X-ray Simulations of Polar Gas in Accreting Supermassive Black Holes

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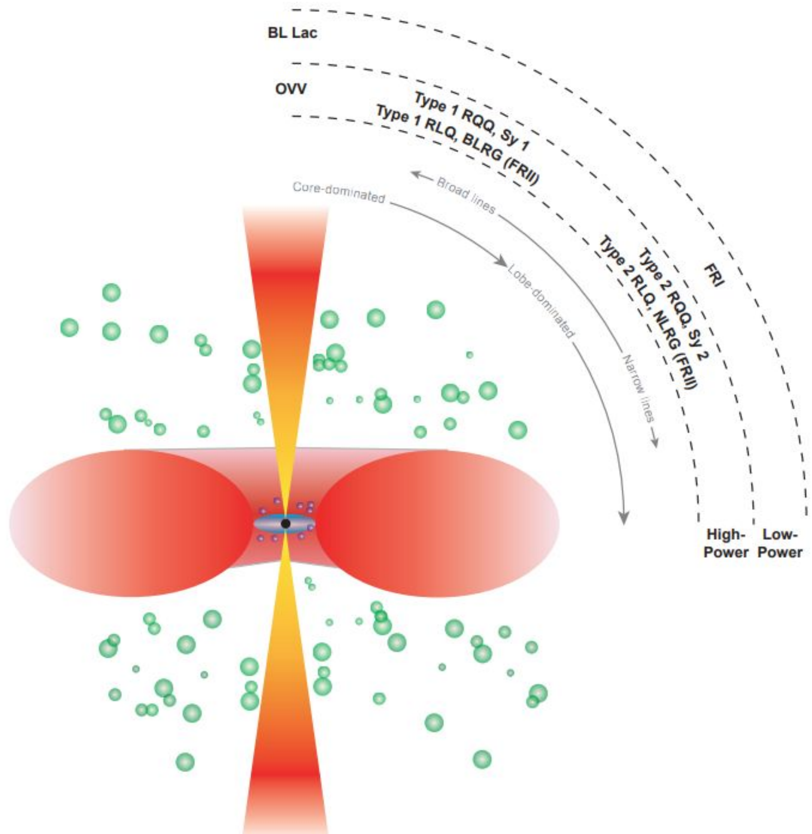
Background / Motivation

- Unified Model: Torus is key for MIR emission



Evans (2005)

Background / Motivation

- Unified Model: Torus is key for MIR emission

- Detection of new polar component (e.g., Stalevski et al. 2017, 2019)

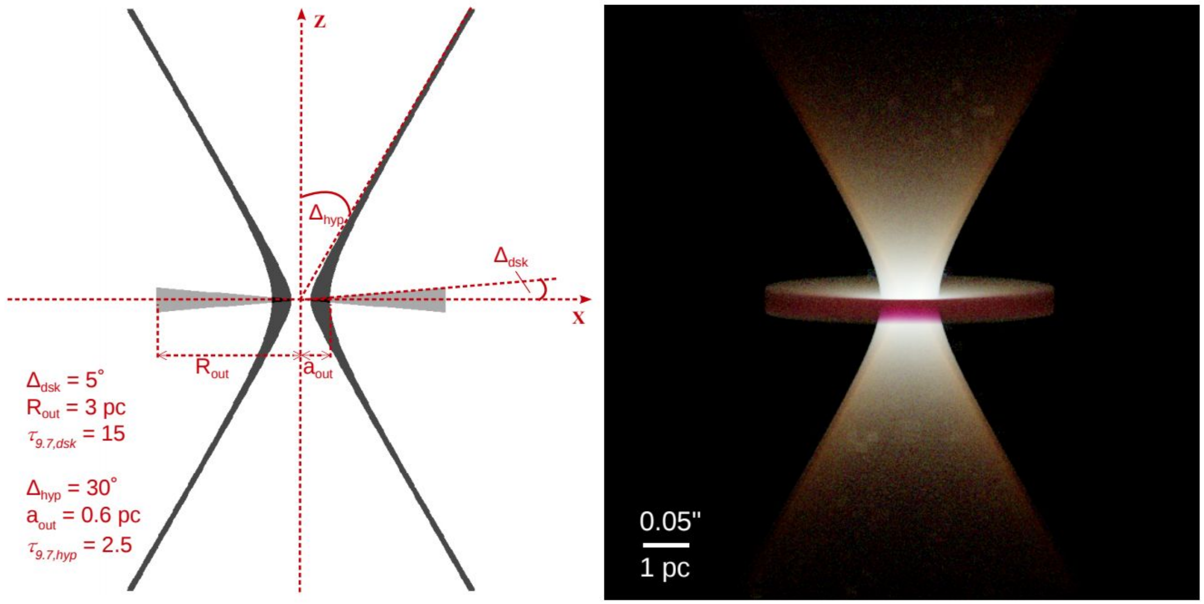


Figure 1. Left: schematic of the model geometry, i.e. dust density cut through the *xz* plane: a geometrically thin dusty disc and a polar dusty wind in a form of a hyperboloid shell. The schematic and the values of the parameters correspond to the best model presented in §4. The dust density is constant both in the disc and in the hyperboloid. The angular width of the hyperboloid shell is 1°. Right: a colour composite image (in logarithmic scale) of the best disc+hyperboloid model made by mapping the 8, 10 and 13 µm flux images obtained with radiative transfer simulations to the blue, green and red, respectively.

