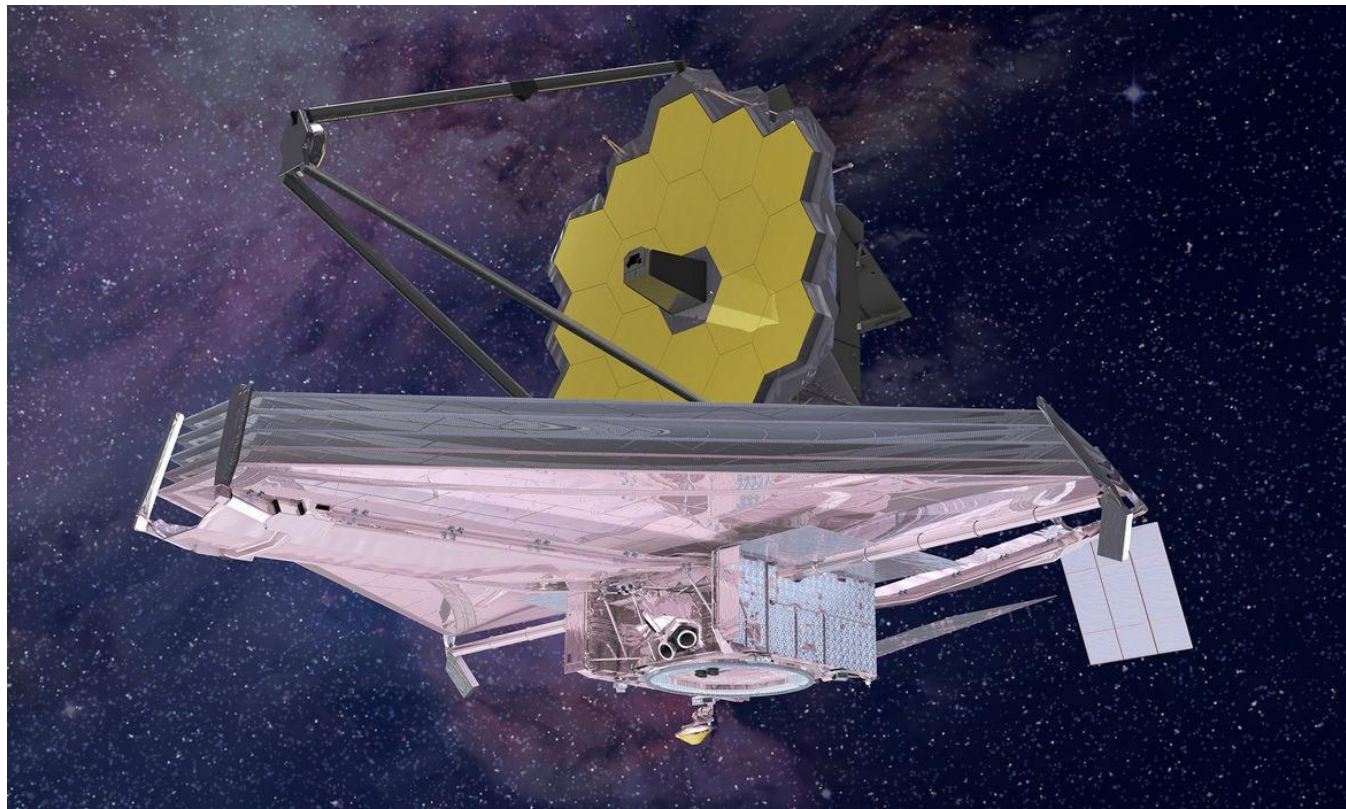


LRDs?



