Spatially Resolving AGN in Transitioning Galaxies with Chandra

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Dartmouth College

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Phil Appleton, Patrick Ogle, Kristina Nyland, Murray Brightman, Mark Lacy

AGN in Post-Starburst Galaxies

Credit: Hubble/Galaxy Zoo

Credit: Hubble/Galaxy Zoo

Actively Star-forming

Quiescent

AGN in Post-Starburst Galaxies

Credit: Hubble/Galaxy Zoo

Credit: APOD/ATLAS3D

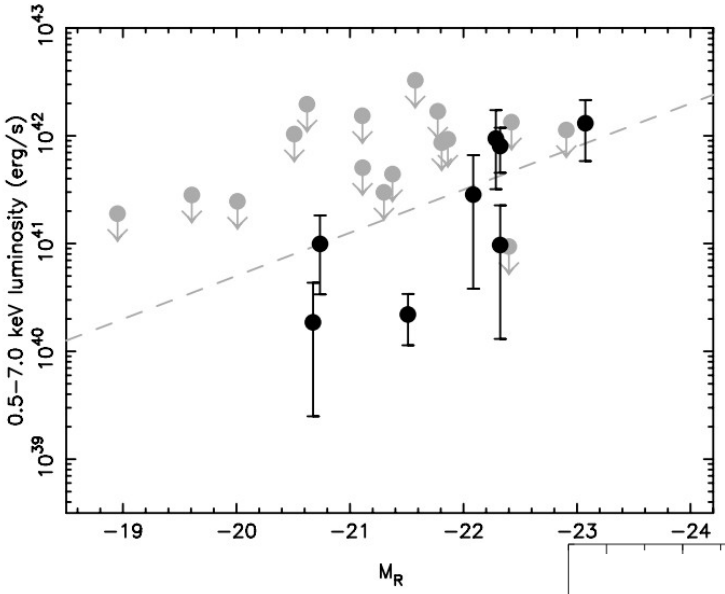
Credit: Hubble/Galaxy Zoo

Actively Star-forming

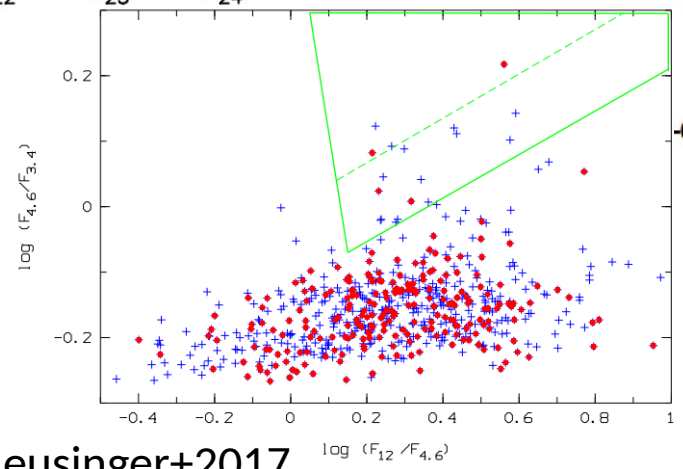
Transition:
- Merger
- Secular Evolution

Quiescent

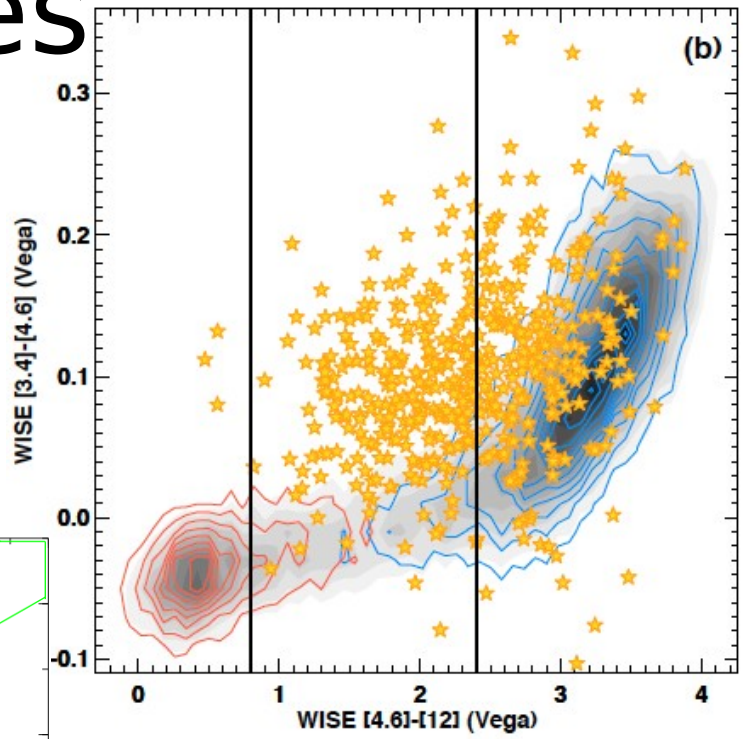
AGN in Post-Starburst Galaxies



Brown+2009

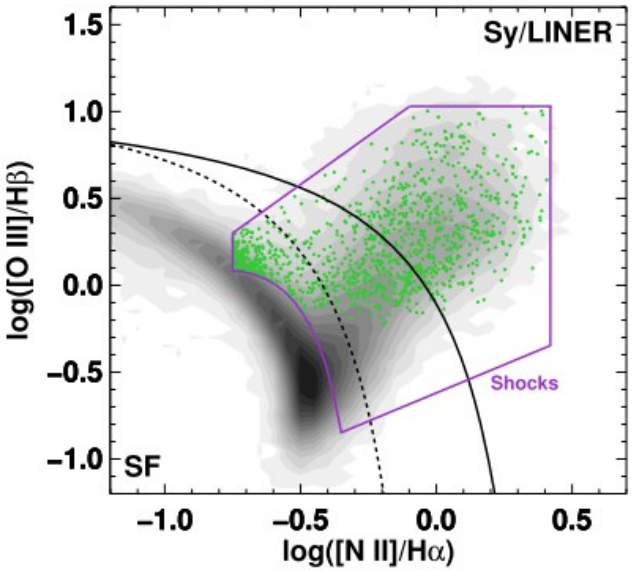


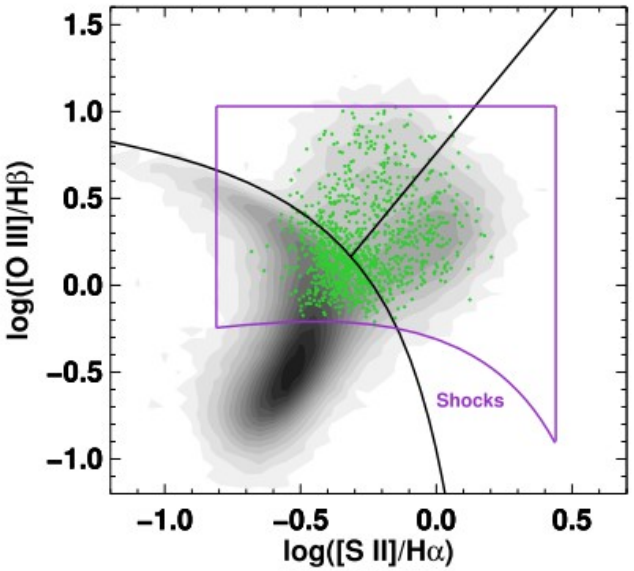
Meusinger+2017

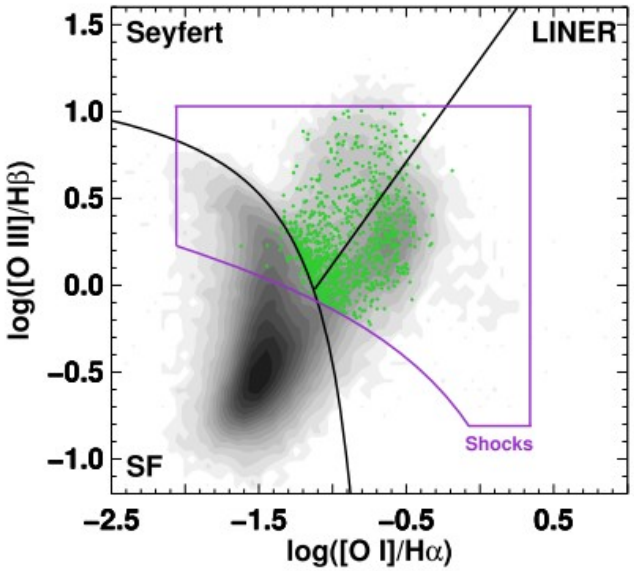


Alatalo+2017

Shocked Post-Starburst Galaxies (SPOGS)