Stalevski et al. (2019)

See also talk by Carolina Andonie

Background / Motivation

- Unified Model: Torus is key for MIR emission
- Detection of new polar component (e.g., Stalevski et al. 2017, 2019))
- What can we learn from X-Ray properties (i.e., *XRISM / Athena*)?

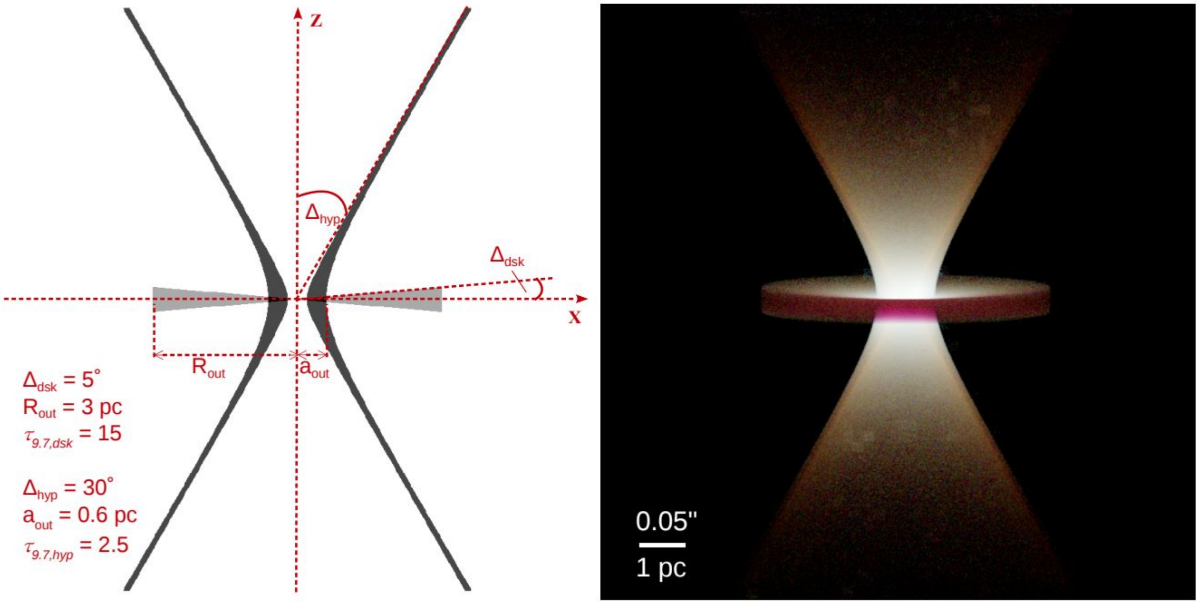
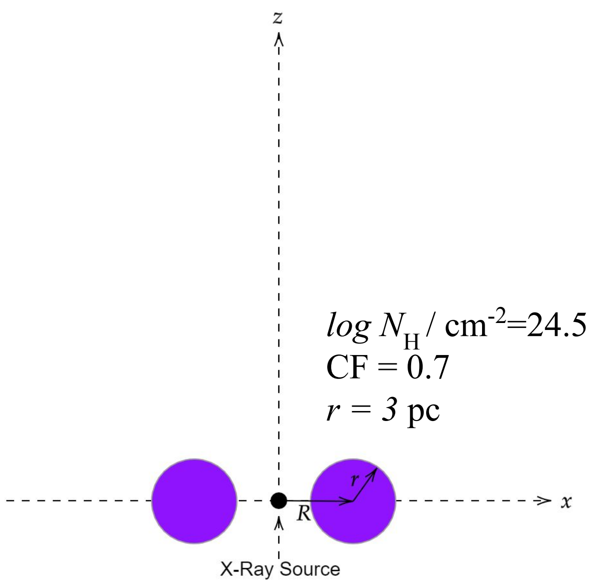


Figure 1. Left: schematic of the model geometry, i.e. dust density cut through the *xz* plane: a geometrically thin dusty disc and a polar dusty wind in a form of a hyperboloid shell. The schematic and the values of the parameters correspond to the best model presented in §4. The dust density is constant both in the disc and in the hyperboloid. The angular width of the hyperboloid shell is 1°. Right: a colour composite image (in logarithmic scale) of the best disc+hyperboloid model made by mapping the 8, 10 and 13 μm flux images obtained with radiative transfer simulations to the blue, green and red, respectively.

