

Chandra X-rays the Heart of the Milky Way

How do you starve
a supermassive black hole?

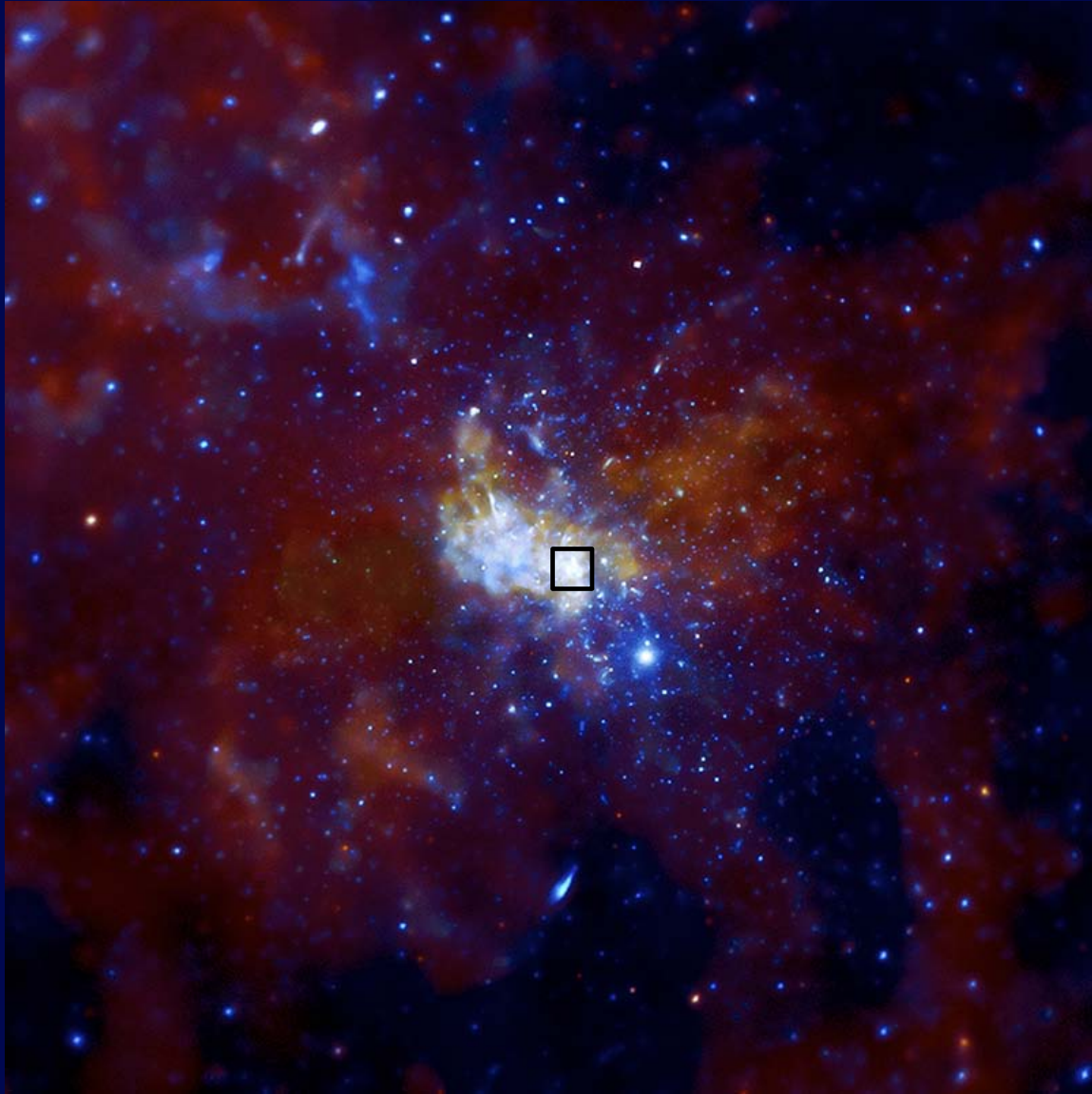
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Chandra image of Sgr A* region



- 120 ly across
- 2 week exposure over 10 years

Red - clouds of 10 million degree gas

Blue - thousands of dead stellar remnants

White - Sgr A East supernovae remnant & supermassive black hole

Frederick K. Baganoff (MIT) & Chandra ACIS Team

30x zoom on the Black Hole (4ly across)



