

# Discovery of a dust scattering halo from a Galactic Center transient

SWIFT J174540.7-290015

Lia Corrales

*Einstein Fellow*

*University of Wisconsin - Madison*

In collaboration with: F. Baganoff (MIT), G. Garmire, D. Haggard (McGill),  
M. Reynolds (UMichigan), N. Degenaar (IoA, UK), B. Mon (McGill)

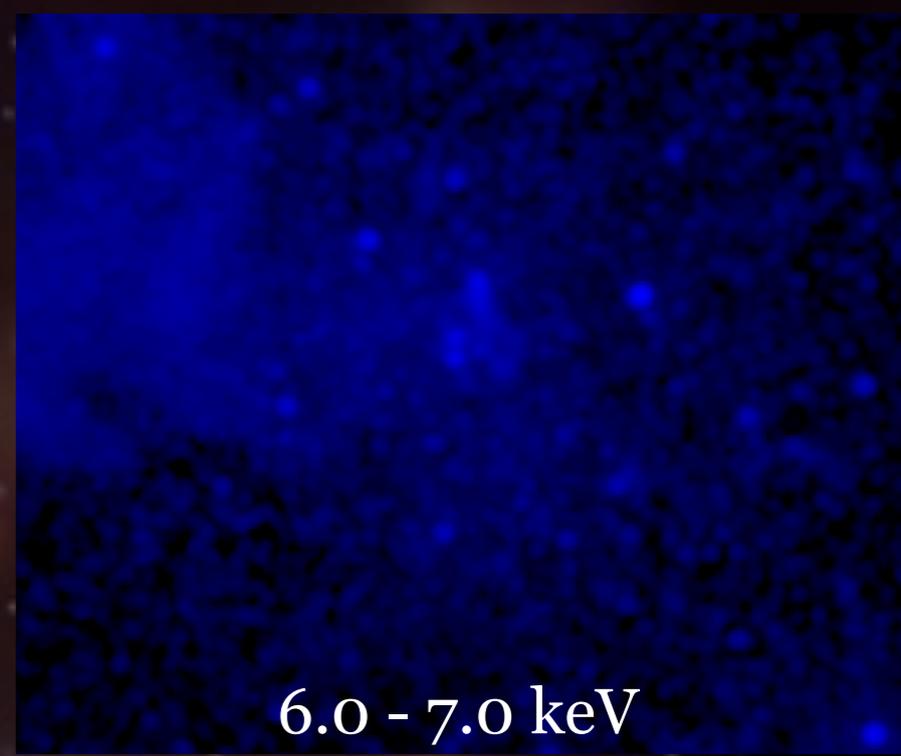
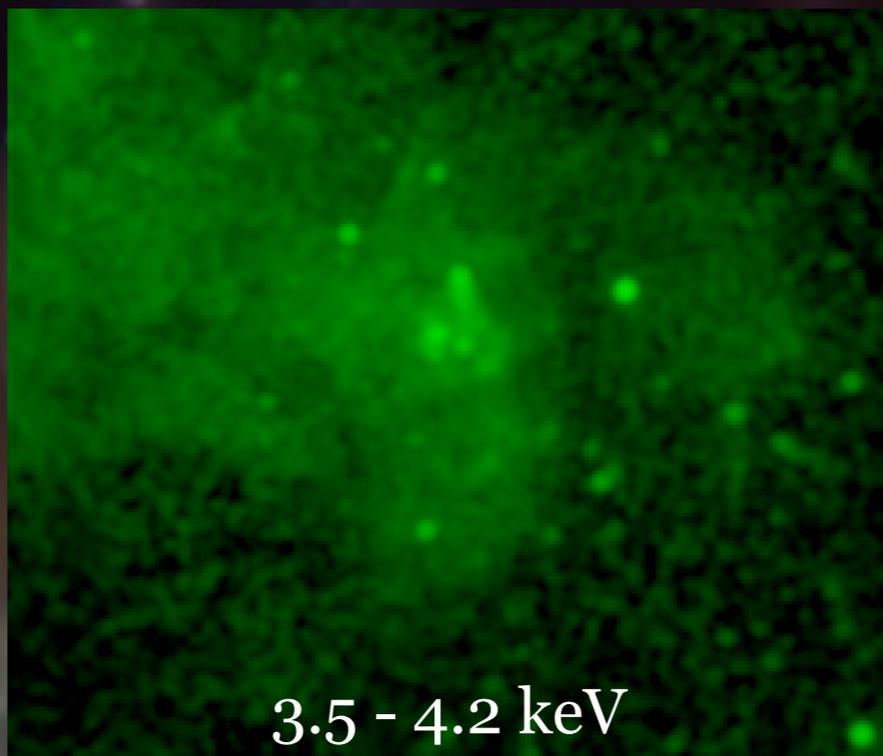
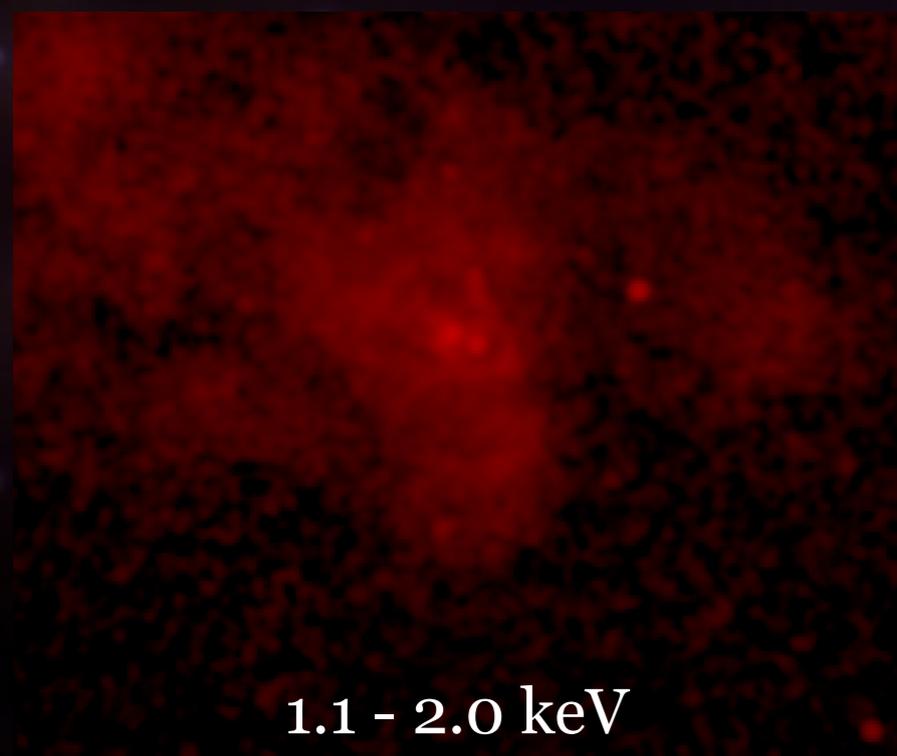
# *Chandra's View* of the Galactic Center

