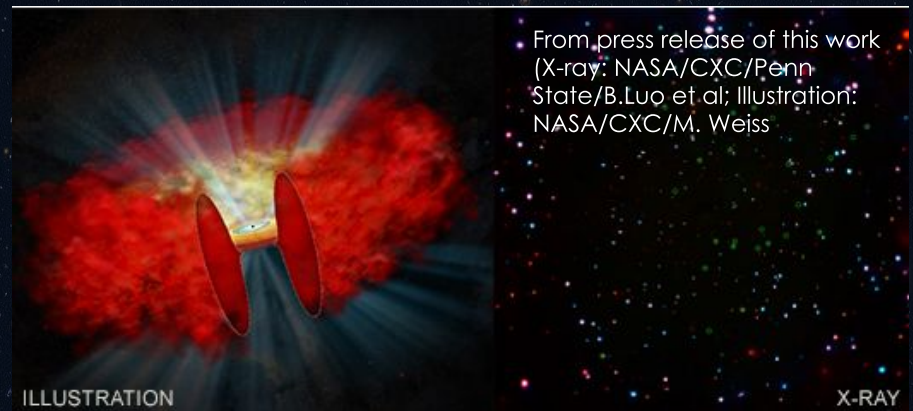


Obscured AGN In **Disguise** in Chandra Deep Field South

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Abstract: We uncover a population of heavily obscured growing central supermassive black holes (or active galactic nuclei --AGN) that were previously identified as lower-luminosity un-obscured AGN or non-active star forming galaxies using archival data from the deepest X-ray survey to date, Chandra 7Ms GOODS-South. The discovery has important implications for understanding how supermassive black holes grow and evolve over billions of years.

Why is this important? -- Supermassive black holes are found in almost all massive galaxies. For over 60 years, the astronomical community still grapples with fundamental questions on their genesis and evolution.



From press release of this work
(X-ray: NASA/CXC/Penn
State/B.Luo et al; Illustration:
NASA/CXC/M. Weiss

AGN hidden by torus
of gas and dust

7Ms CDFS - almost
every dot is an AGN

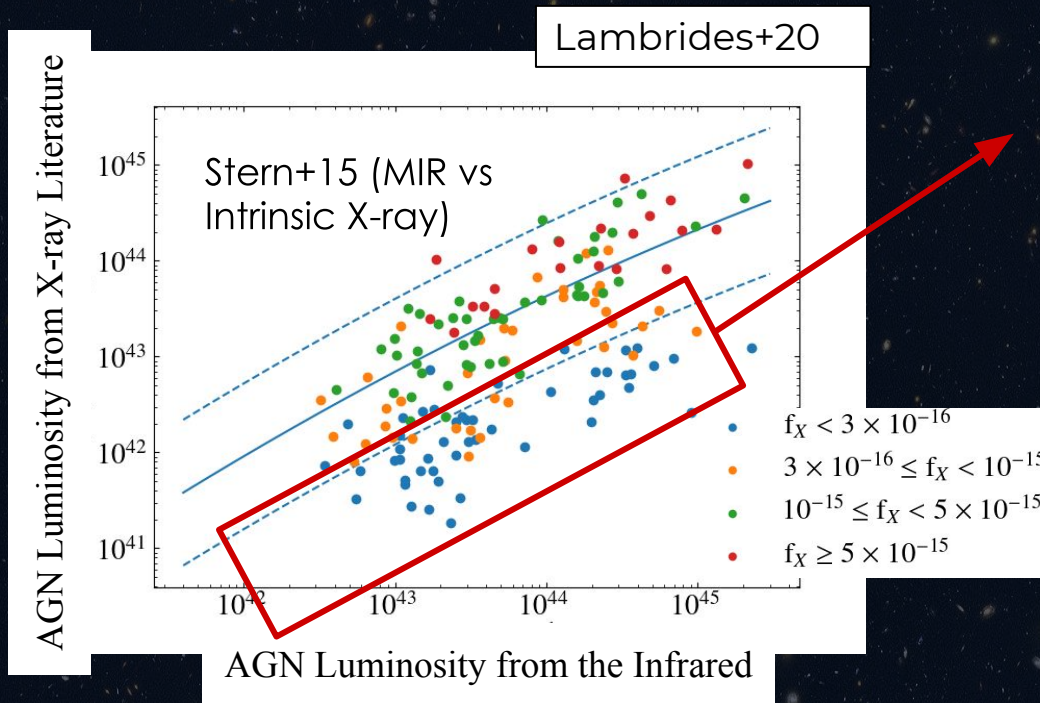
Some models of galaxy evolution explain the SMBH-Host Galaxy connection via a **merging paradigm**: A quiescent black hole becomes active during a period of gas in-fall as a consequence of a gas-rich merger (Magorian+98, Di Matteo+05, Hopkins+06, Blecha+2013)



Finding large enough samples of obscured AGN to test the critical prediction of AGN becoming obscured due to galaxy collisions is *difficult*.

In general, AGN shows clues of their existence in a multitude of wavelengths. In our work, we take advantage of the unprecedented wavelength coverage of the GOODS-S field of the sky and connect the X-ray information (commonly used to find obscured AGN and AGN power) to the infrared (AGN power indicator).

The X-ray luminosity from the literature is under predicted compared to the Infra-red.

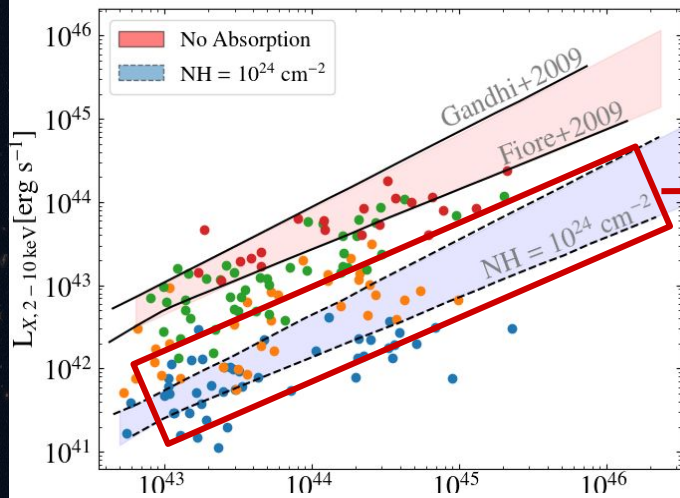


A third of the sample is $> 2\sigma$ below the expected relationship!

There is additional obscuration that has not been taken into account in the X-ray literature for over 30% of the X-ray AGN sample from 7Ms CDFS.

When we account for this obscuration assuming the X-ray sources with underpredicted X-ray values are obscured AGN **we match predicted values** inferred from the X-ray background.

Lambrides+20



AGN Luminosity from the Infrared

A 30% increase of heavily obscured AGN.

