# A Rapidly Accreting Active Galactic Nucleus Hidden in a Dust-Obscured Galaxy at $z \sim 0.8$

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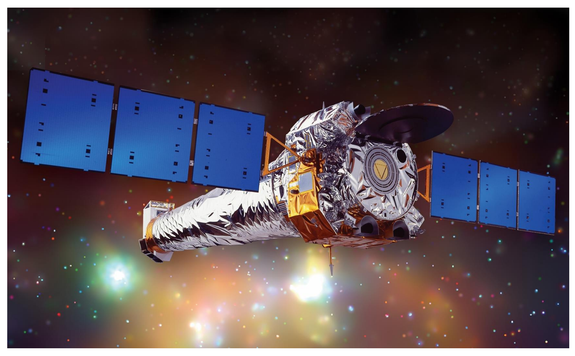
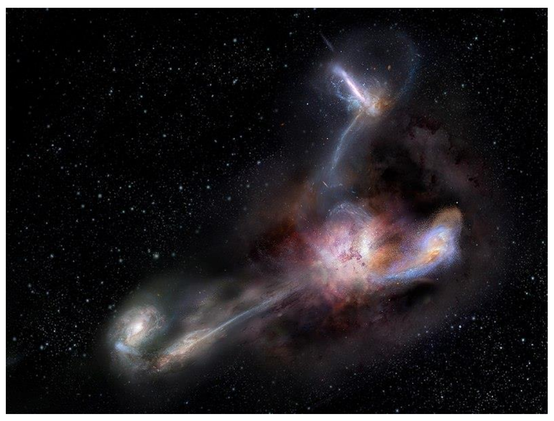
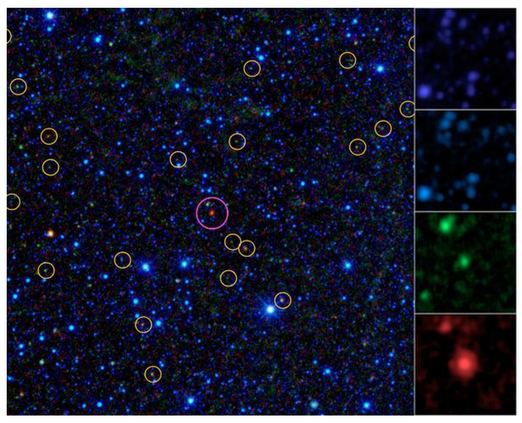


## Dust-Obscured Galaxies

- Under the SMBH–galaxy coevolution framework, the peak of both SMBH accretion and host-galaxy star formation occurs during dust-enshrouded, heavily obscured phases following mergers among gas-rich galaxies. ***DOGs and Hot DOGs may represent this peak phase.***

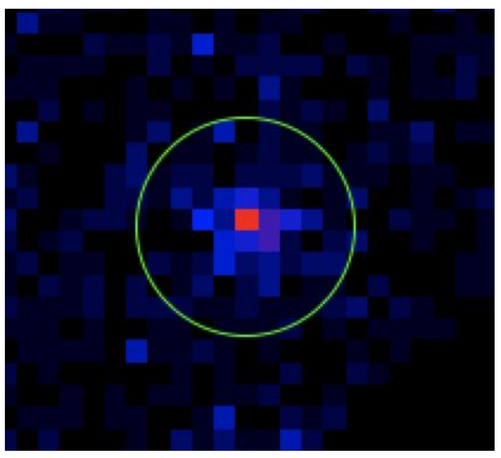




## SDSS J132440.17+450133.8

- One of the most X-ray and IR-luminous DOGs discovered to-date!
- Originally observed by Chandra in 2019; follow-up observation conducted by XMM-Newton in 2023

