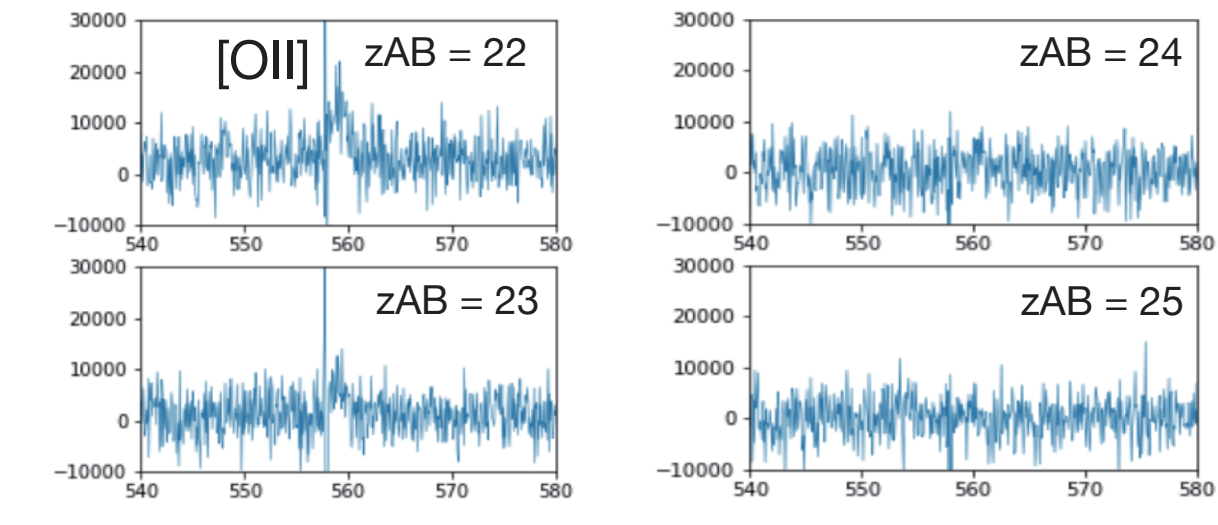
- To investigate physical and statistical properties of optically-faint radio galaxies (RGs) with spectroscopic redshift.

Target selection

- ~300 RGs selected based on a joint HSC catalog + VLASS + FIRST



Simulated PFS spectrum for an RG at $z = 0.5$ with 2 hours exposure



5 NB-selected AGN (co-PI: H.Uchiyama) (co-PI: T.Nagao)

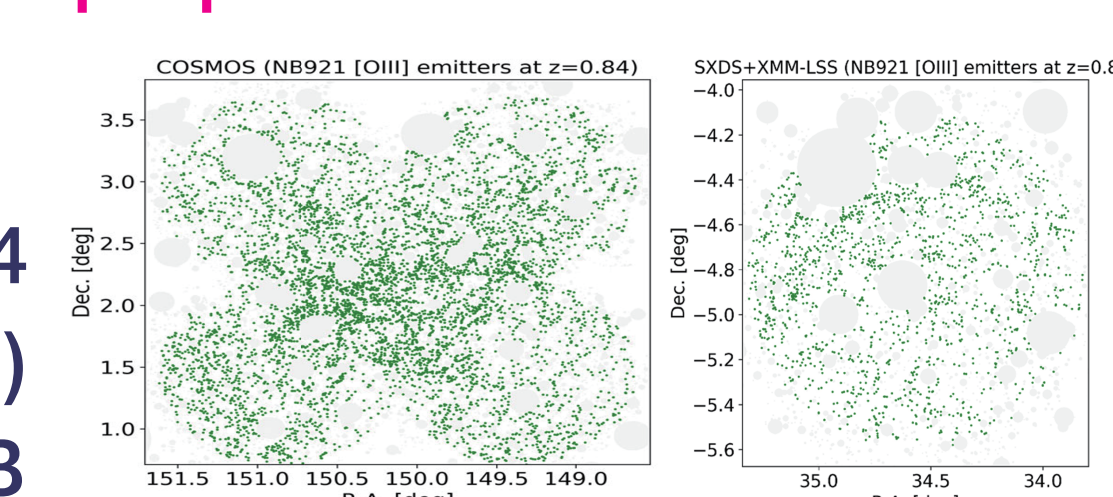


Science goal

- To Construct a catalog of OIII emitter AGN at $z=0.84$ based on Narrow-band (NB) filters, and examine their physical and statistical properties.

Target selection

- OIII emitters at $z=0.84$ catalog (Hayashi+20) in which NB and BB colors are used.



Simulated PFS spectrum with 2 hours exposure