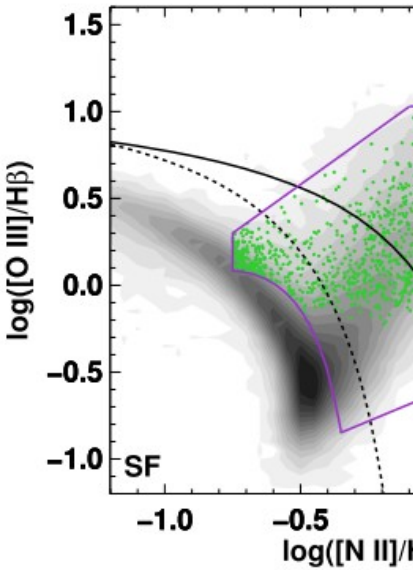


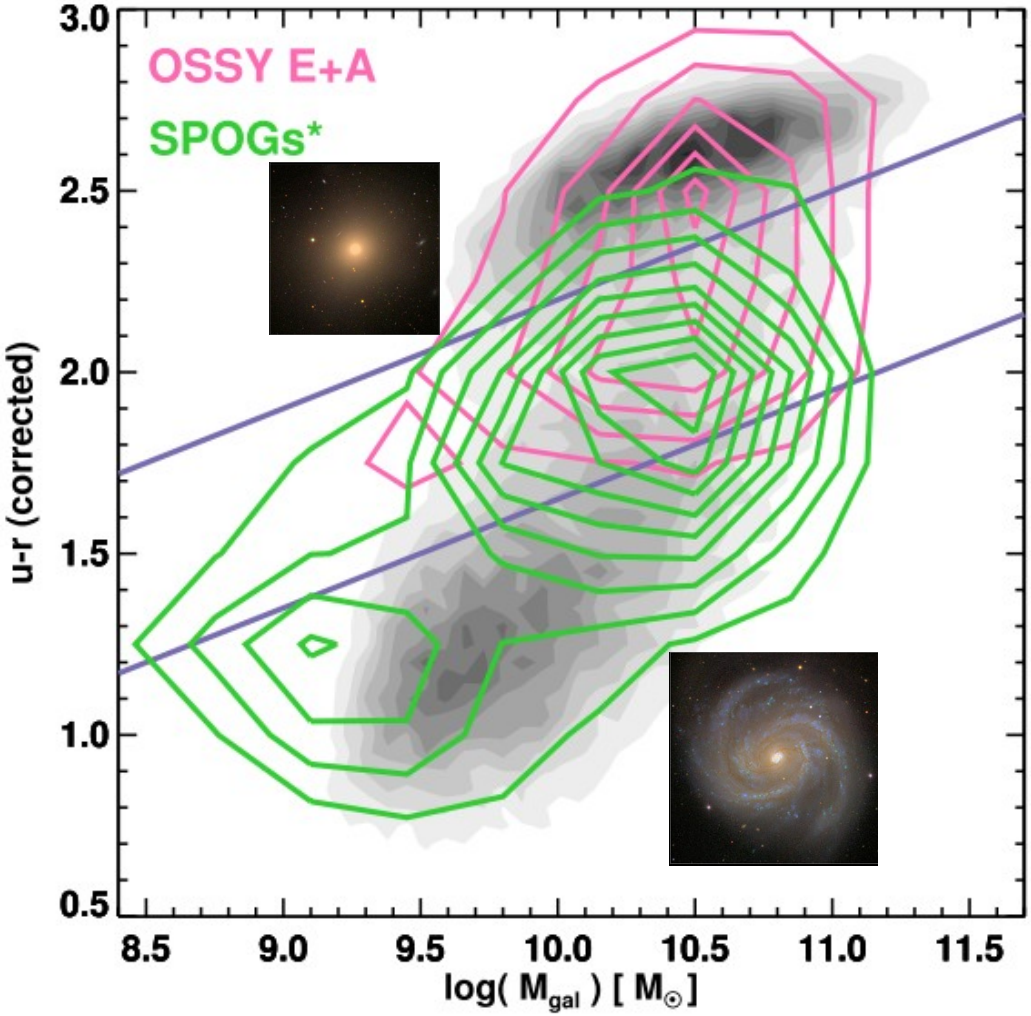


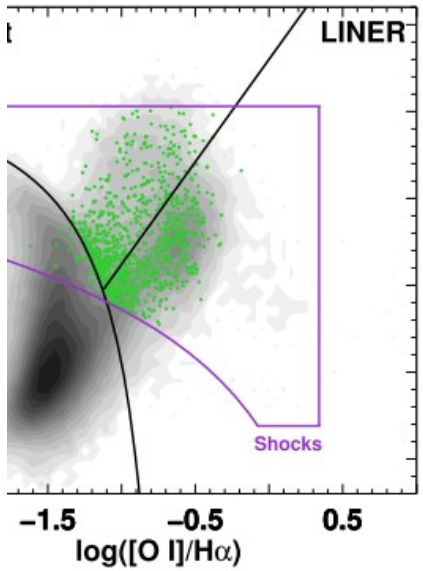


Alatalo+2016

Shocked Post-Starburst Galaxies (SPOGS)

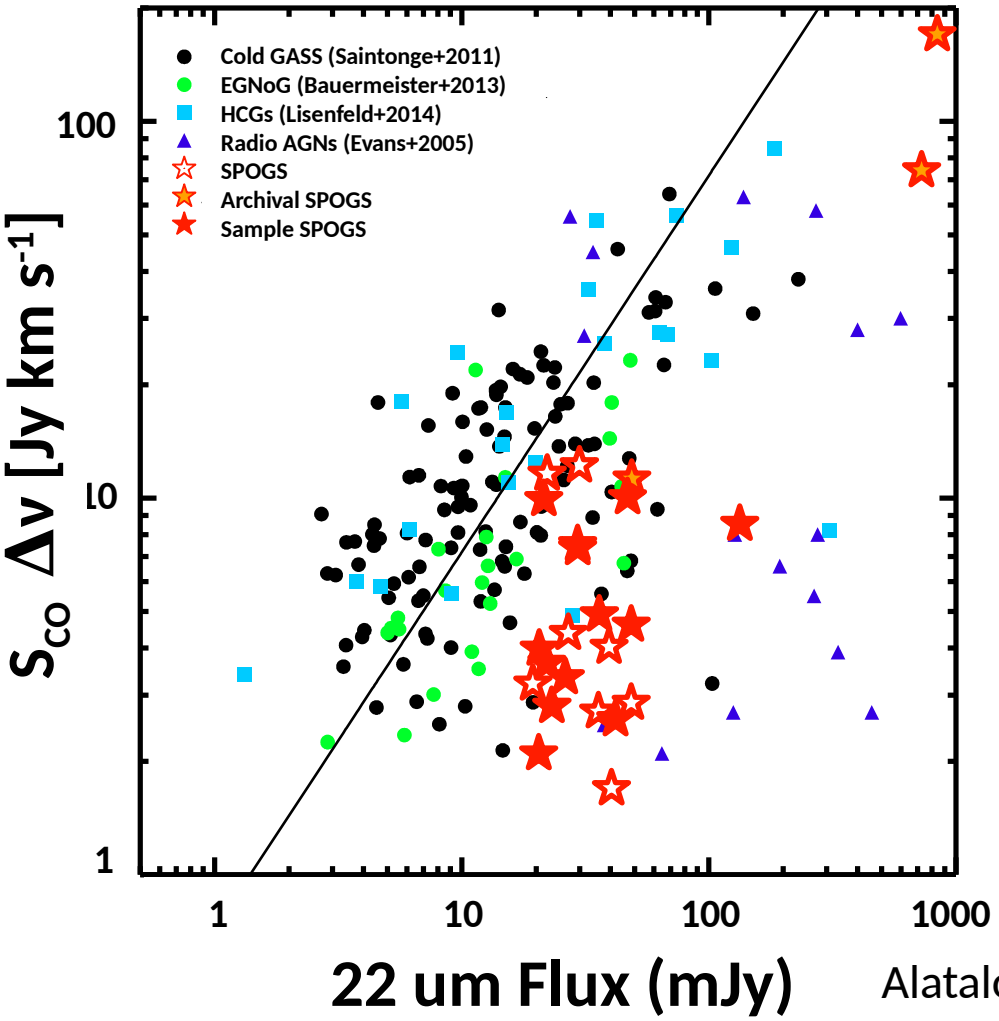






Alatalo+2016

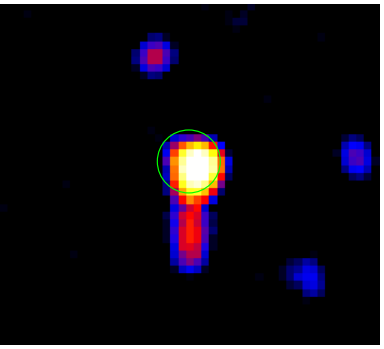
AGN in SPOGS



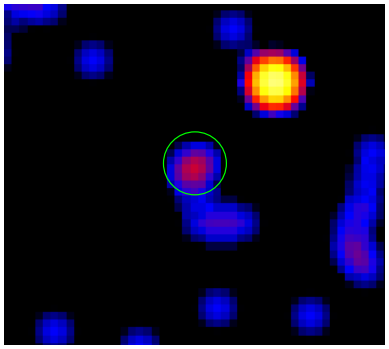
Alatalo+2016, Lanz+ in prep.