XMM-Newton



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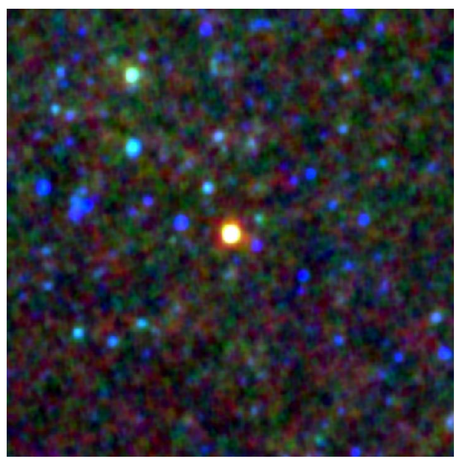
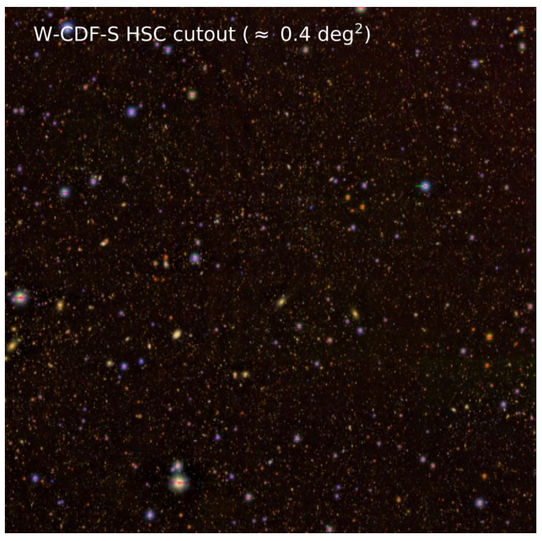
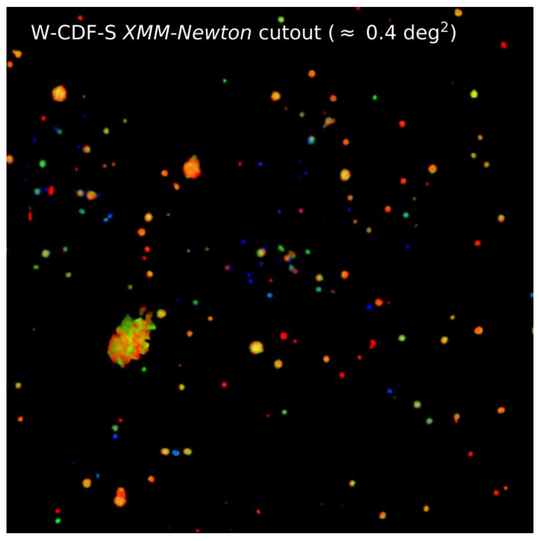


## Supplementary Sample

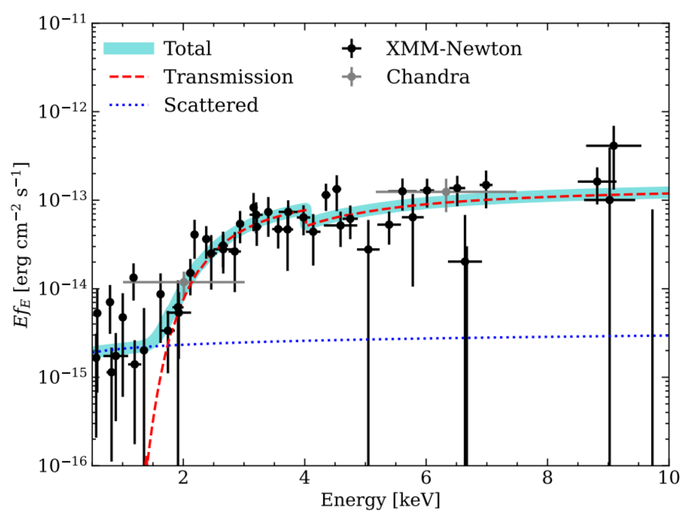
- Observed as part of the 50 ks XMM-Spitzer Extragalactic Volume Survey
- Selected from XMM-SERVS DOG catalog (Yu et al., incl. Cristello, 2024)
- 21 total X-ray detected DOGs with > 200 source counts