CEERS 14448
 $z=4.75$



NGDEEP 4321
 $z=8.92$



PRIMER-COS 10539
 $z=7.48$



CEERS 20320
 $z=5.27$



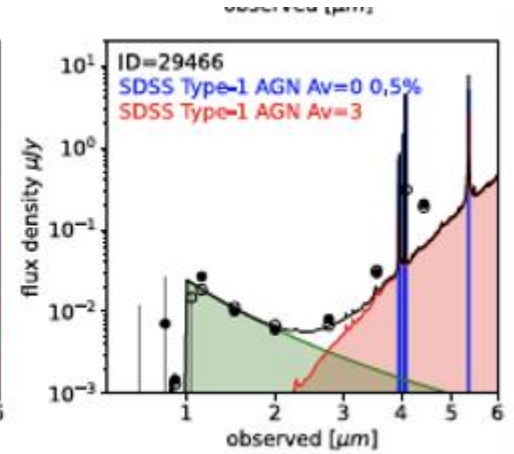
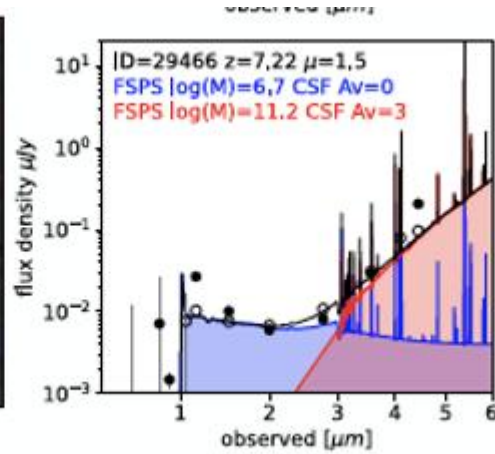
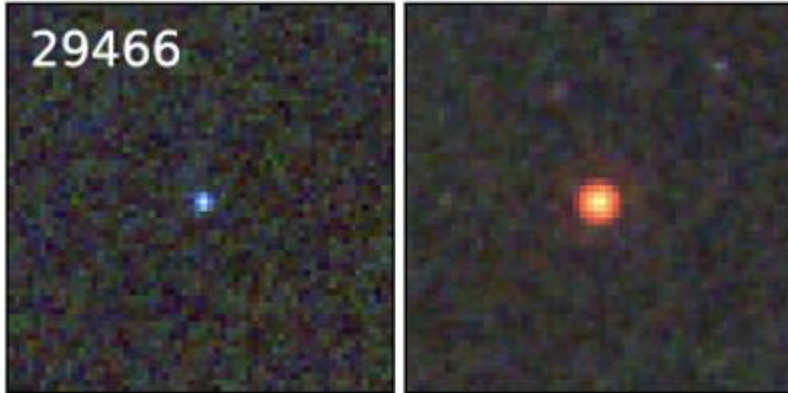
JADES 9186
 $z=4.99$