AGN in SPOGS

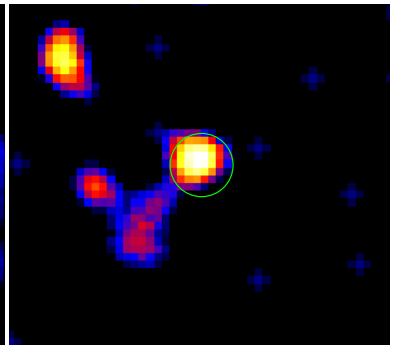
Cycle 18 Program; PI L. Lanz



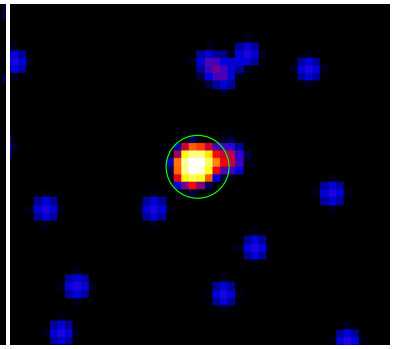
SPOG462:
5 cts



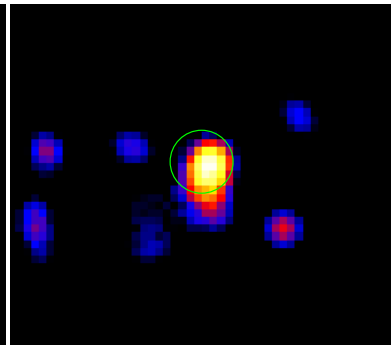
SPOG955:
2 cts



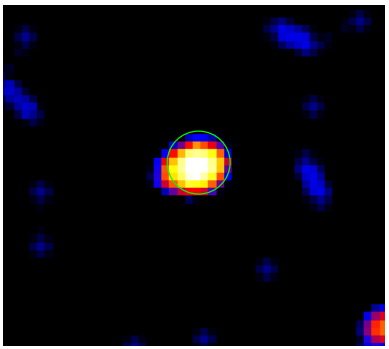
SPOG186:
3 cts



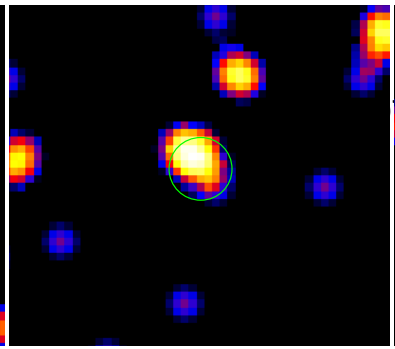
SPOG157:
10 cts



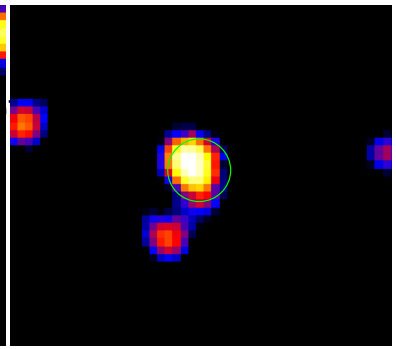
SPOG662:
4 cts



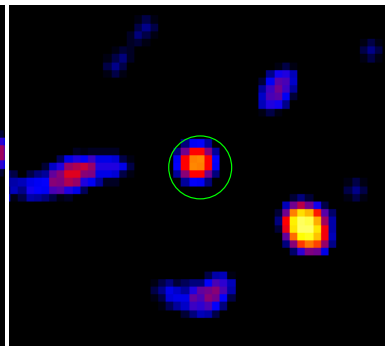
SPOG498:
4 cts



SPOG224:
3 cts



SPOG253:
6 cts

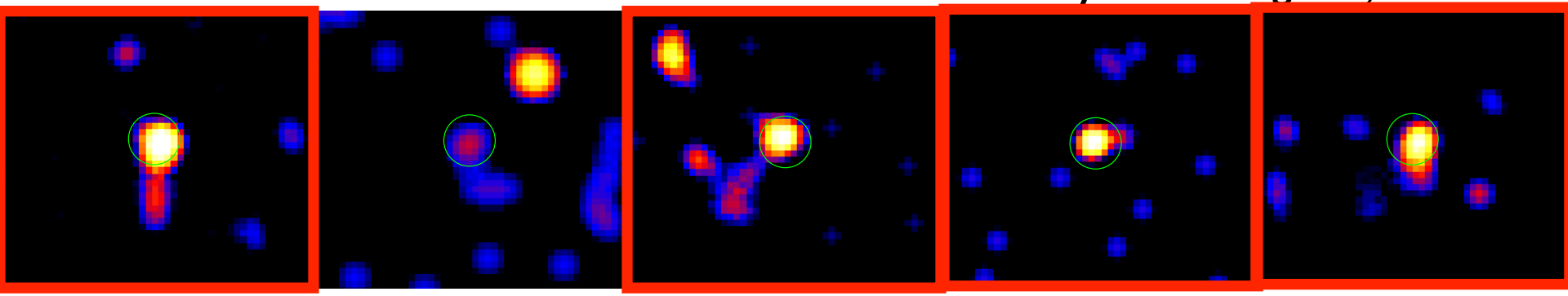


SPOG689:
2 cts

SPOG4

AGN in SPOGS

Cycle 18 Program; PI L. Lanz



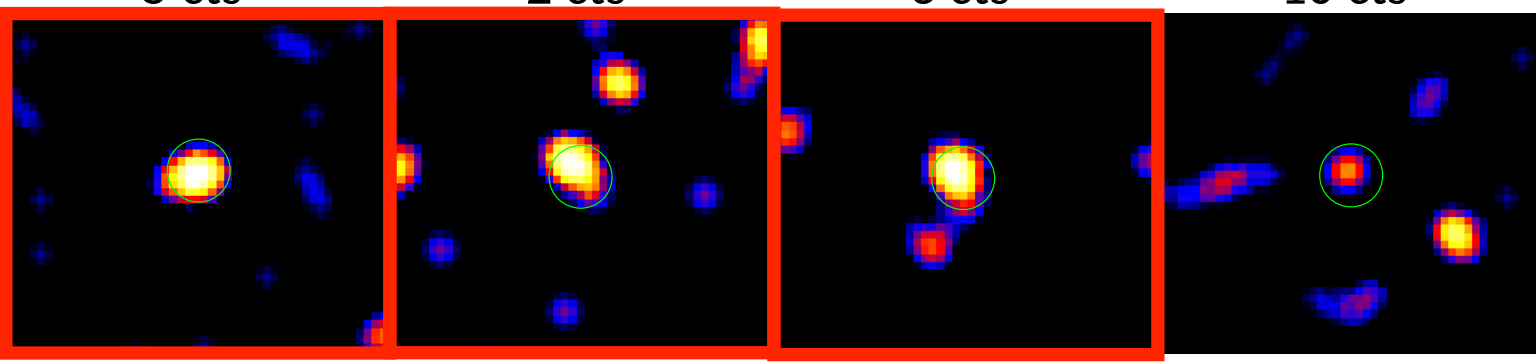
SPOG462: 5 cts

SPOG955: 2 cts

SPOG186: 3 cts

SPOG157: 10 cts

SPOG662: 4 cts



SPOG498: 4 cts

SPOG224: 3 cts

SPOG253: 6 cts

SPOG689: 2 cts

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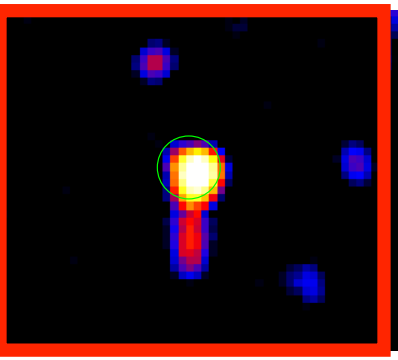

SPOG462:
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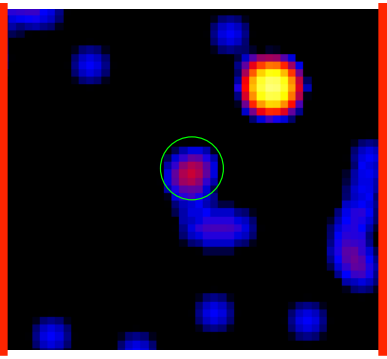
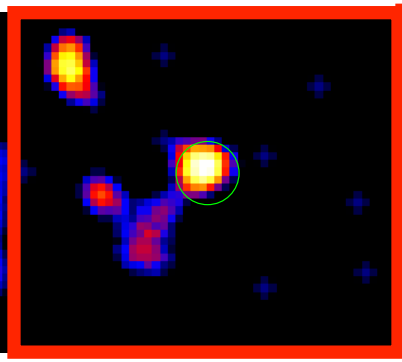
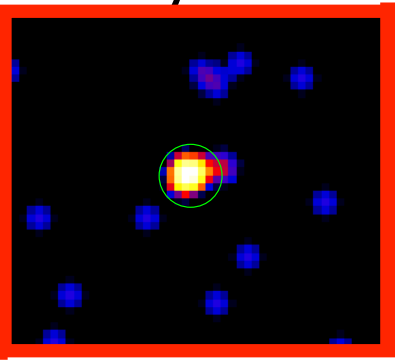