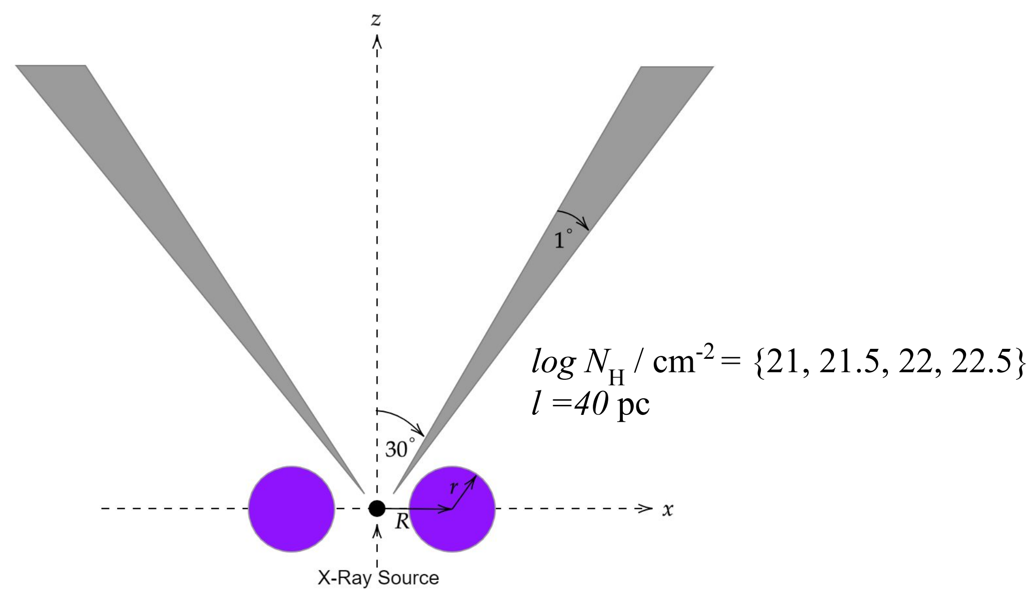
Stalevski et al. (2019)

See also talk by Carolina Andonie

Simulation Setup / Baseline
RefleX* (Paltani & Ricci 2017)



vs.



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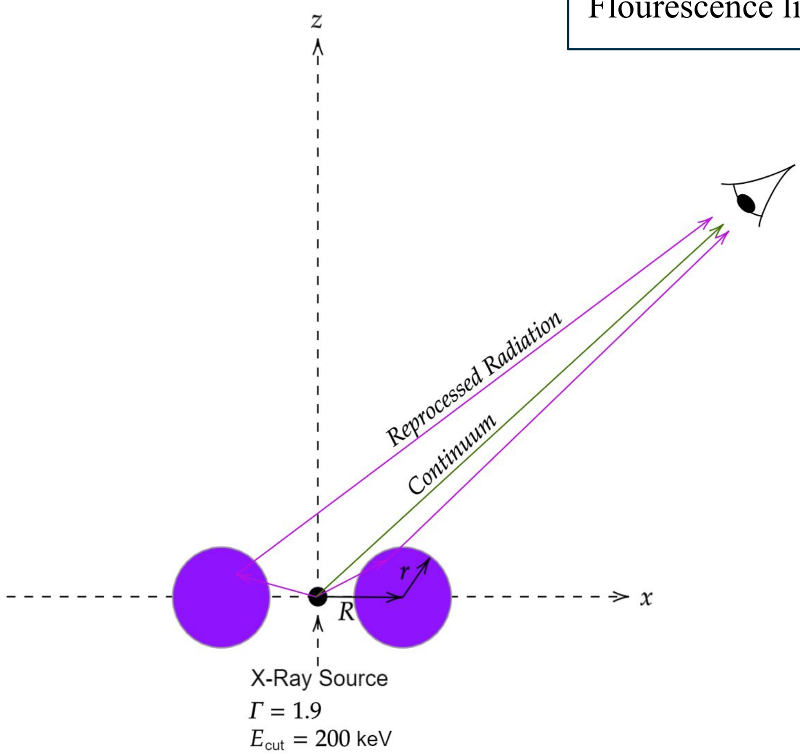
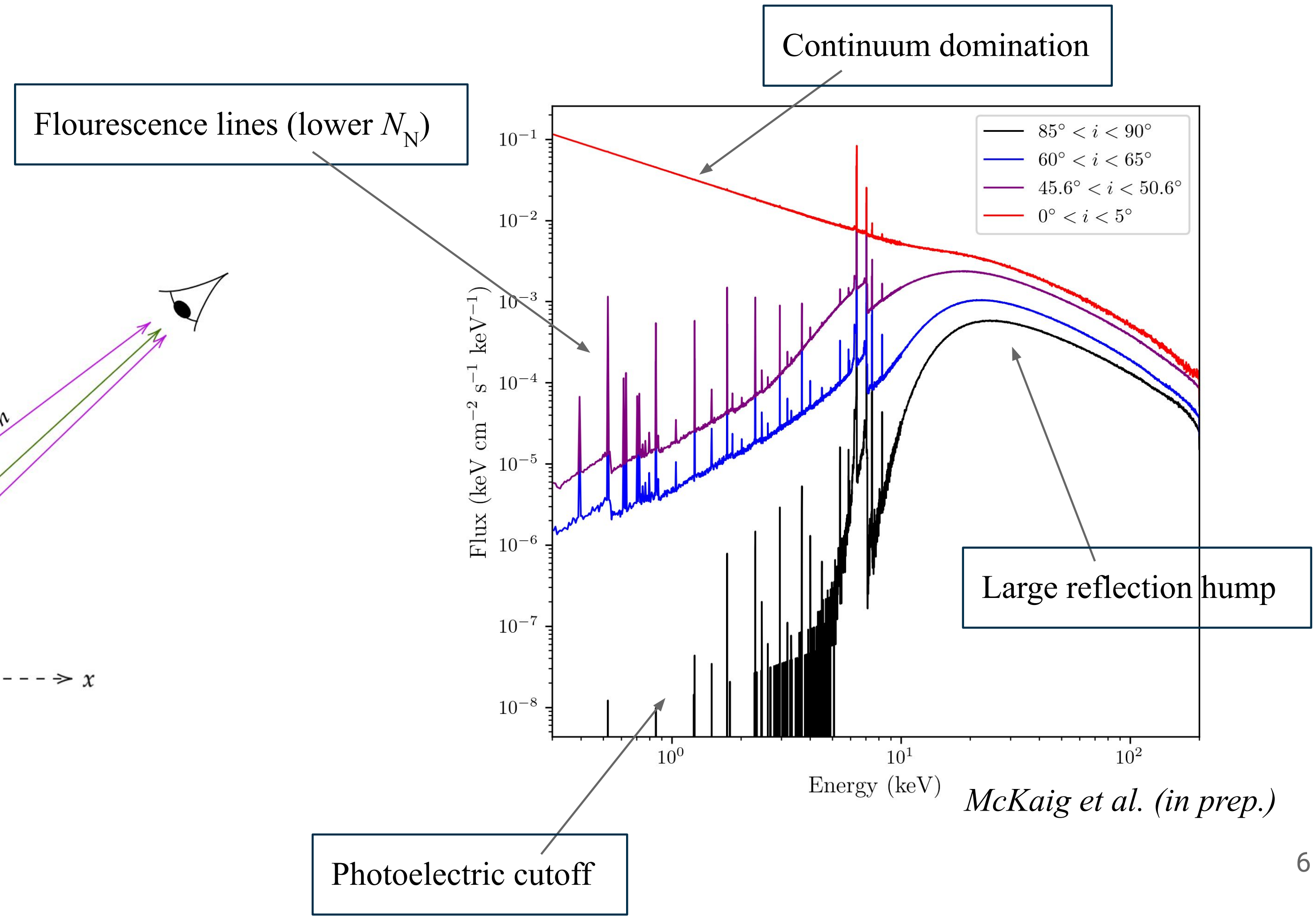
*https://www.astro.unige.ch/reflex/