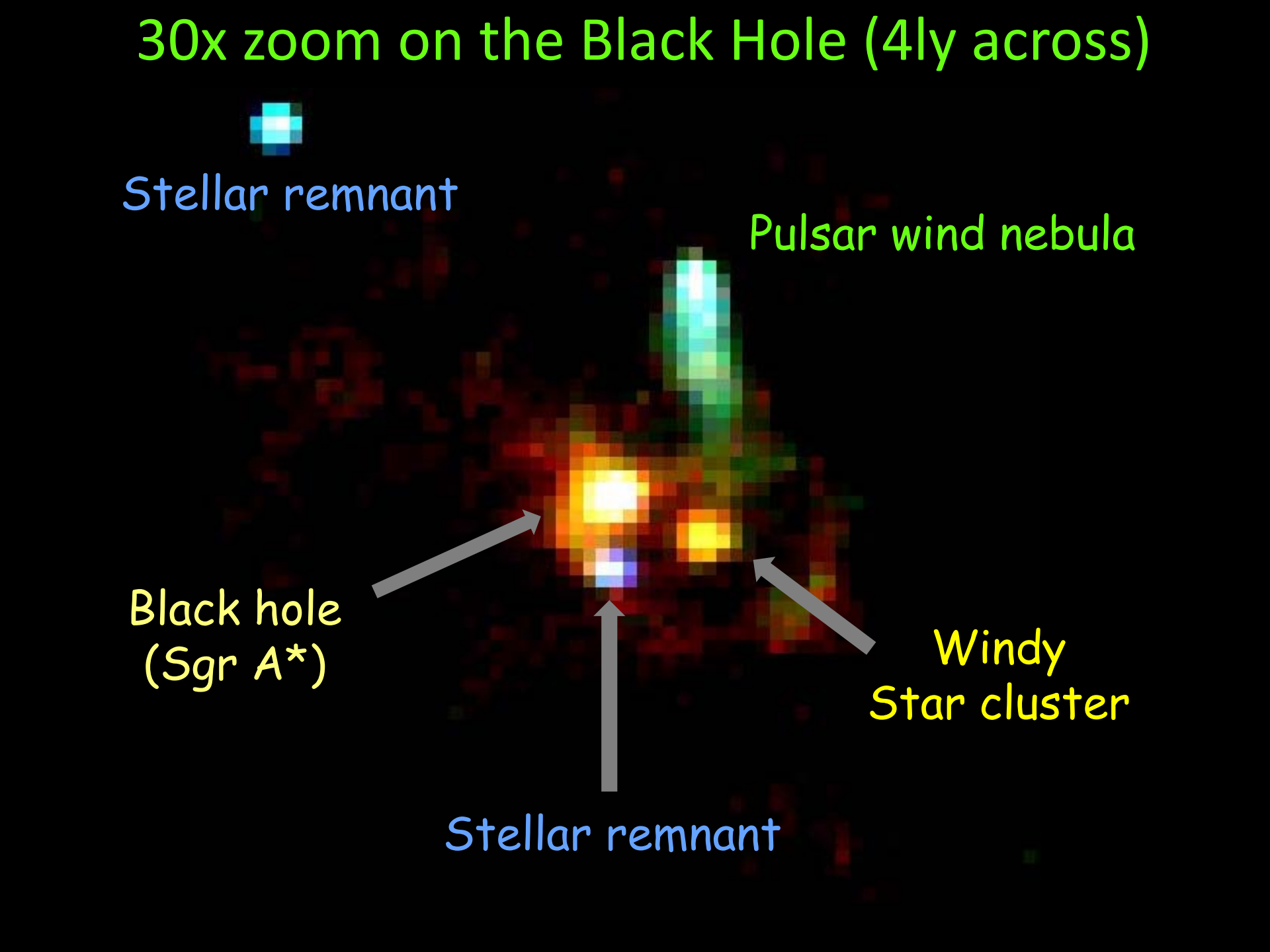
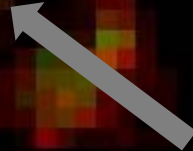
Stellar remnant

Pulsar wind nebula

Black hole
(Sgr A*)

Windy
Star cluster

Stellar remnant



Starving the Black Hole

- Black Hole feeds off winds from surrounding stars
- Previously thought to capture only 1% of these fast winds
- Would be 100x brighter in X-rays than observed!
- Somehow most of that 1% must escape the pull of the Black Hole