SPOG955:
2 cts



SPOG186:
3 cts



SPOG157:
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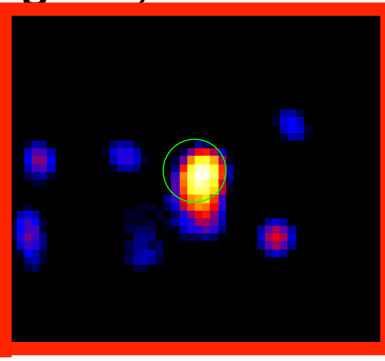
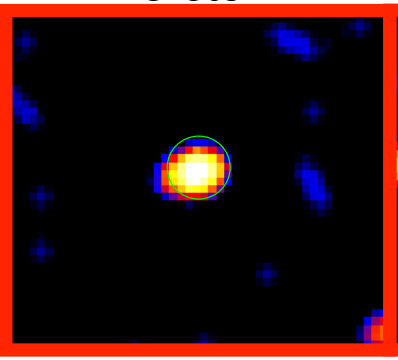


SPOG662:
4 cts



SPOG498:
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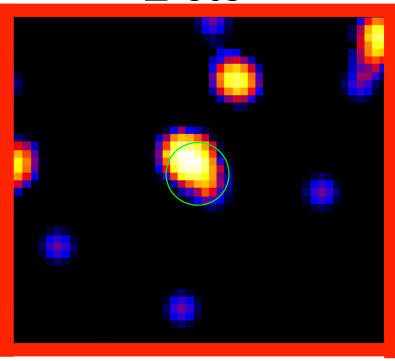

SPOG224:
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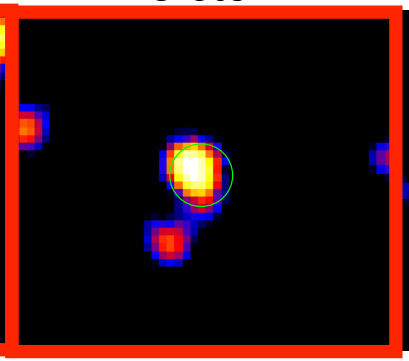
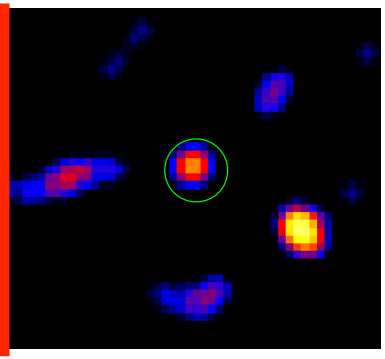


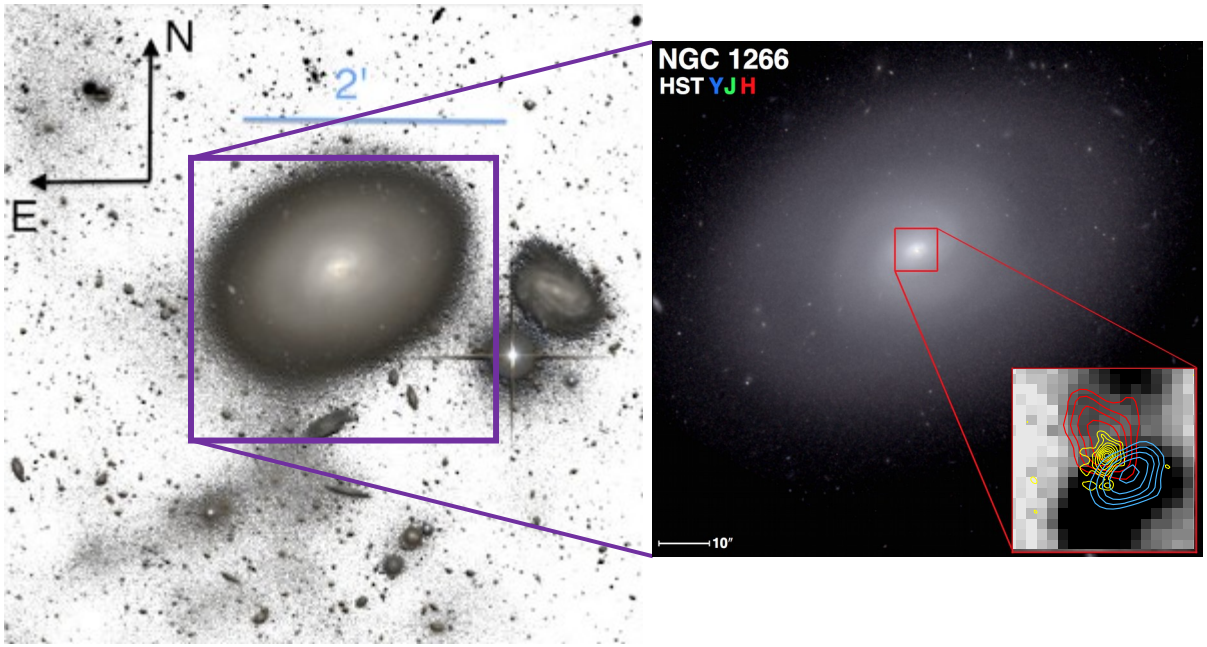
SPOG253:
6 cts



SPOG689:
2 cts

SPOG4

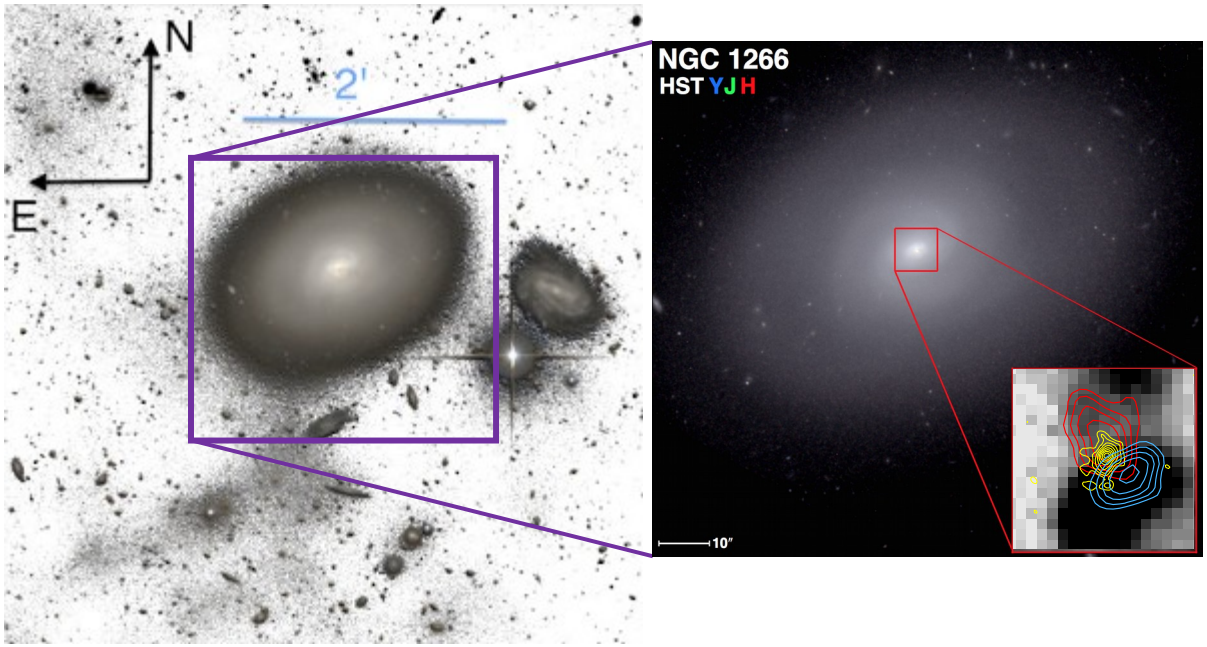
Proto-typical SPOG: NGC 1266



Alatalo+11; Nyland+13; Duc+15

Outflow-driving
low-luminosity AGN
in
compact nuclear starburst
surrounded by
very infertile molecular disk