See also talk by Claudio Ricci

Simulation Setup / Baseline





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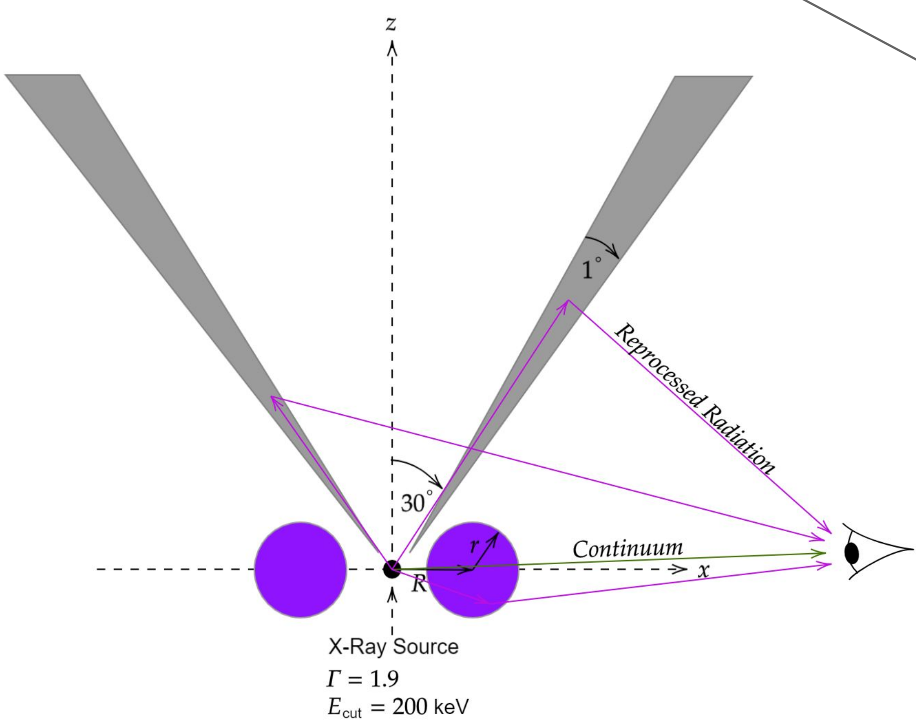
Results: Torus + Hollow Cone

New Flourescence line features (O, Ne, Mg, Si,...)!