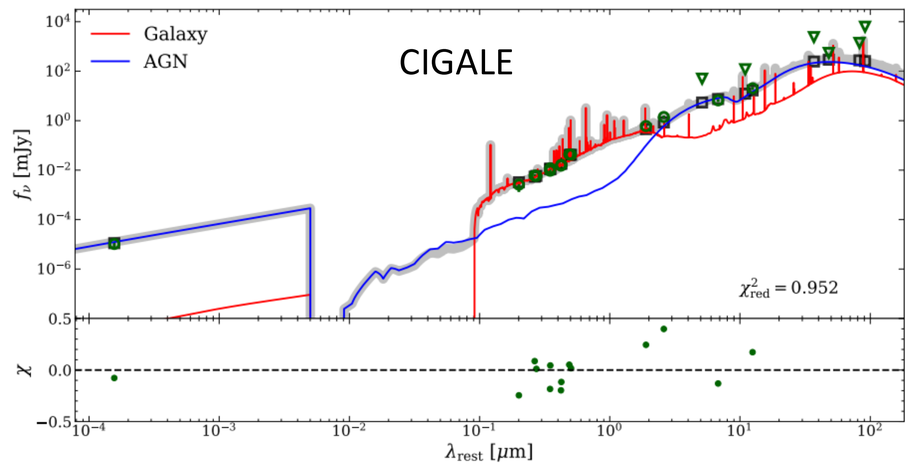



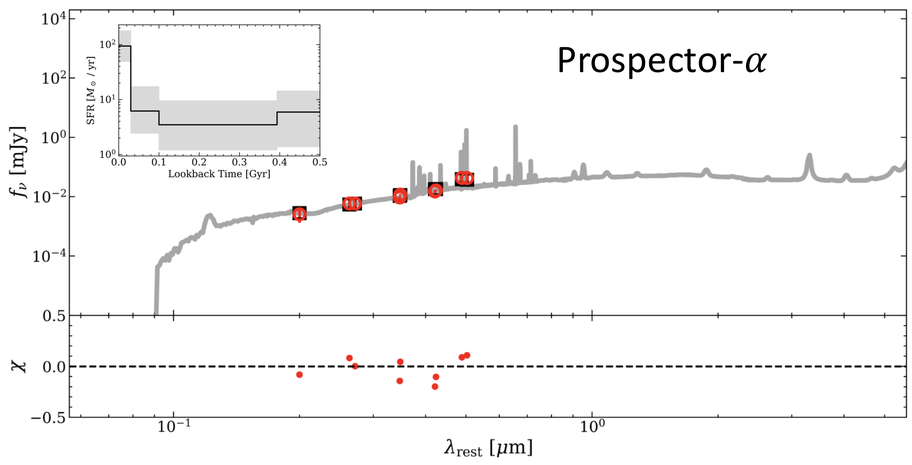

## X-ray Spectral Analysis

- Best-fit model includes…
  - Galactic absorption
  - Intrinsic absorption
  - Compton-scattering along line-of-sight
  - Soft scattered component




## Spectral Energy Distribution Fitting

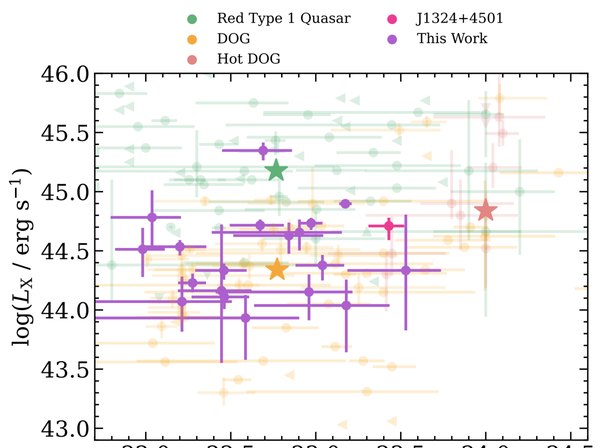


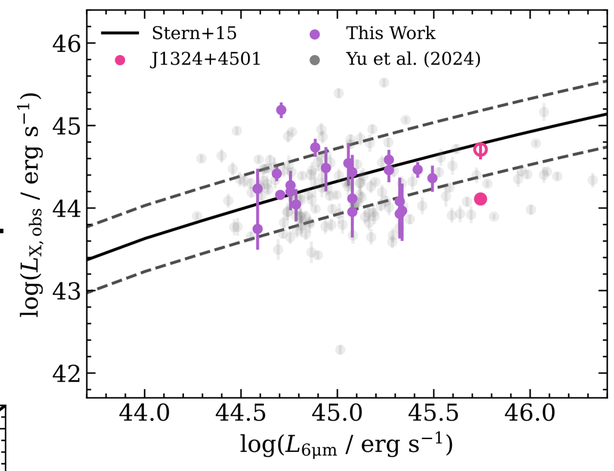

log (SFR / $M_\odot$ yr$^{-1}$) = 2.68 ± 0.43
log ($M_\star$ / $M_\odot$) = 11.29 ± 0.51
log ($M_{BH}$ / $M_\odot$) = 8.27 ± 0.40

$\lambda_{Edd} = 1.13^{+1.34}_{-0.71}$

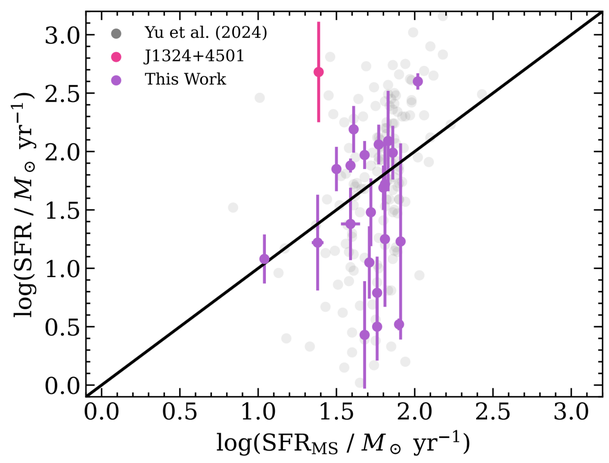
## Key Results




→ X-ray detected DOG population is heterogeneous in $L_X$ and $N_H$




Low-to-moderate X-ray obscuration ←




→ Star formation rates vary greatly over 2 orders of magnitude

## Future Prospects

- Build large sample of high- and low-$\lambda_{Edd}$ DOGs
- Compare our X-ray detected DOGs to high-$z$ quasars observed with JWST
- JWST imaging/spectroscopy
- Athena and/or Lynx will shorten observing time for X-ray detected DOGs!

*We thank Wei Yan, Joel Leja, and Bingjie Wang for insightful discussions.*