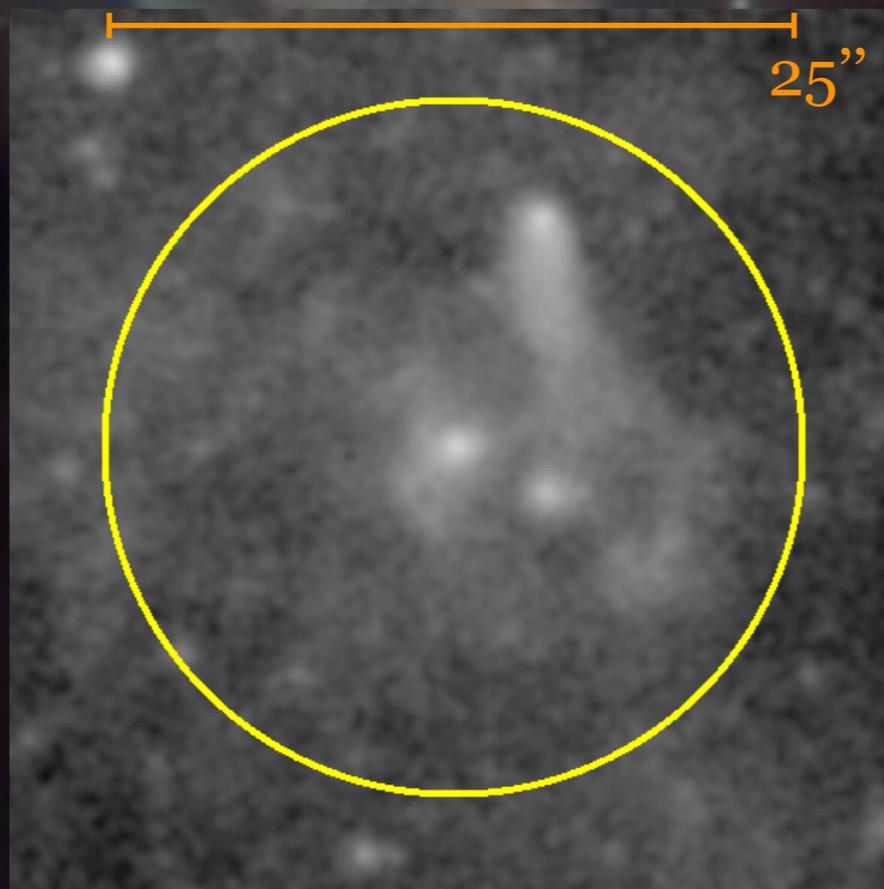
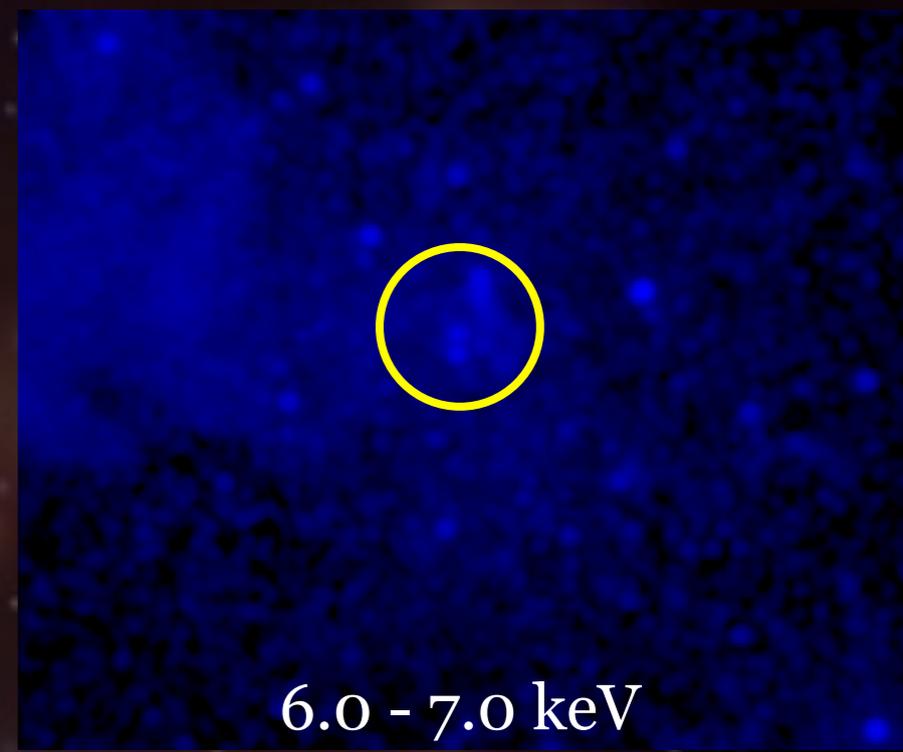