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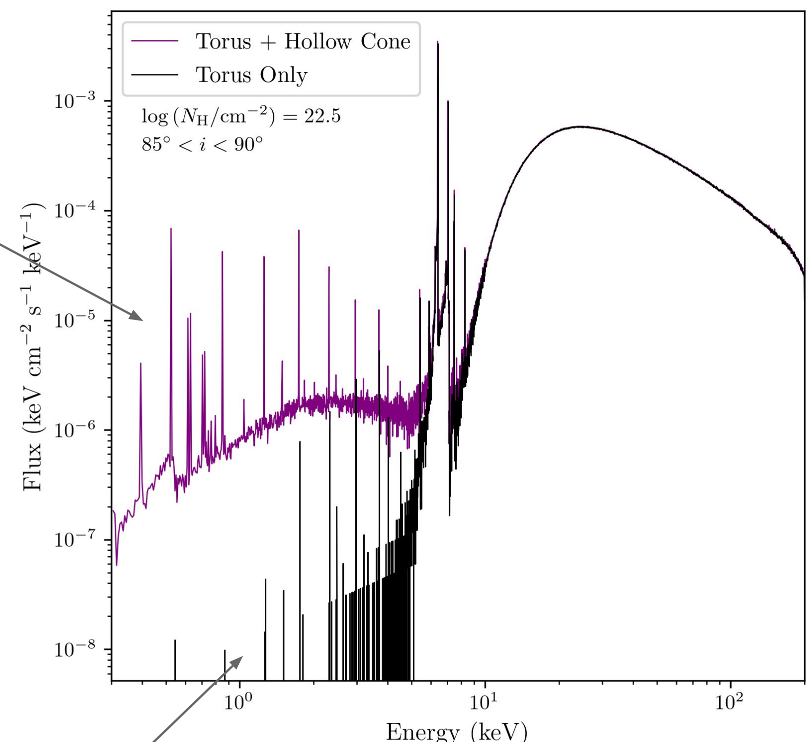
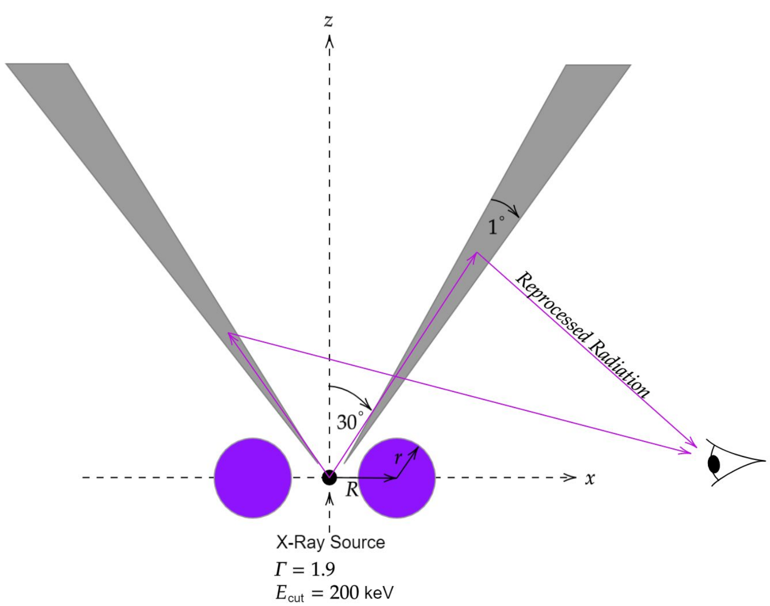
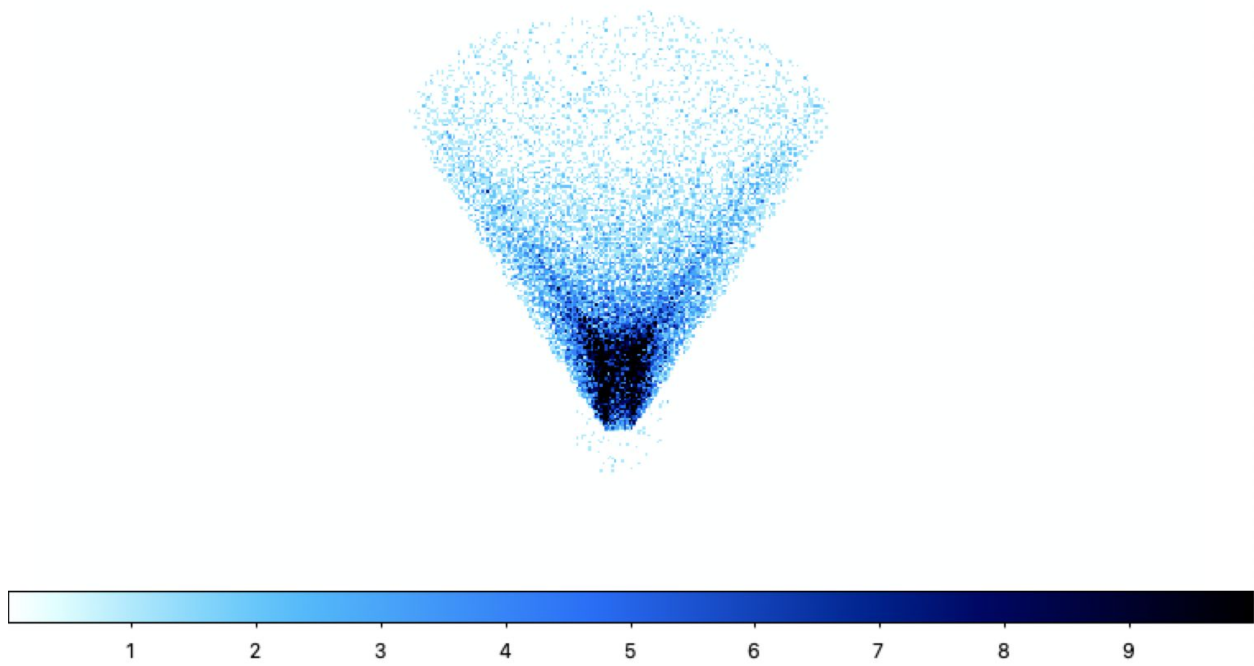


