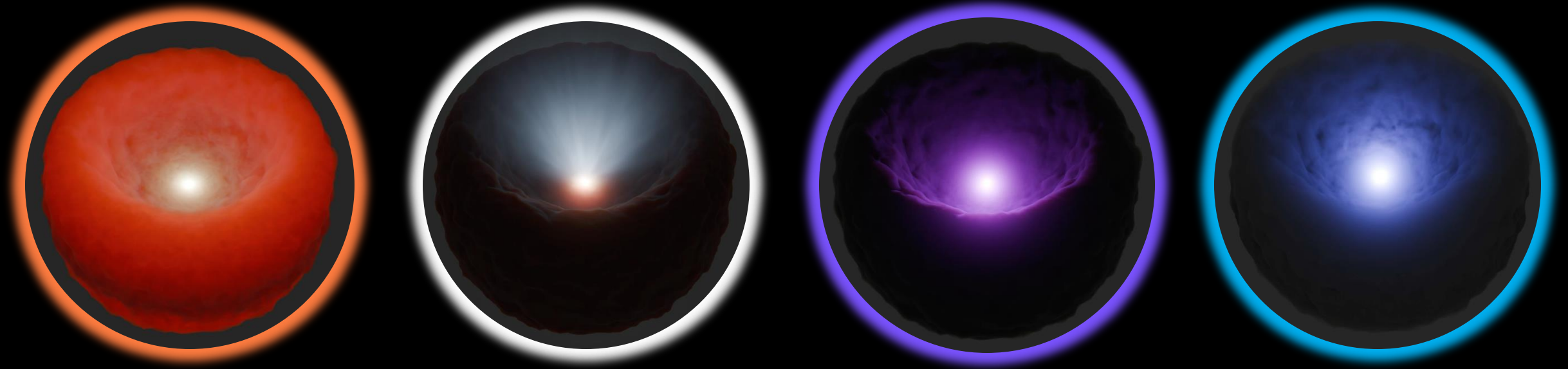
Uncovering the Dining Habits of Supermassive Black Holes in our Cosmic Backyard with NuLANDS



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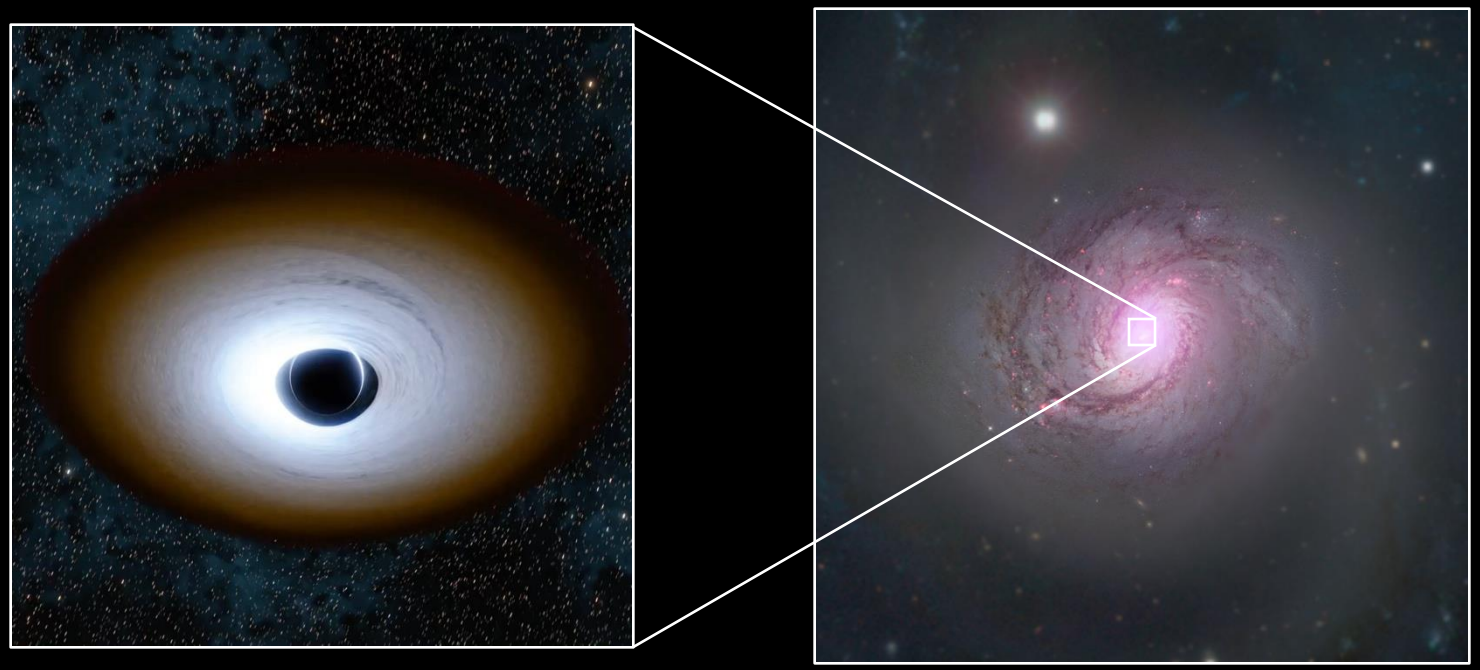
Active Galactic Nuclei (AGN)