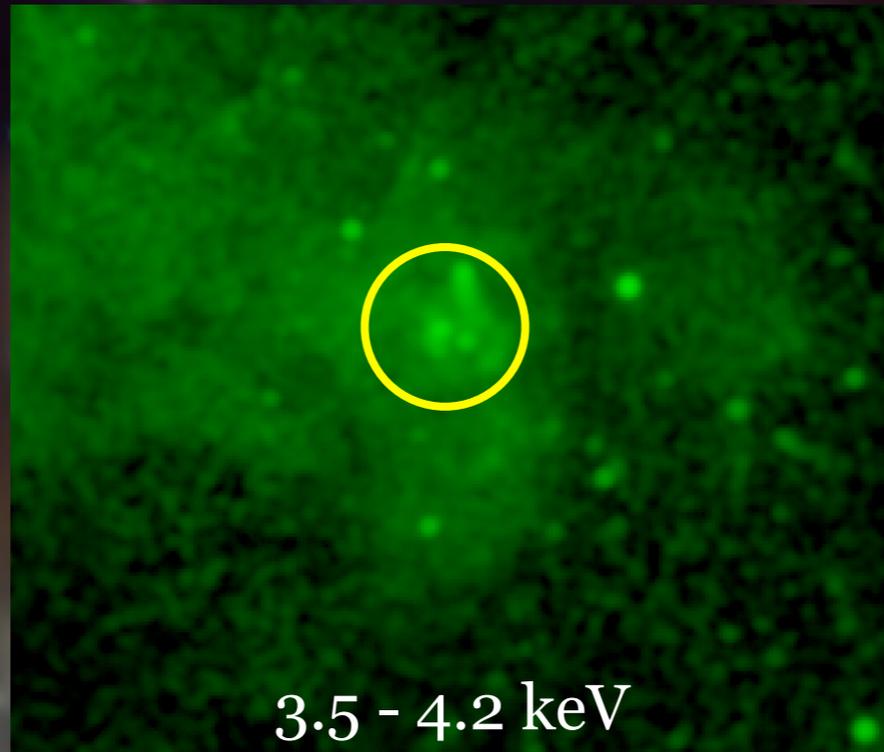
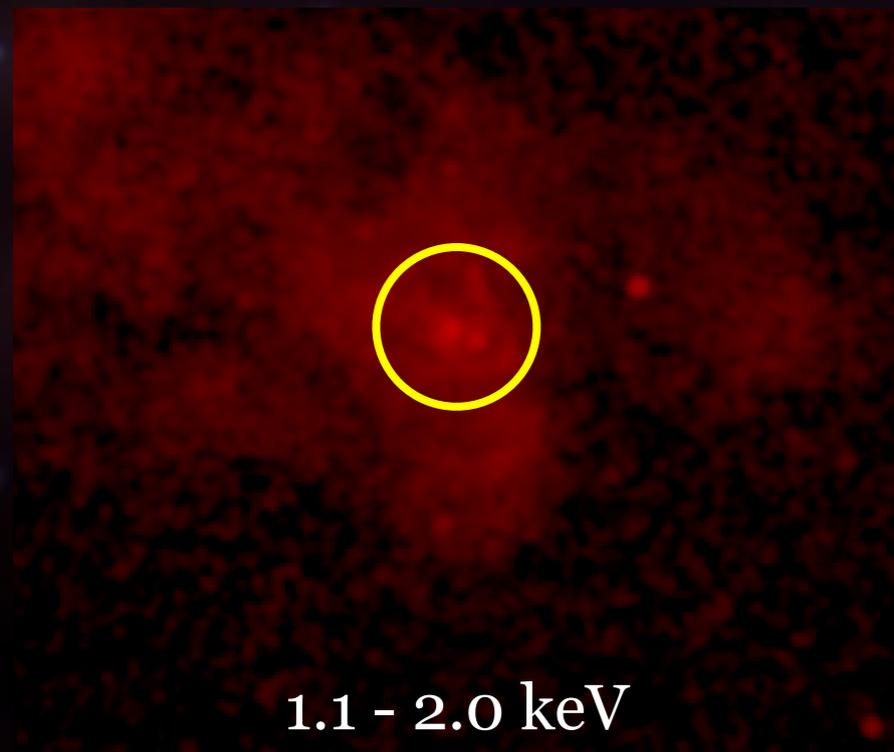