Proto-typical SPOG: NGC 1266



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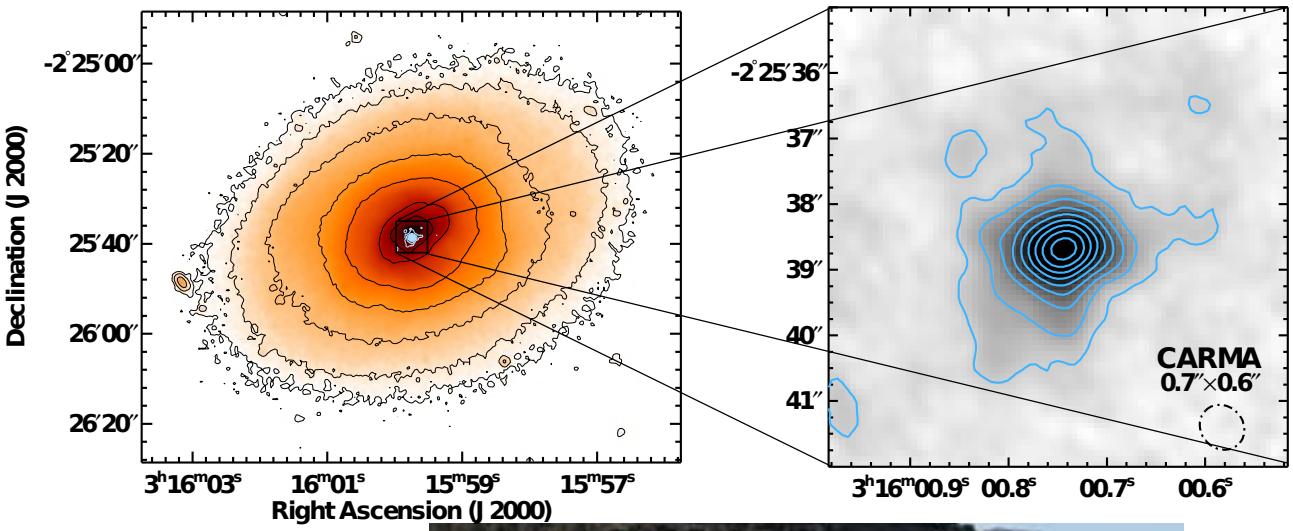
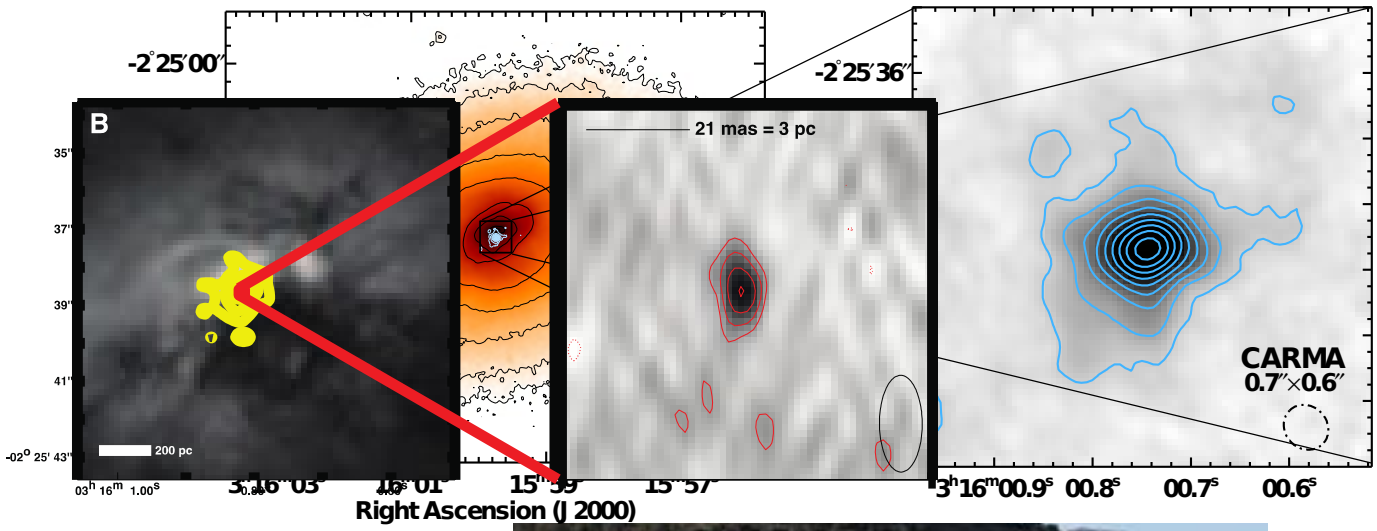