Supermassive black hole

Host galaxy



~ 0.1 light years

~ 100,000 light years

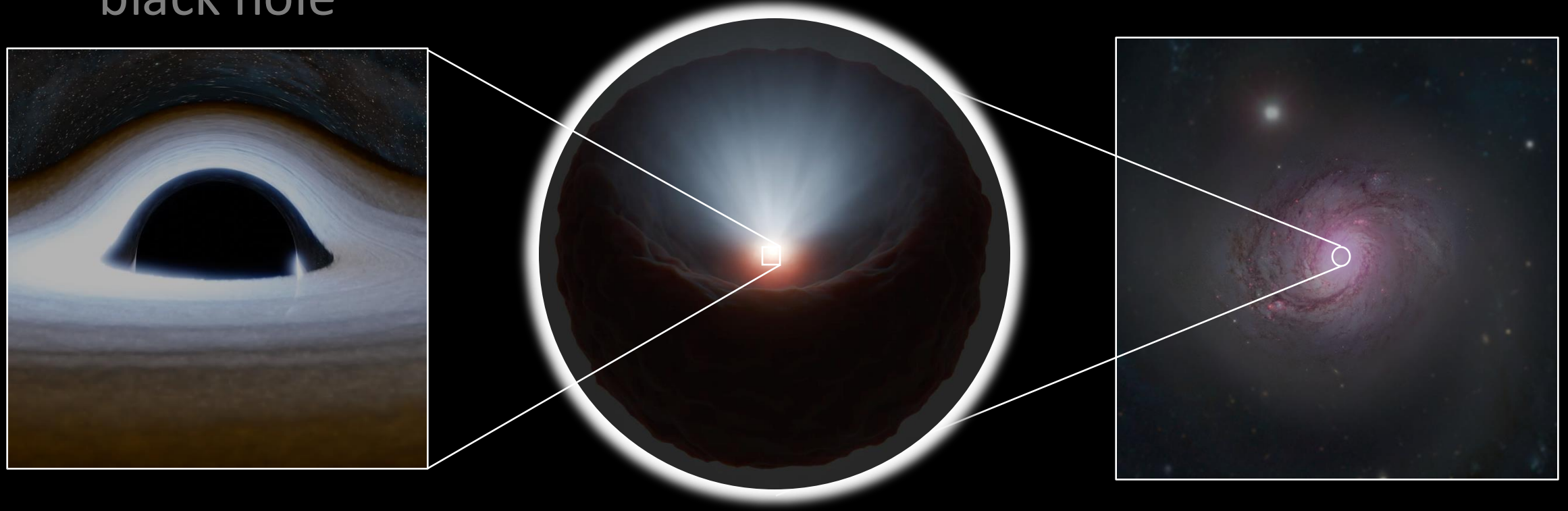
Graphics: R. Hurt/NASA/JPL

Ubiquitous obscuration

Supermassive black hole

Obscuration