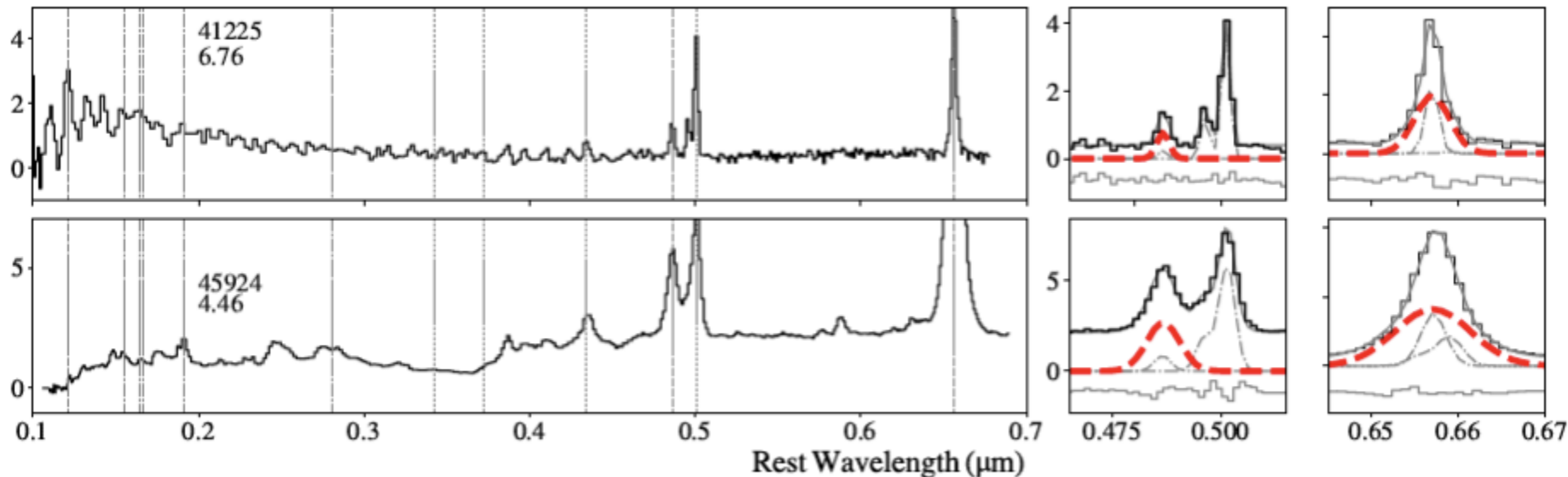
PRIMER-UDS 17818
 $z=6.40$



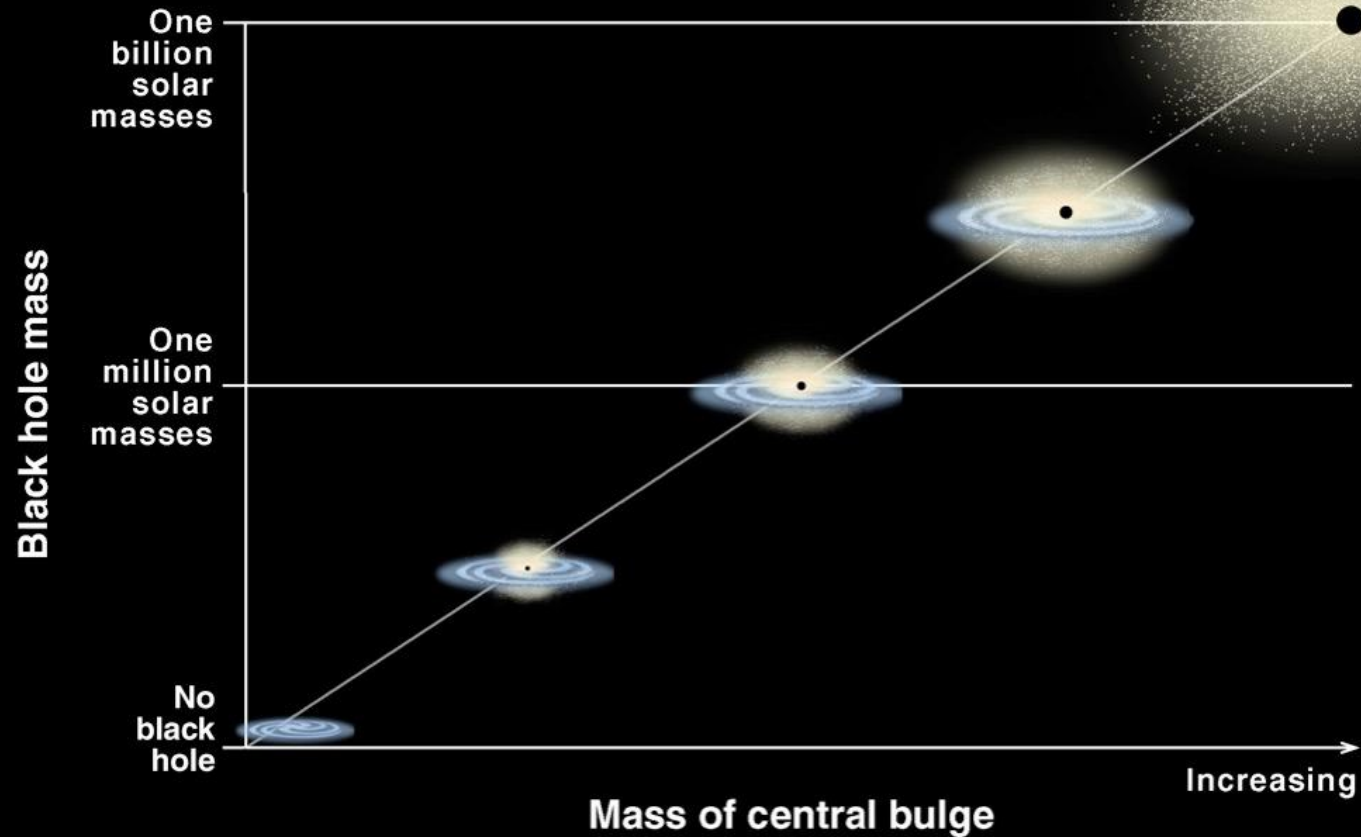
- Extremely compact, point-like
- Upper limits on size: $R_e \lesssim 50$ pc
- Often no sign of any underlying galaxy
- Peculiar V-shaped spectral energy distribution
- Interpreted as obscured AGN in optical + scattered light in the ultraviolet
- Intrinsically X-ray weak?