Some of the captured gas escapes

- Gas heats up as it falls closer to the Black Hole
- Previous models ignored conduction, which transfers heat to the gas farther out
- Extra heat creates pressure causing more winds to escape the pull of gravity
- We use the Chandra data to test the model

30x zoom on the Black Hole (4ly across)



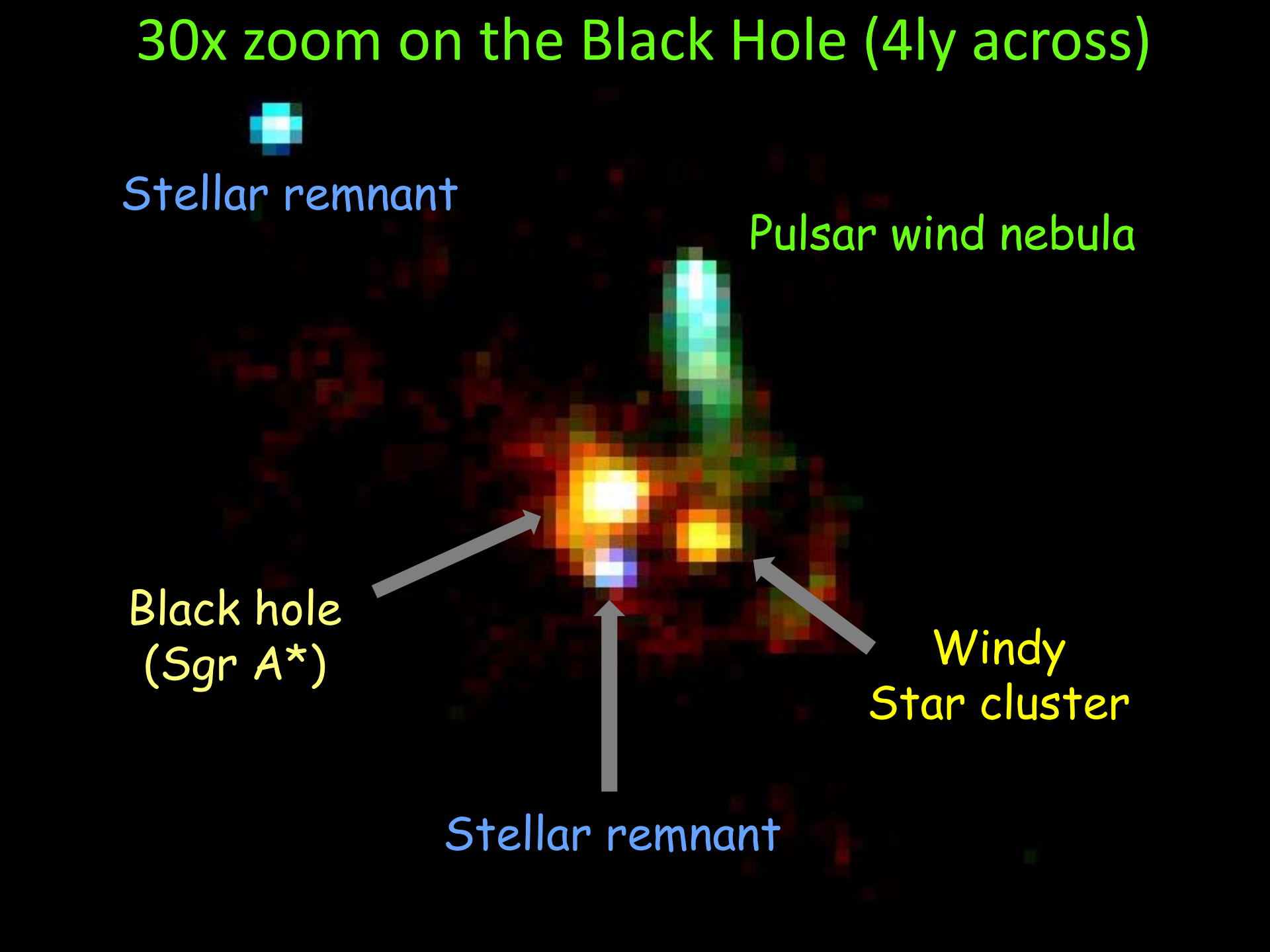
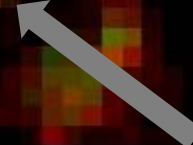
Stellar remnant