*Image Credit: NASA/CXC/MIT/F.K.Baganoff*

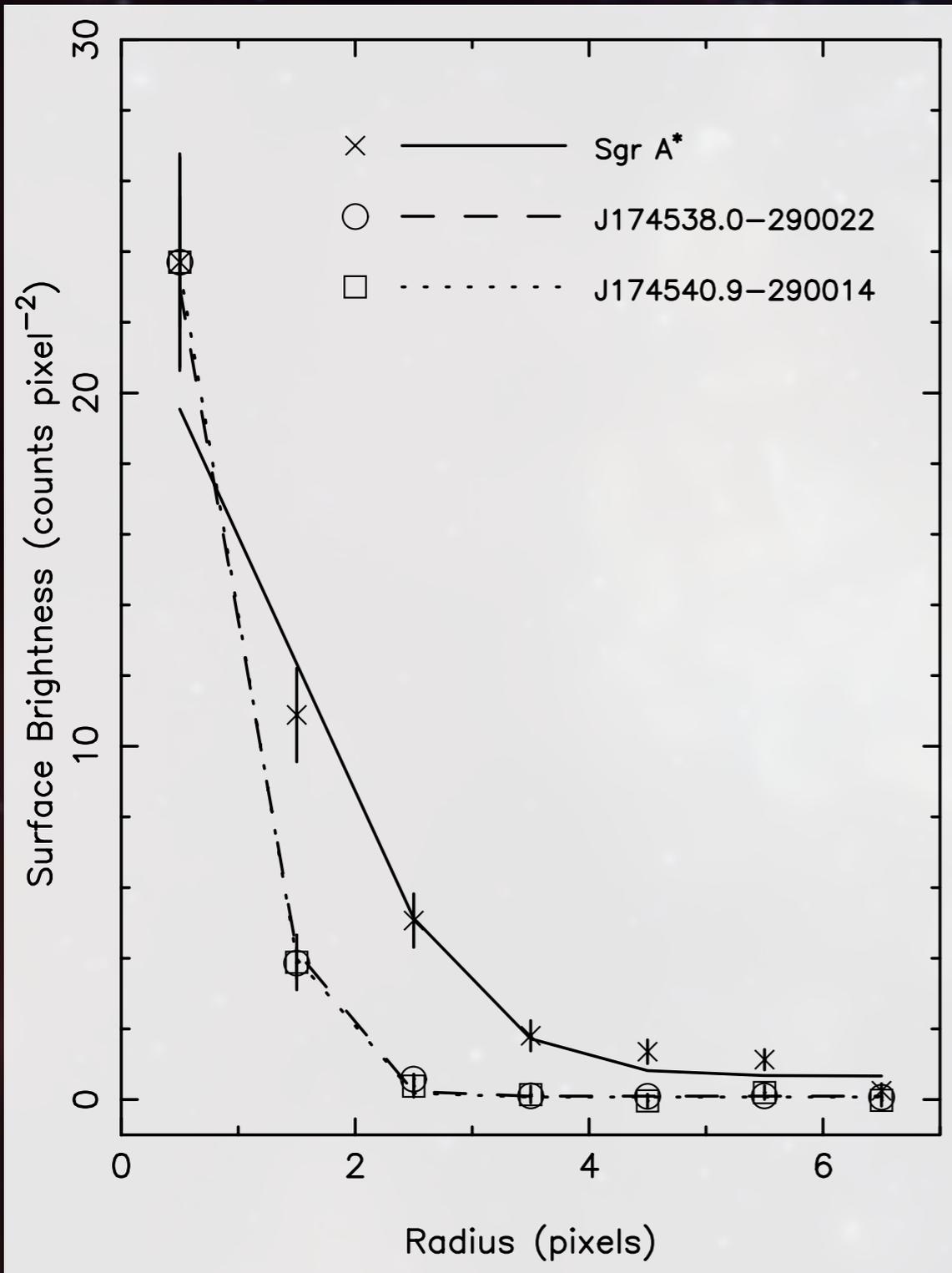