- $H\alpha$ FWHM $\approx 1000\text{--}5000\text{ km s}^{-1}$
- $M_{\bullet} \approx 10^6 - 10^8 M_{\odot}$
- $L_{\text{bol}}/L_{\text{Edd}} \approx 0.1\text{--}1$
- Low gas-phase metallicities

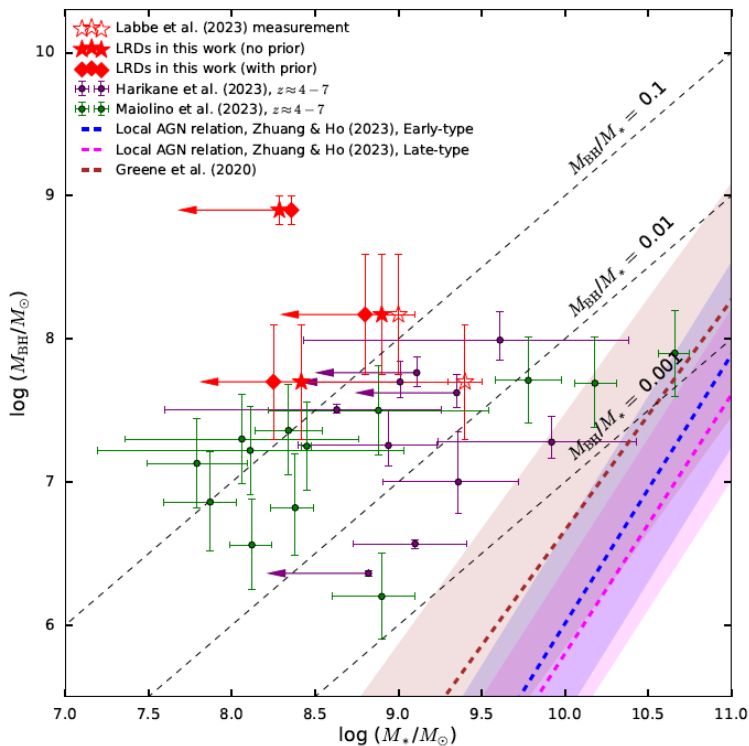
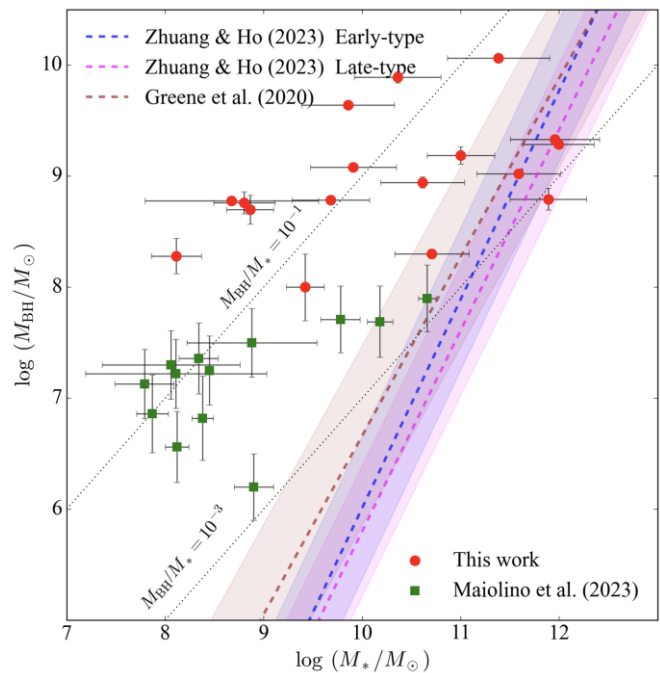