Host galaxy



~ 0.1 light years

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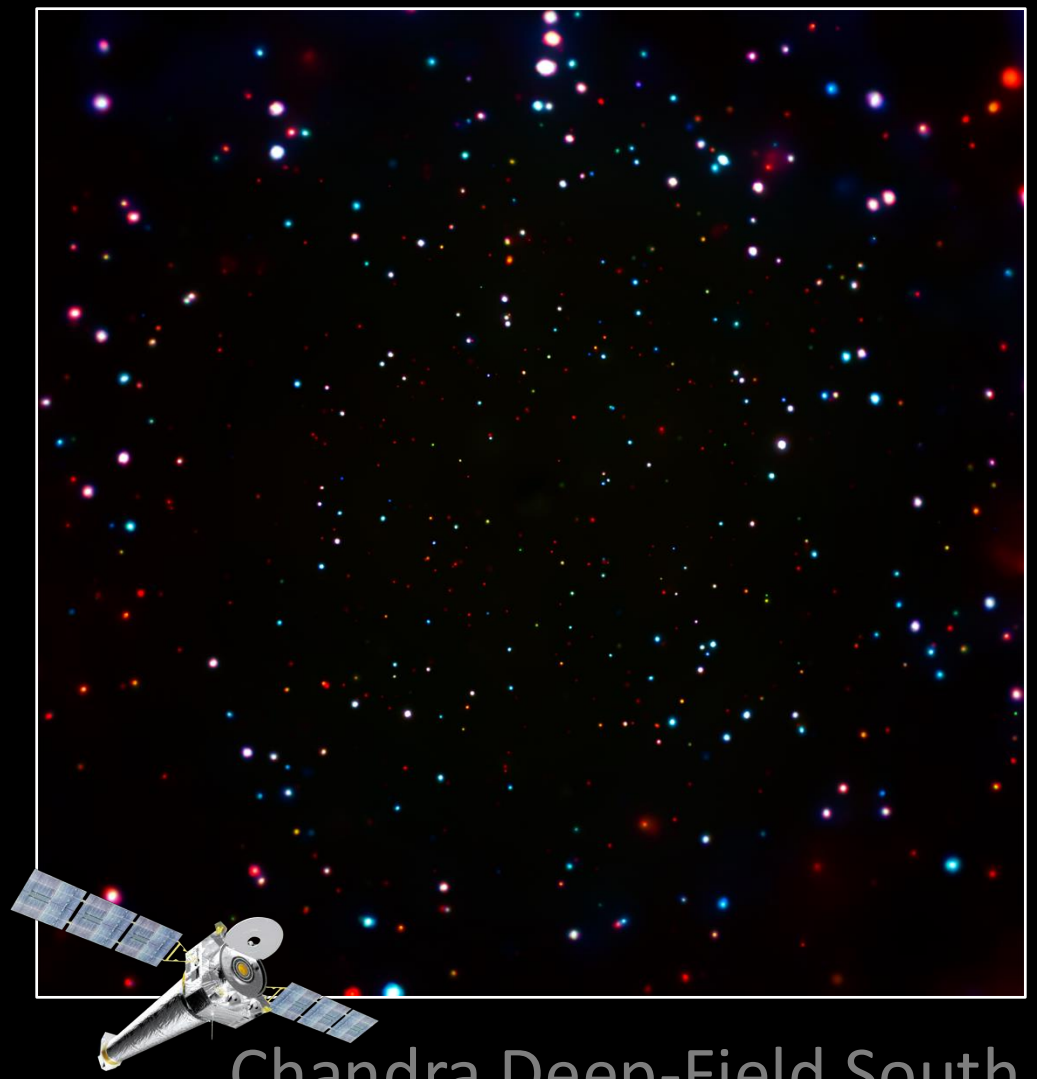
The X-ray sky



Chandra Deep-Field South

The most AGN in a single image (~5000)