$1 \times 10^9 M_\odot$ molecular gas

Alatalo+11, Alatalo+15

Proto-typical SPOG: NGC 1266

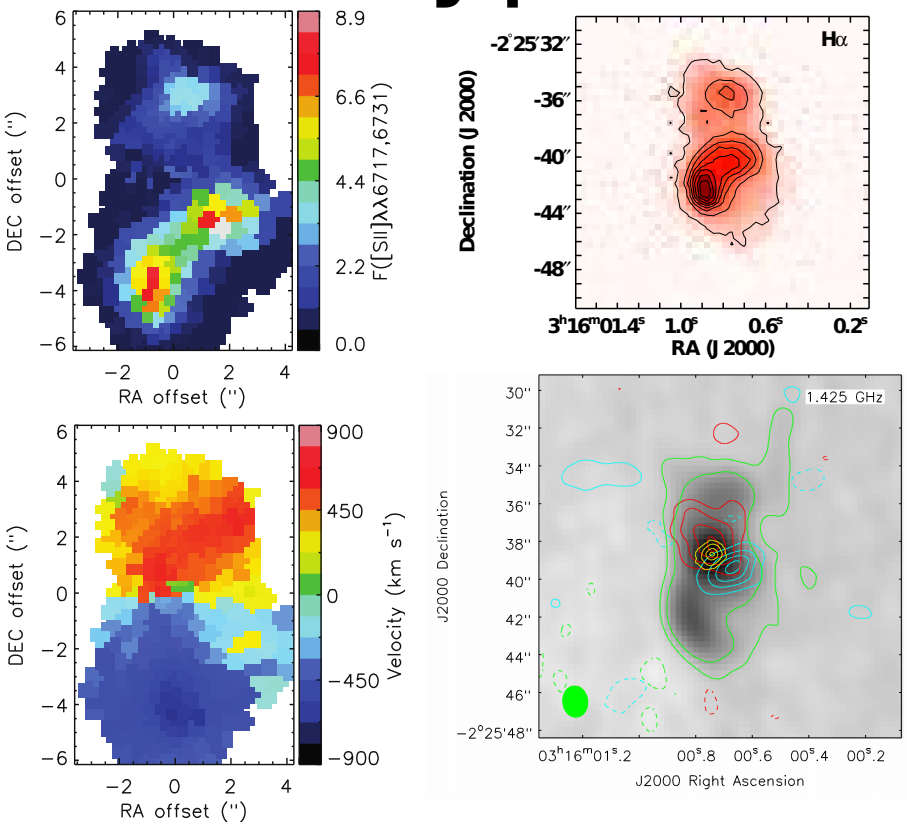


$1 \times 10^9 M_\odot$ molecular gas

N_{H_2}(VLBA PS) $= 3 \times 10^{24}$ cm^{-2}

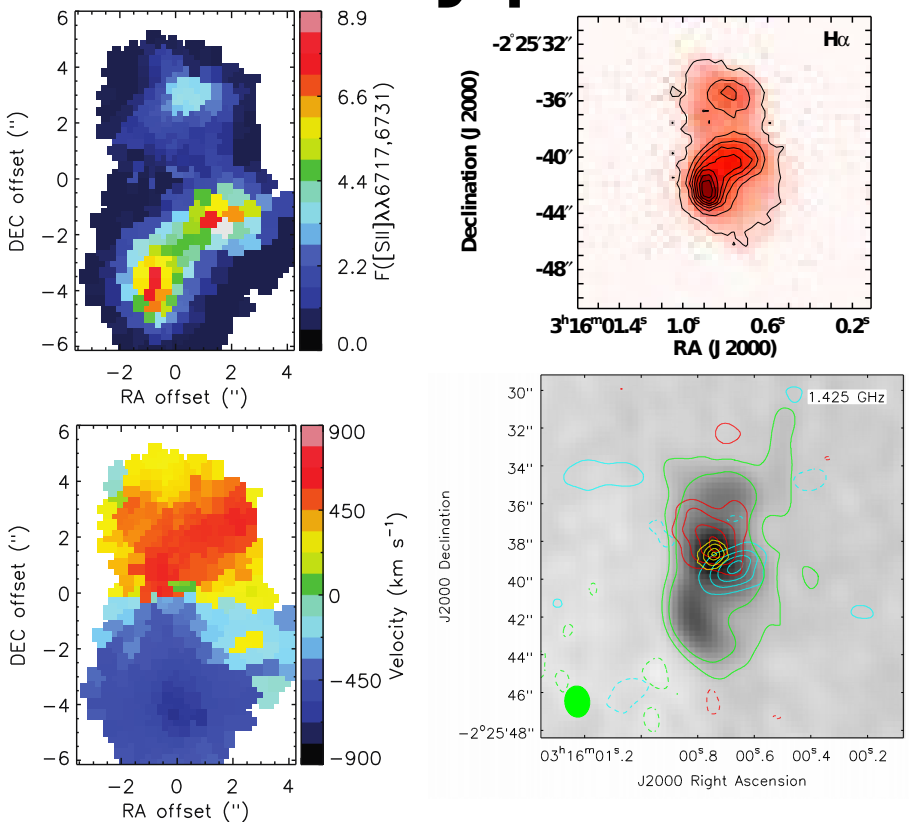
Alatalo+11, Alatalo+15, Nyland+13

Proto-typical SPOG: NGC 1266



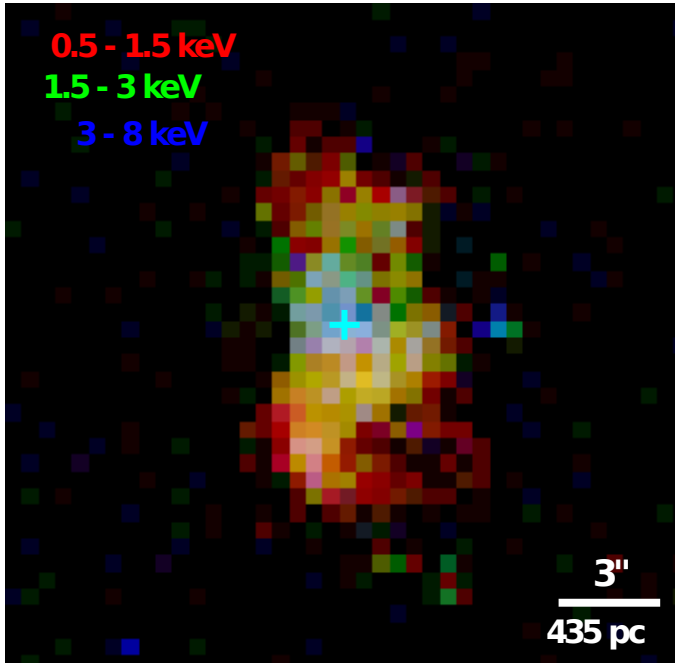
Davis+12; Alatalo+11; Nyland+13

Proto-typical SPOG: NGC 1266



Davis+12; Alatalo+11; Nyland+13

Lanz+ in prep.; Nyland+ in prep.



Cycle 18 Program; PI K. Alatalo

Credit: NASA/CXC/NGST

Proto-typical SPOG: NGC 1266

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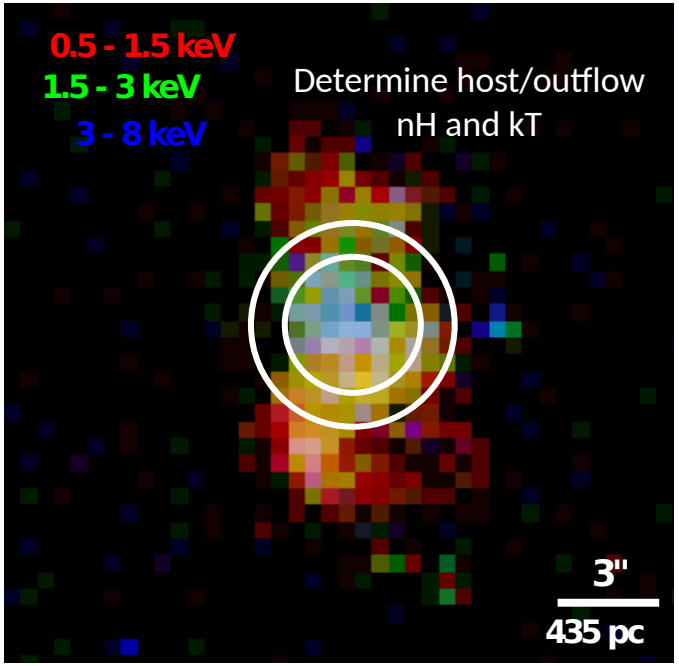

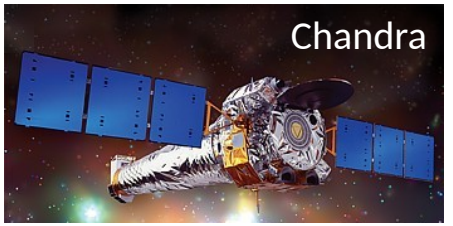

Credit: NASA/CXC/NGST

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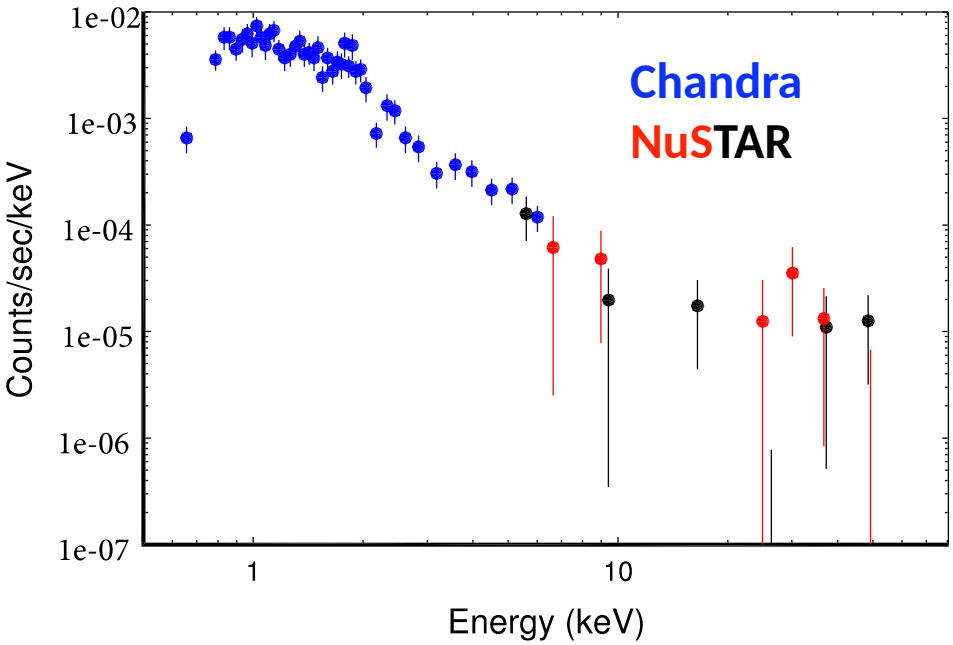
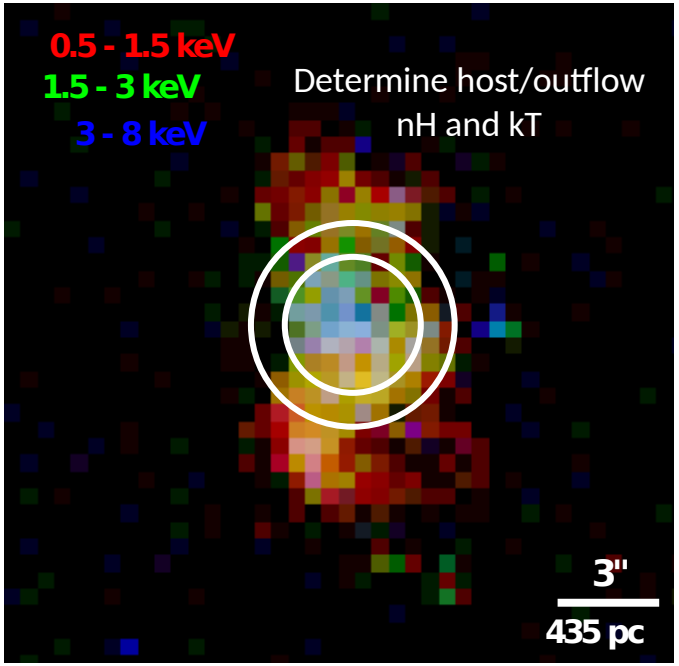
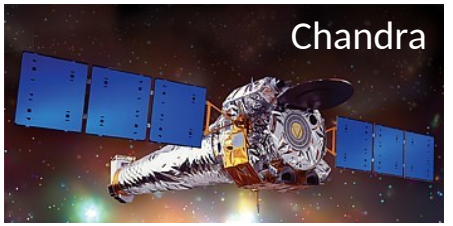


Lanz+ in prep.