Pulsar wind nebula

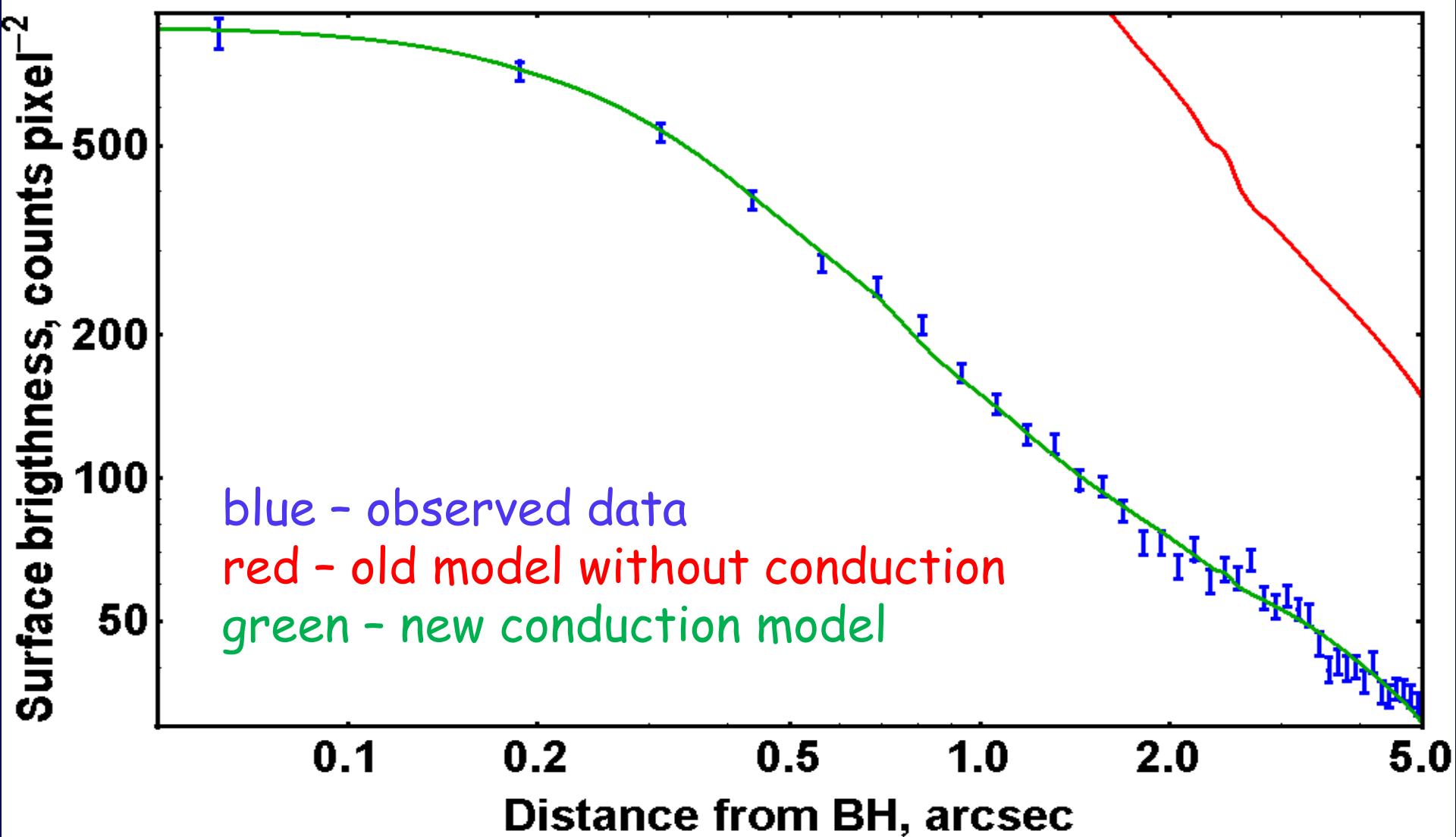
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Distribution of X-rays from gas near the BH



✓ Only 1% of that 1% actually falls onto the Black Hole

Summary

- ✓ Chandra has given us a detailed X-ray view of the winds that feed Sgr A*
- ✓ The new conduction model explains the extended shape of X-rays from gas near the Black Hole
- ✓ Only 0.01% of the stellar winds actually reaches the event horizon of the Black Hole

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