Correlation Between Black Hole Mass and Bulge Mass



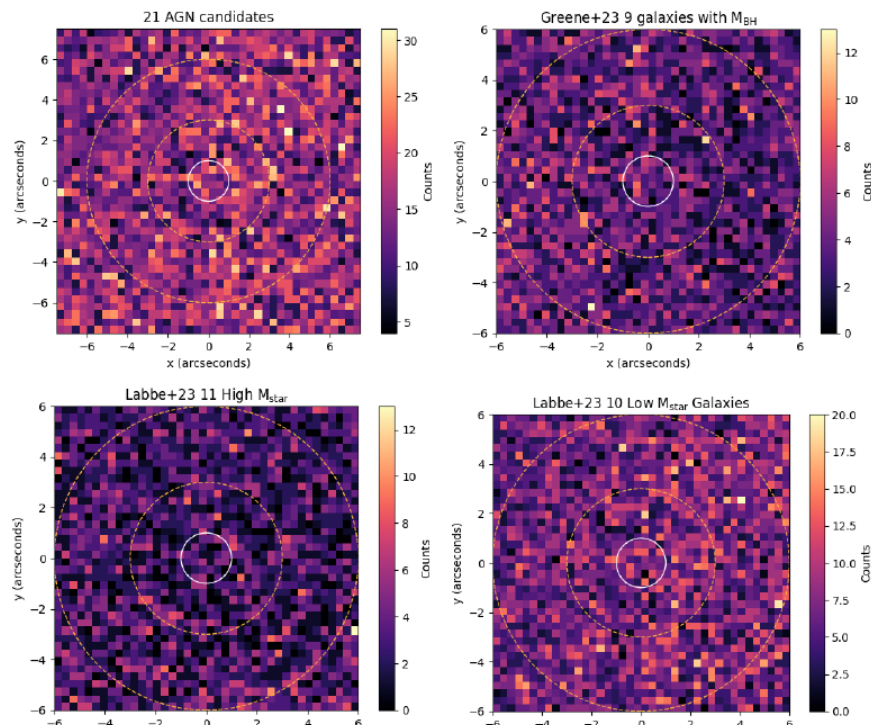
Improvements in Host Galaxy Measurements: Quasars

Li, Ho, Chen (2024)m Chen, Ho, Li & Zhuang (2024)

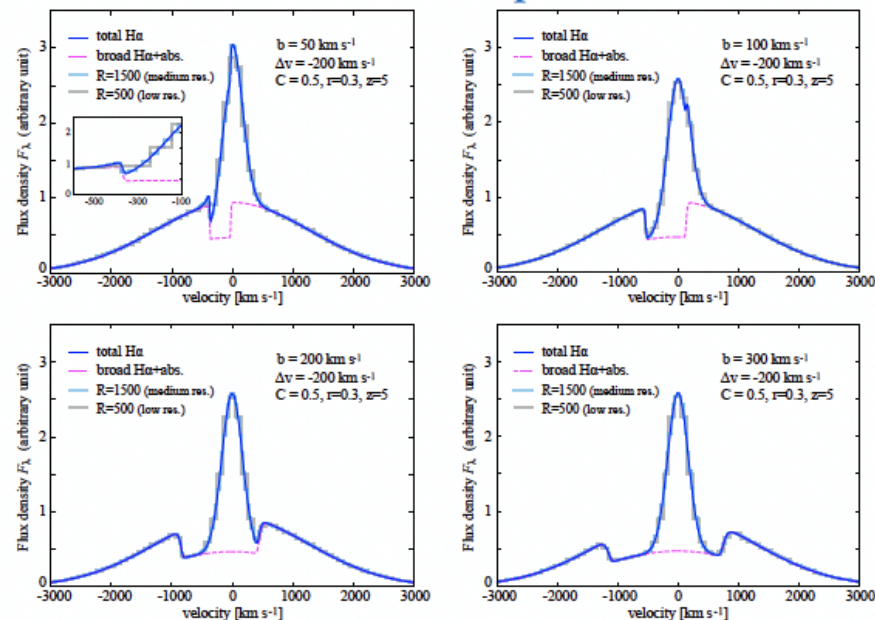


Are we sure there is a galaxy?

No X-ray emission, AGNs?