Photoelectric cutoff

Results: Imaging the System

0.3-4 keV: Emission from polar region





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Results: Imaging the System

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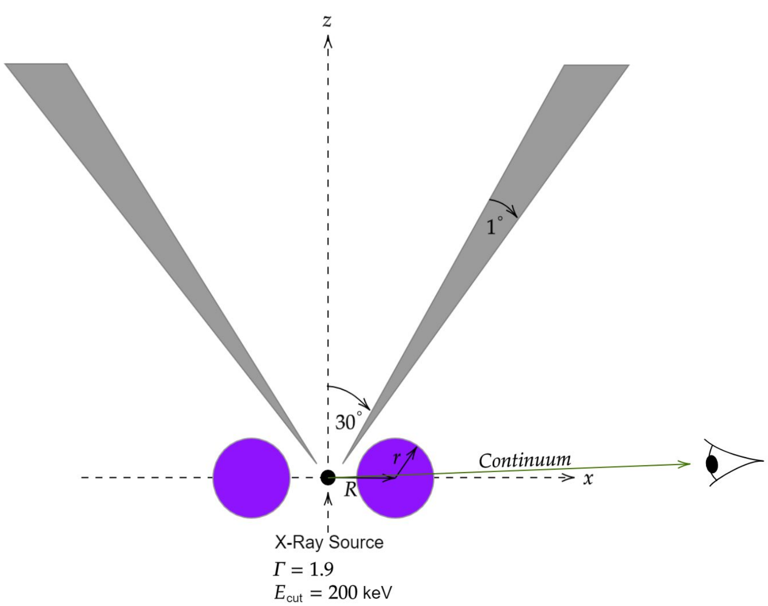
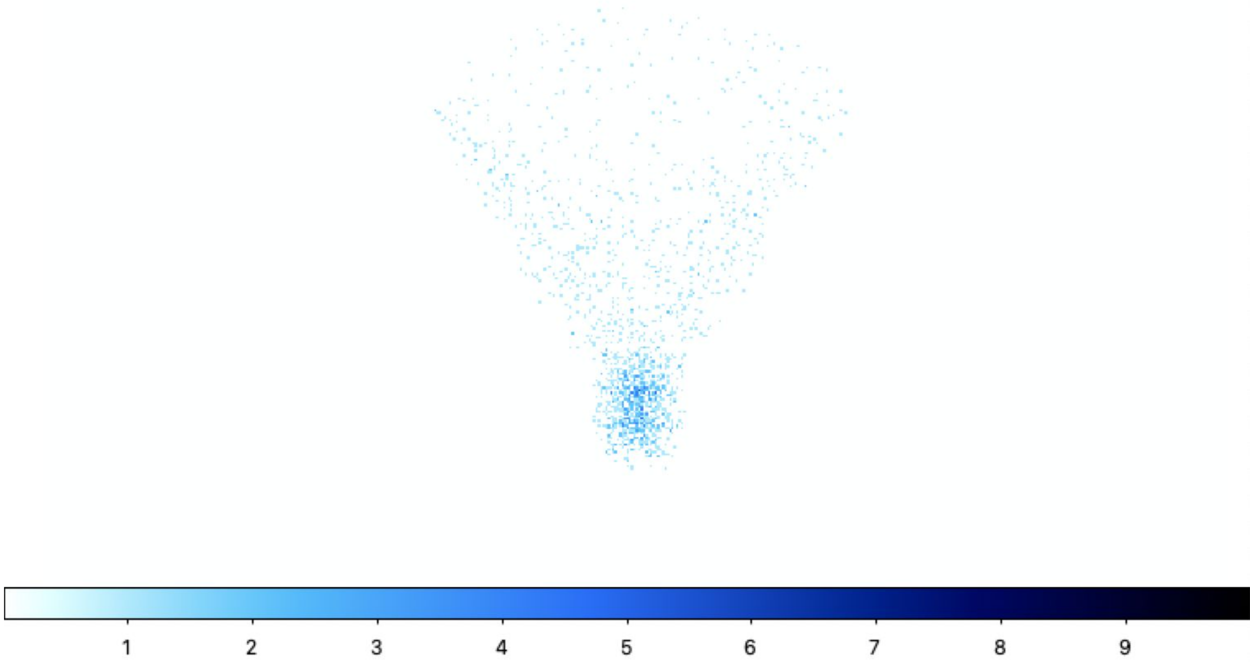
5-6 keV: Mostly scattered continuum