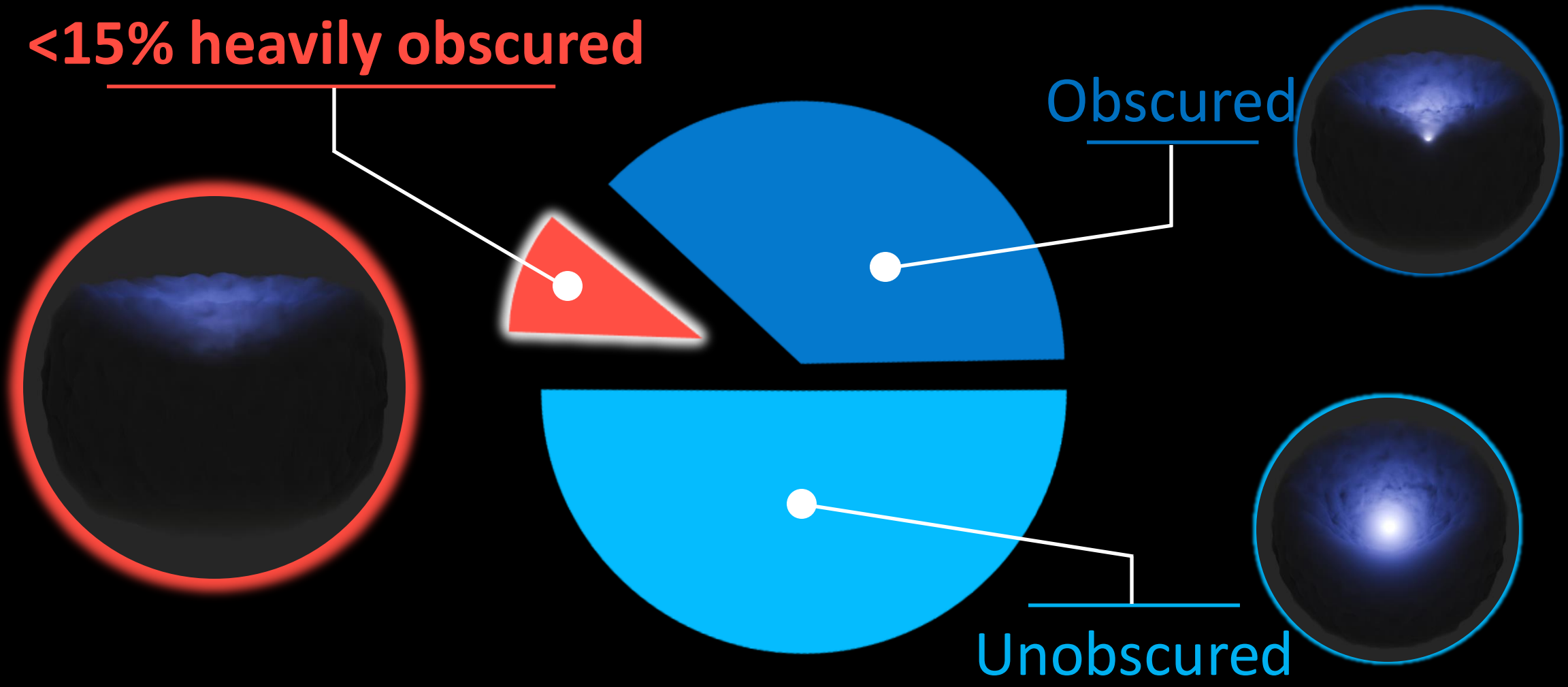
30-50% of AGN are predicted to be heavily obscured

Could be twice as many AGN in this image if including those we can’t see!