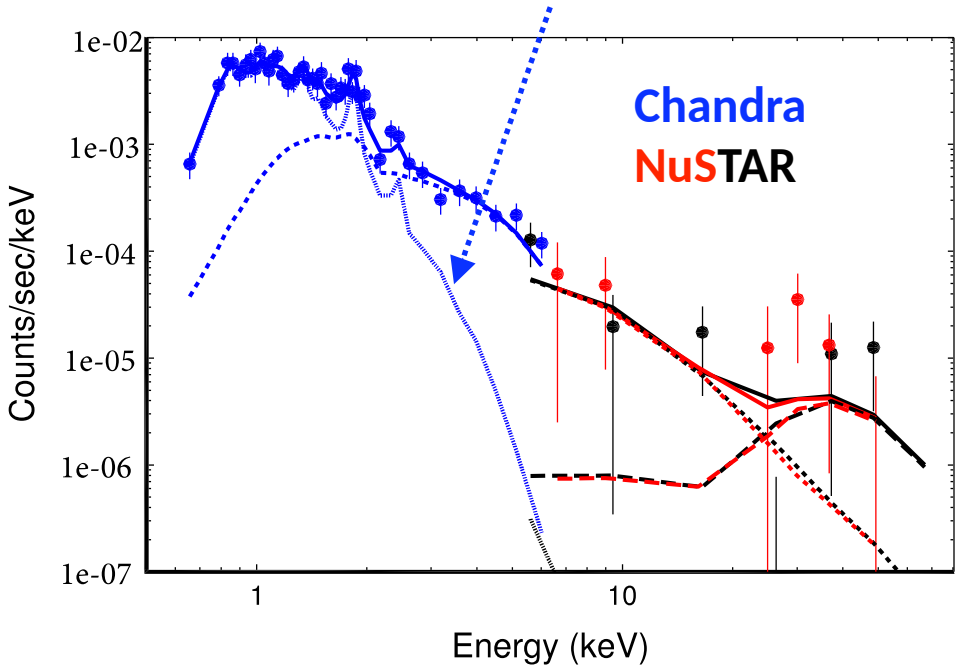


Credit: NASA/CXC/NGST

Proto-typical SPOG: NGC 1266

Lanz+ in prep.

Thermal (Outflow): 0.62 keV behind 7.4 x 10^{21} cm^{-2}



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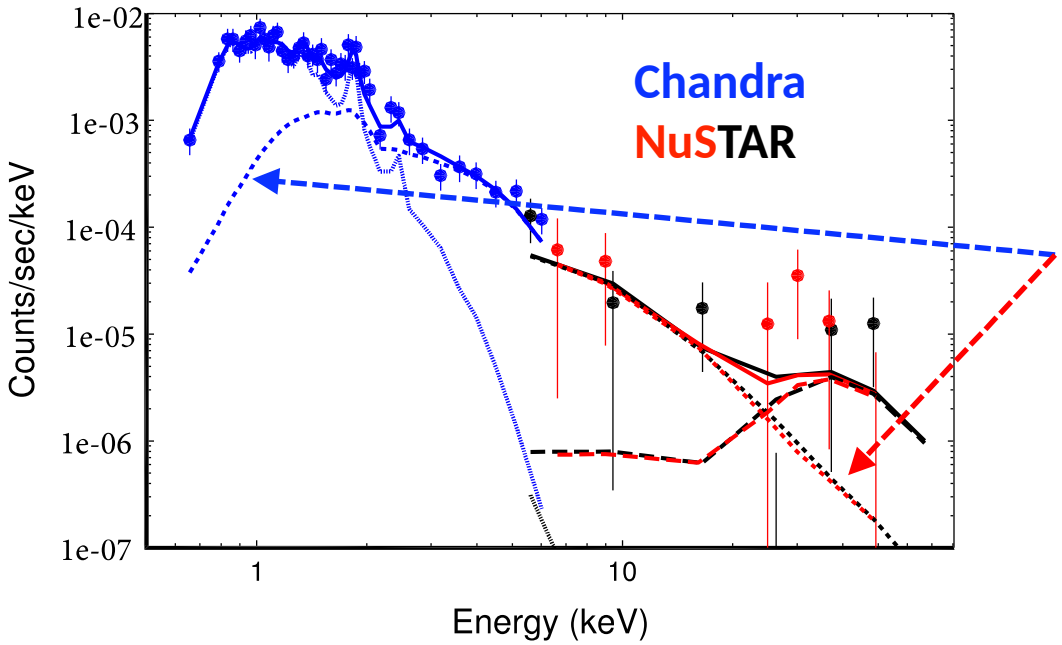

Scattered PL (AGN): Γ = 1.83 (linked)

Proto-typical SPOG: NGC 1266

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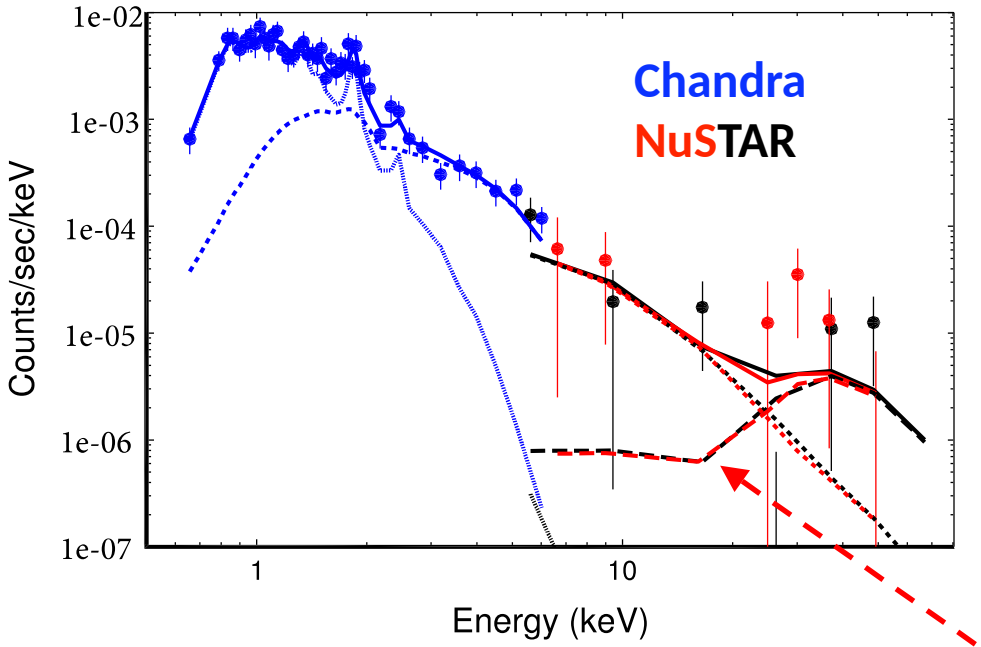


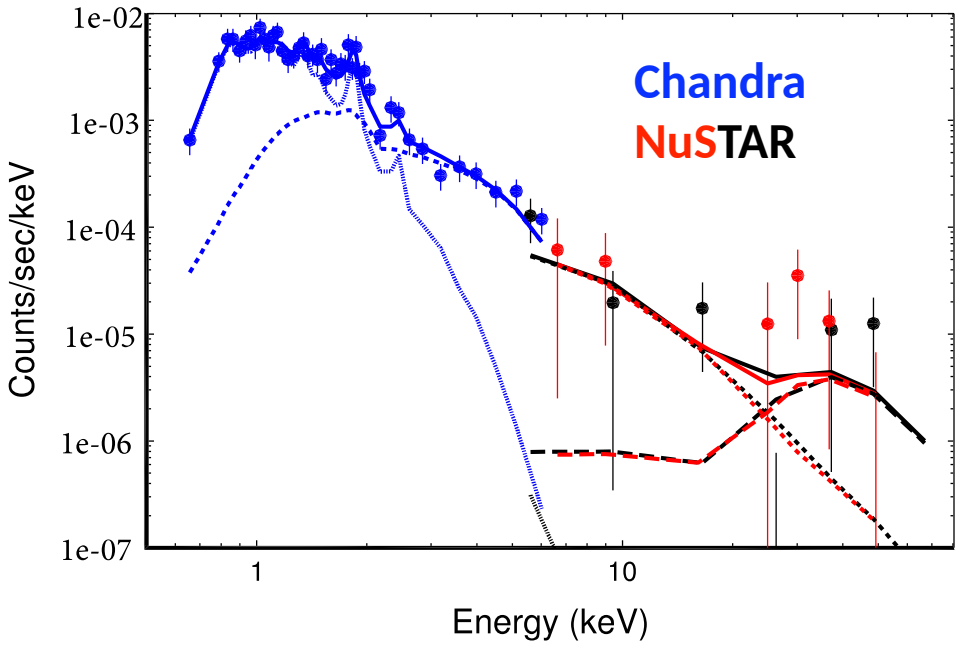
Scattered PL (AGN): Γ = 1.83 (linked)

Transmitted PL (AGN): Γ = 1.83 behind 4.1 x 10^{25} cm^{-2}

Proto-typical SPOG: NGC 1266

Lanz+ in prep.