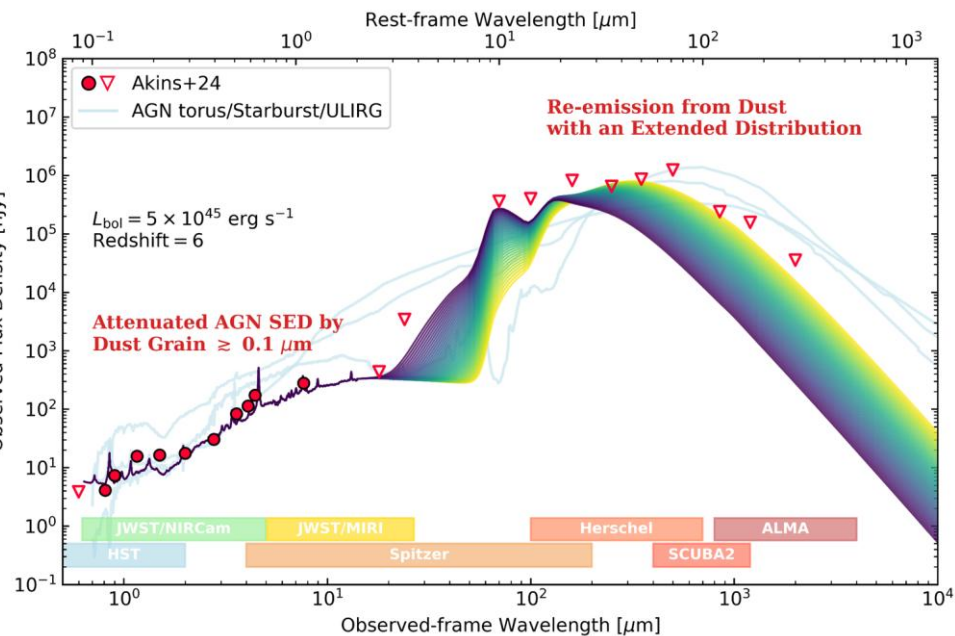
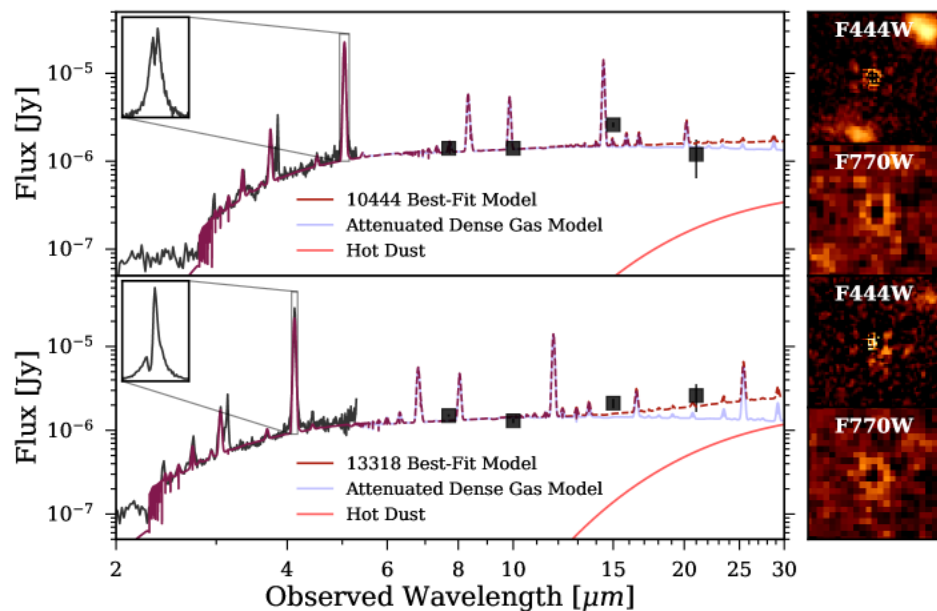


Balmer absorption



Inayoshi & Maiolino (2024)

No torus?



☯ JWST discovery of numerous $z \approx 5 - 11$ galaxies with $M_{\bullet} \approx 10^6 - 10^8 M_{\odot}$.

☯ Important new constraints on formation mechanism of SMBHs

High Balmer decrement

What provide the accreting material?

Many questions