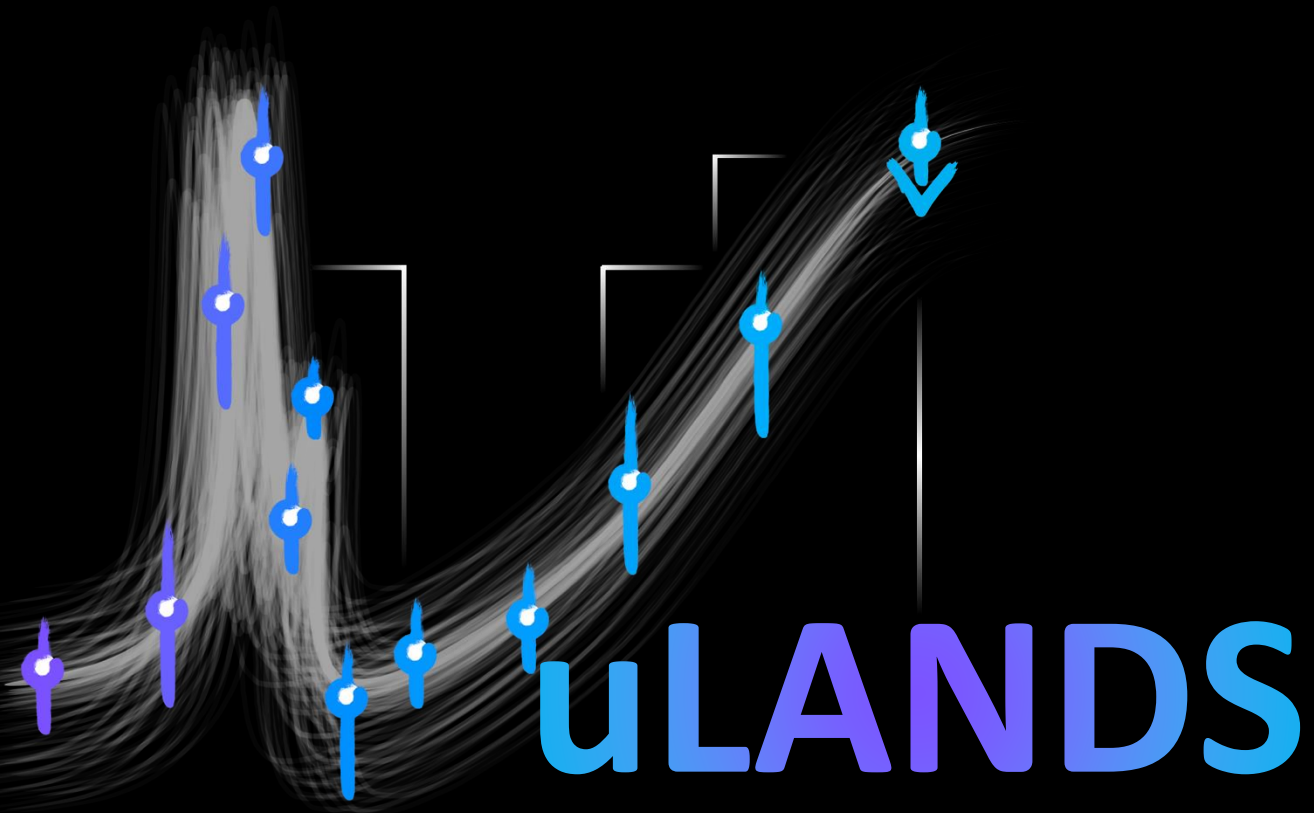
We find a heavily obscured AGN abundance of 35±9%.

This is the first measurement in our cosmic backyard that is consistent with predictions.

Heavily obscured AGN are missed in our cosmic backyard

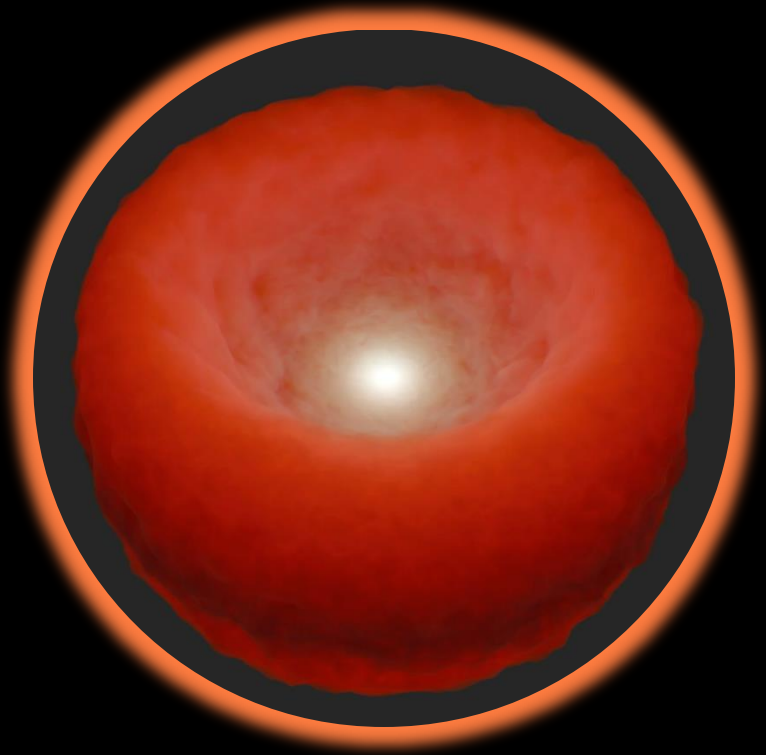


Detecting unobscured and obscured AGN equally well within 600 million light years.