Results: Imaging the System

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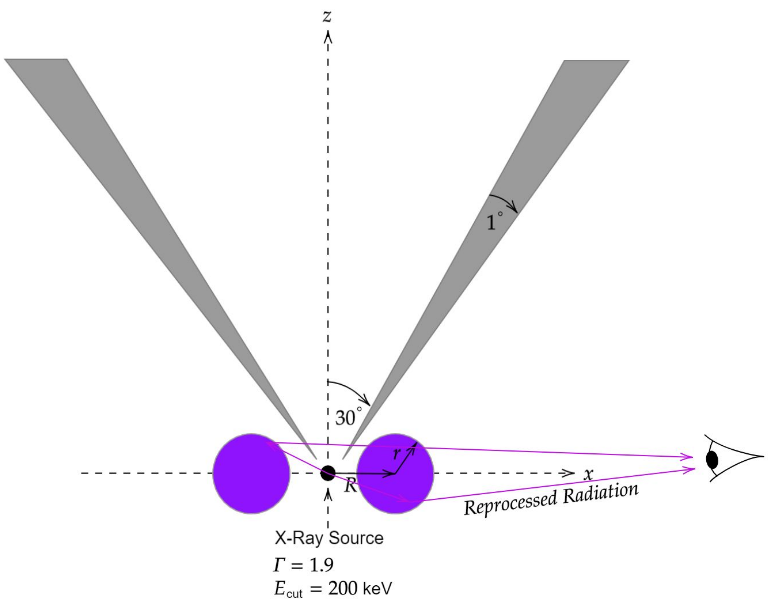
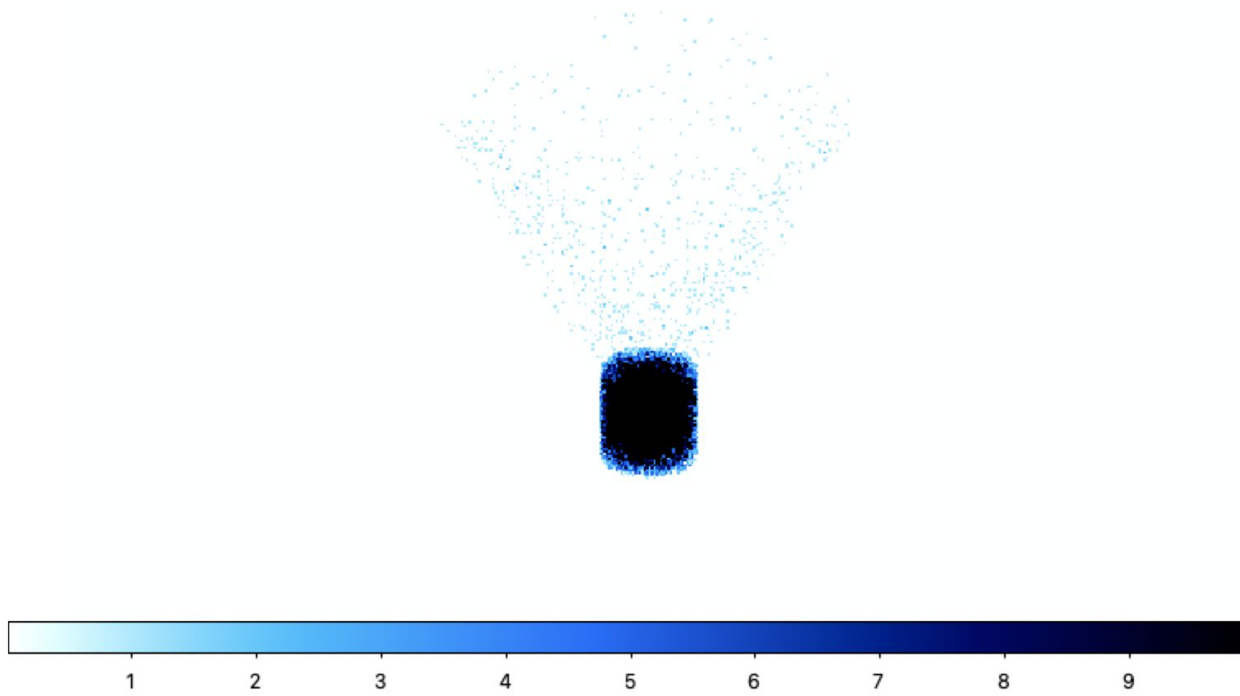
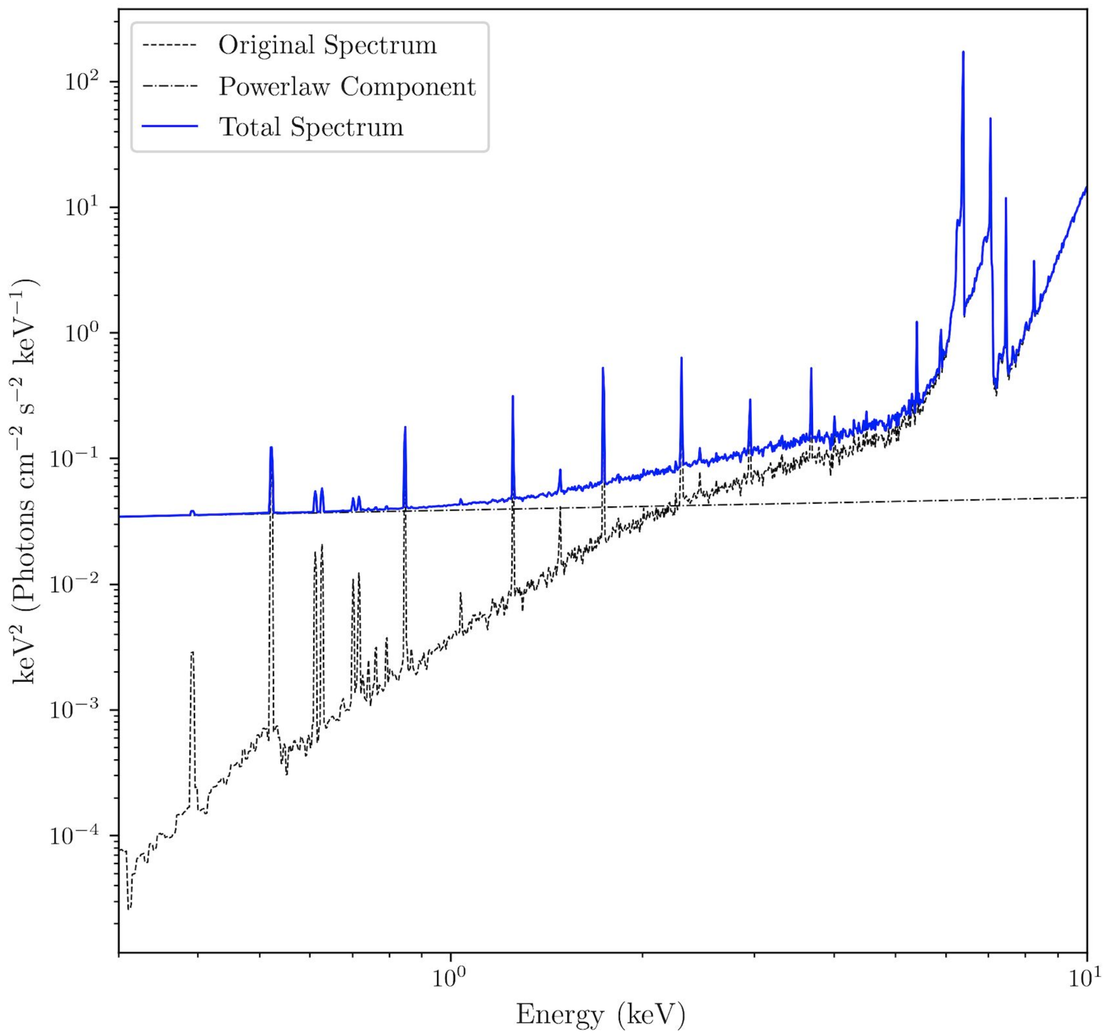
6.3-6.5 keV: Iron Kα complex