*Image Credit: NASA/CXC/MIT/F.K.Baganoff*

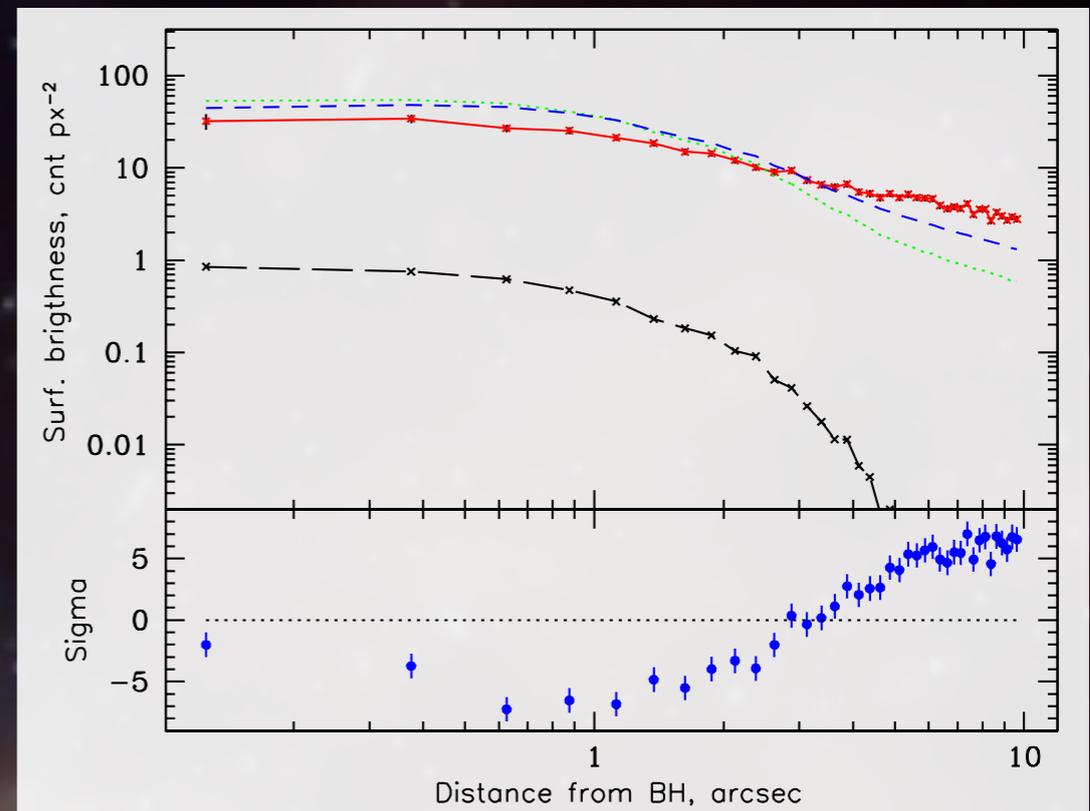