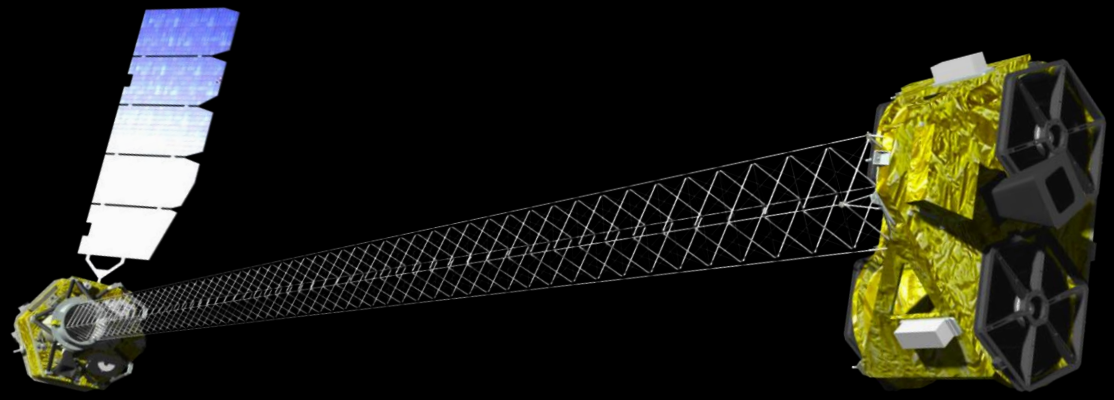
Boorman et al., 2025
ApJ 978, 118

The obscurer is the emitter in the infrared



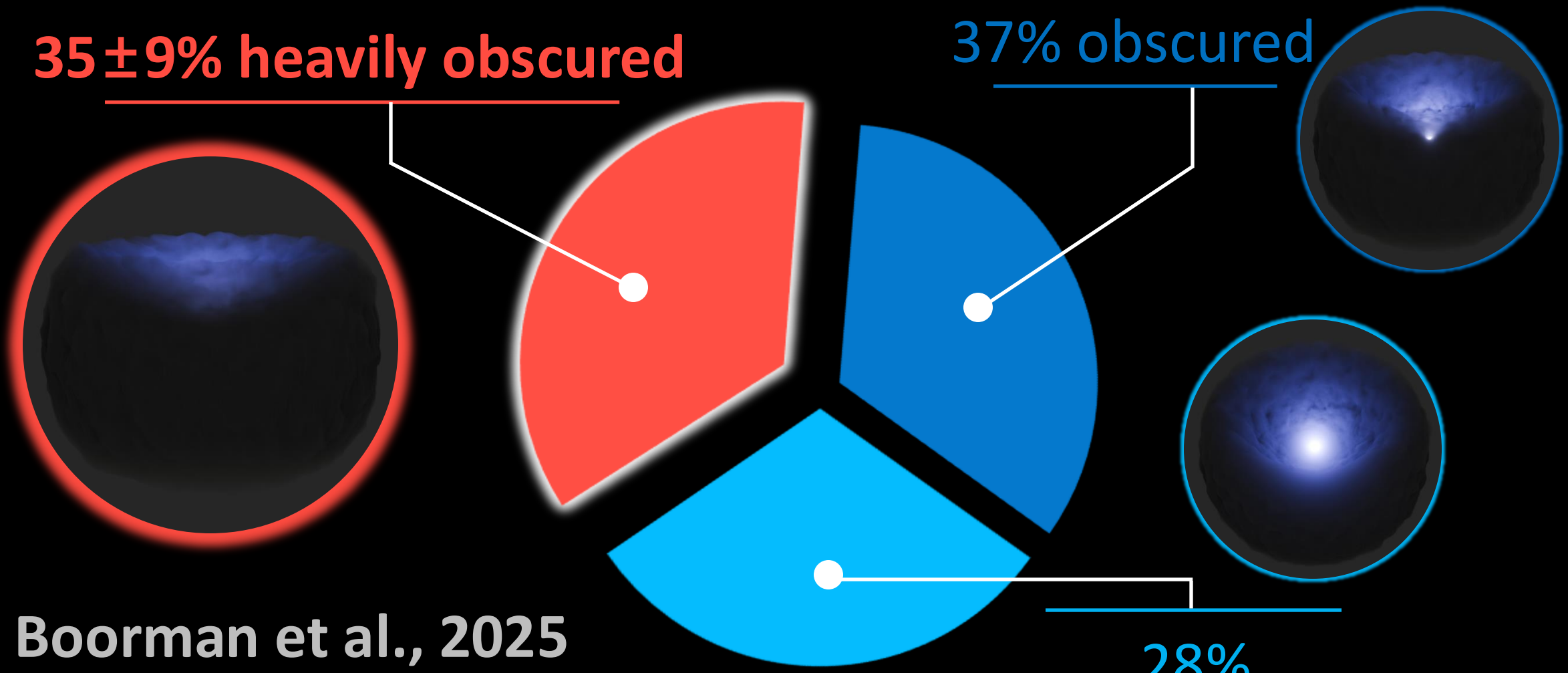
AGN are ~equally bright in the infrared at every orientation