Thermal (Outflow): 0.62 keV behind 7.4 x 10^{21} cm^{-2}



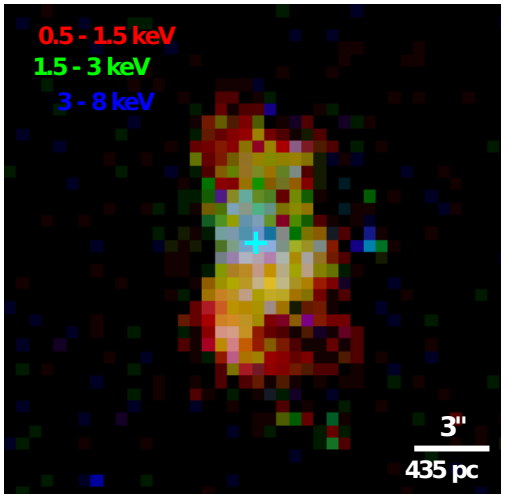
2-10 keV Intrinsic Luminosity: 7.7 x 10^{40} erg s^{-1}

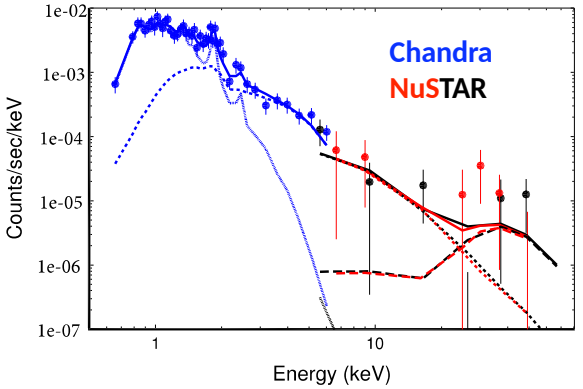
Scattered PL (AGN): Γ = 1.83 (linked)

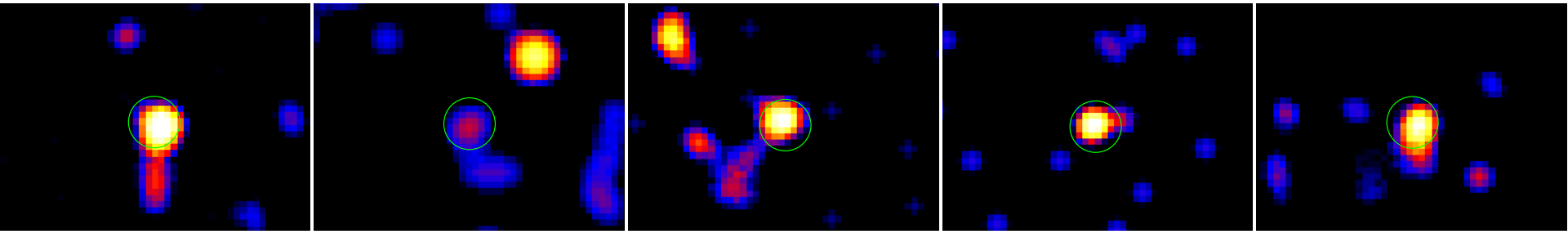
Transmitted PL (AGN): Γ = 1.83 behind 4.1 x 10^{25} cm^{-2}

Summary

AGN are present in early transitioning galaxies but …



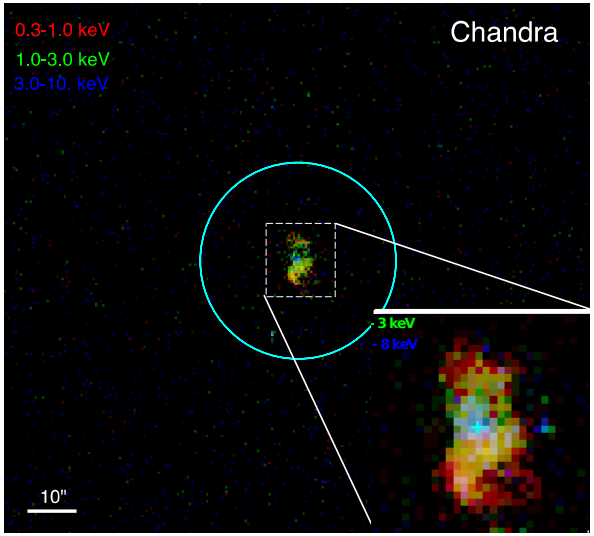


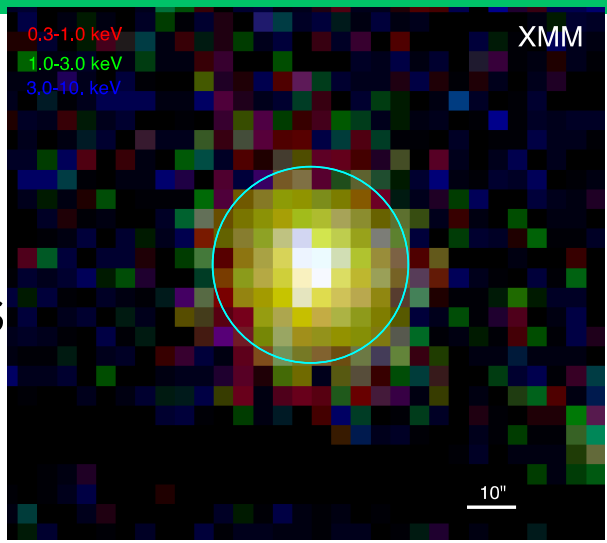


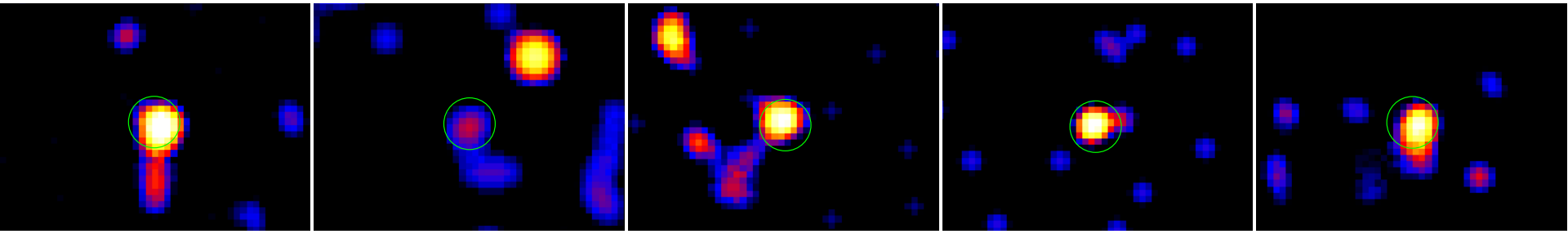
Summary

AGN are present in early transitioning galaxies but …

Likely to be faint and/or heavily obscured







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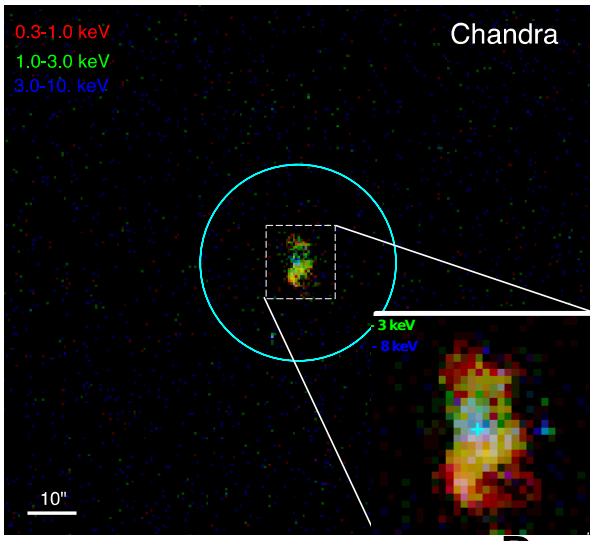

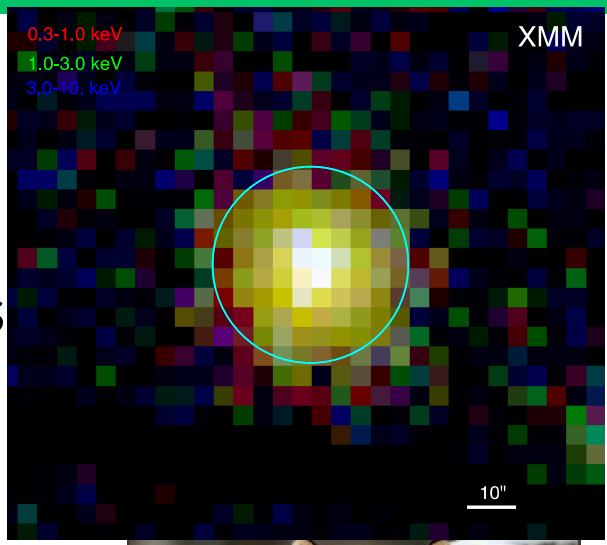

Likely to be faint
and/or
heavily obscured

Requiring good **Spatial Resolution** to separate from host galaxy