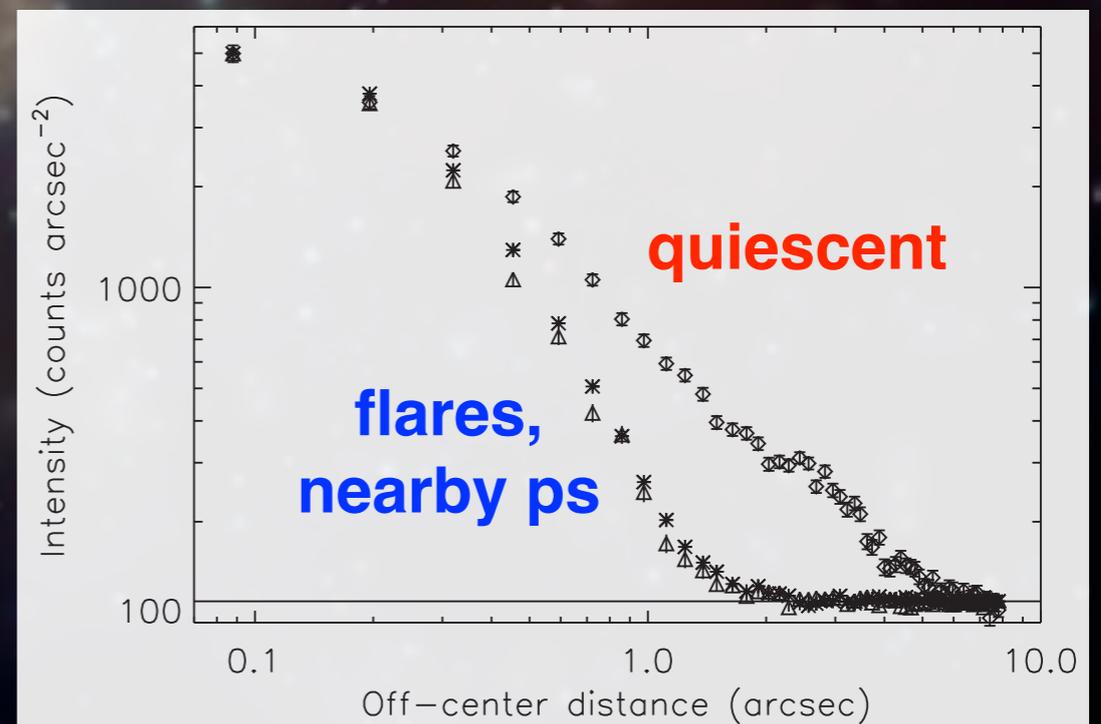
**central  
parsec**



Baganoff+ 2003

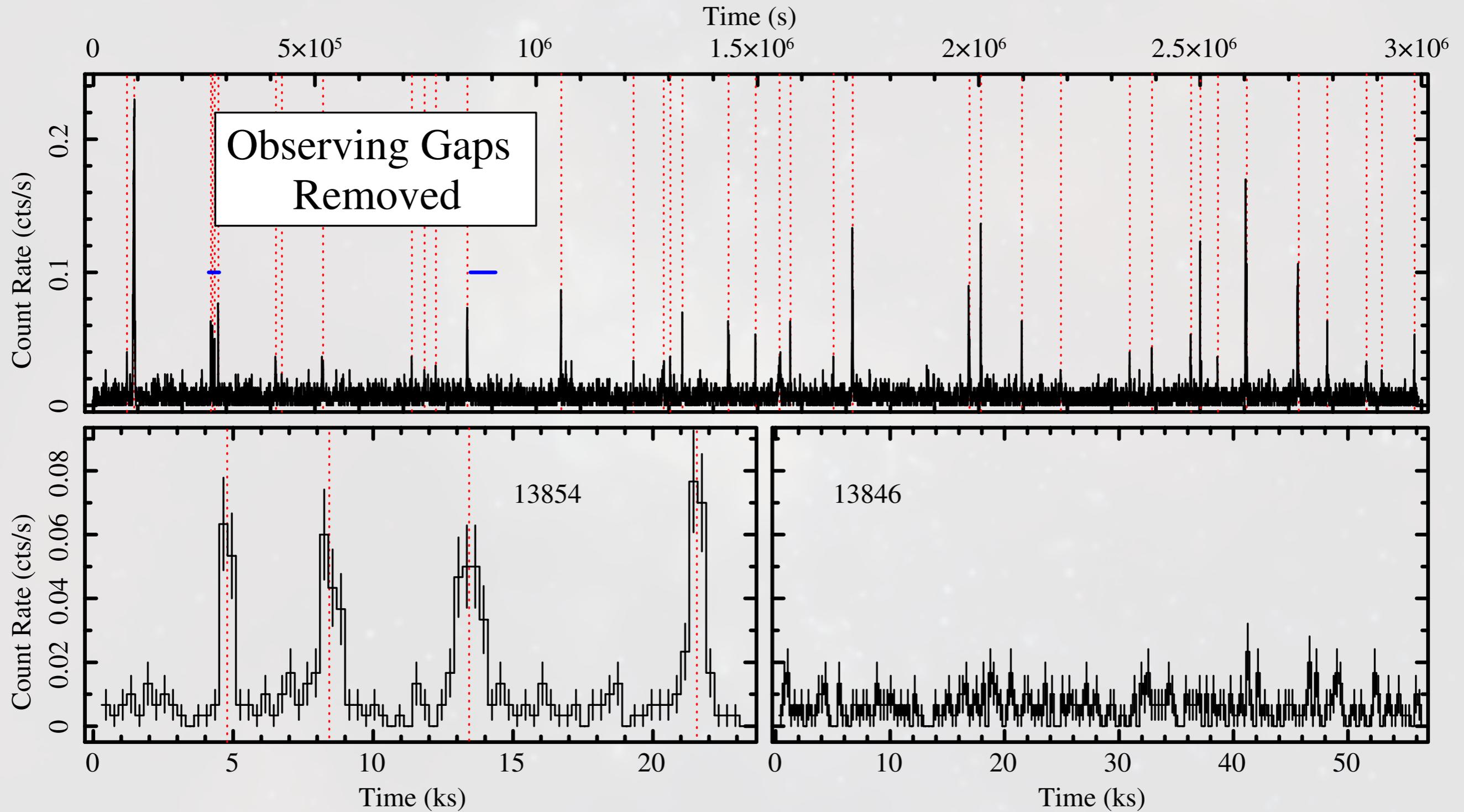