A 1000-hour NuSTAR Legacy Survey



NuSTAR provides the most robust characterisation of heavily obscured AGN by focusing high energy X-ray light

The highest abundance of heavily obscured AGN



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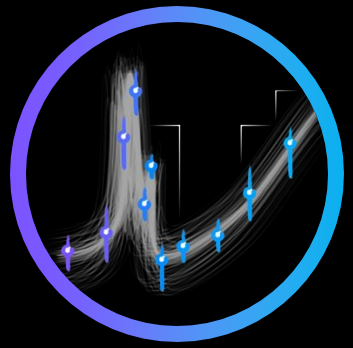
Implications

Without proper knowledge of the **abundance of growing massive black holes**, our understanding of galaxy evolution is **incomplete**

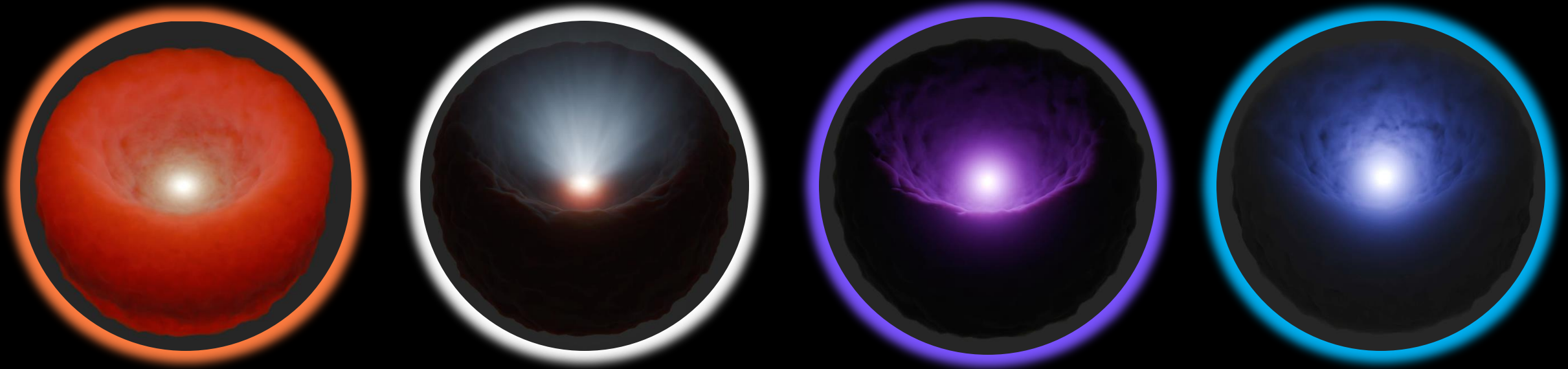


NuLANDS finds obscured and unobscured growing supermassive black holes approximately equally well, and 35±9% are heavily obscured

Many more of our nearest cosmic neighbours are expected to harbour hidden monster black holes. Where are they?

Thank you!

Poster: 411.10



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