Detecting Polar Gas in Obscured AGN



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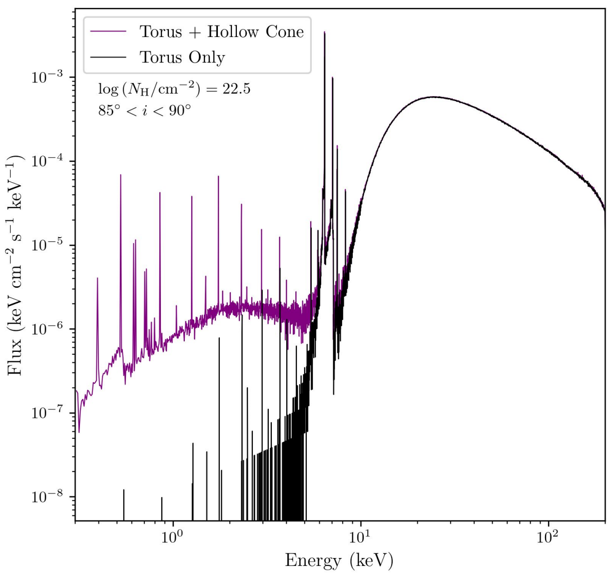
Summary / Conclusion

- Polar gas can produce stronger Flourescence line features (O, Mg, Si)
- Expected to be observed in heavily obscured AGN
- Observable with *XRISM / Athena* (kinematics / origin)



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