Rozanska+ 2015



Wang+ 2013

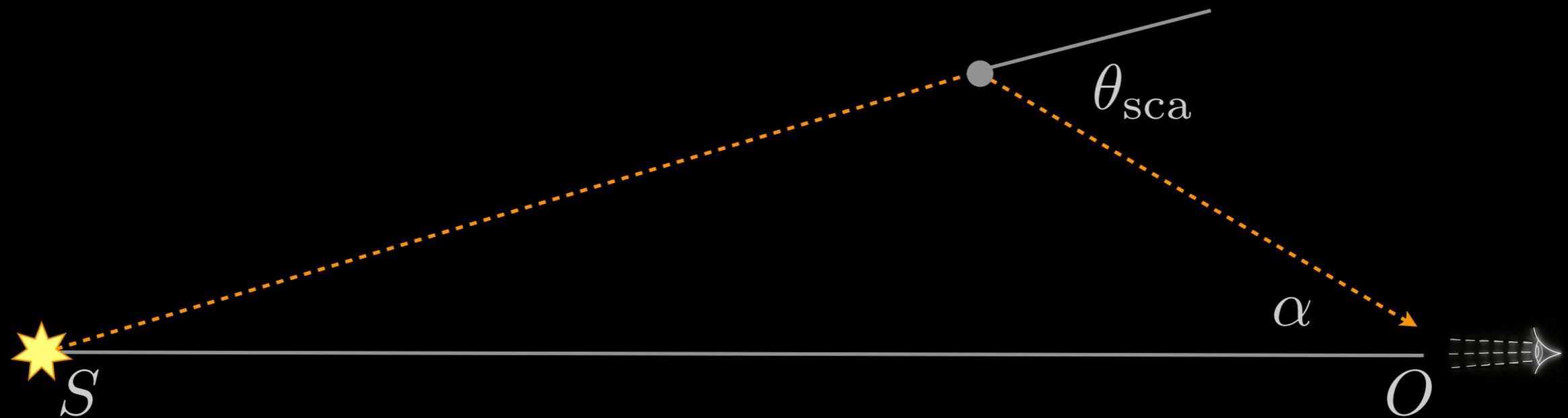
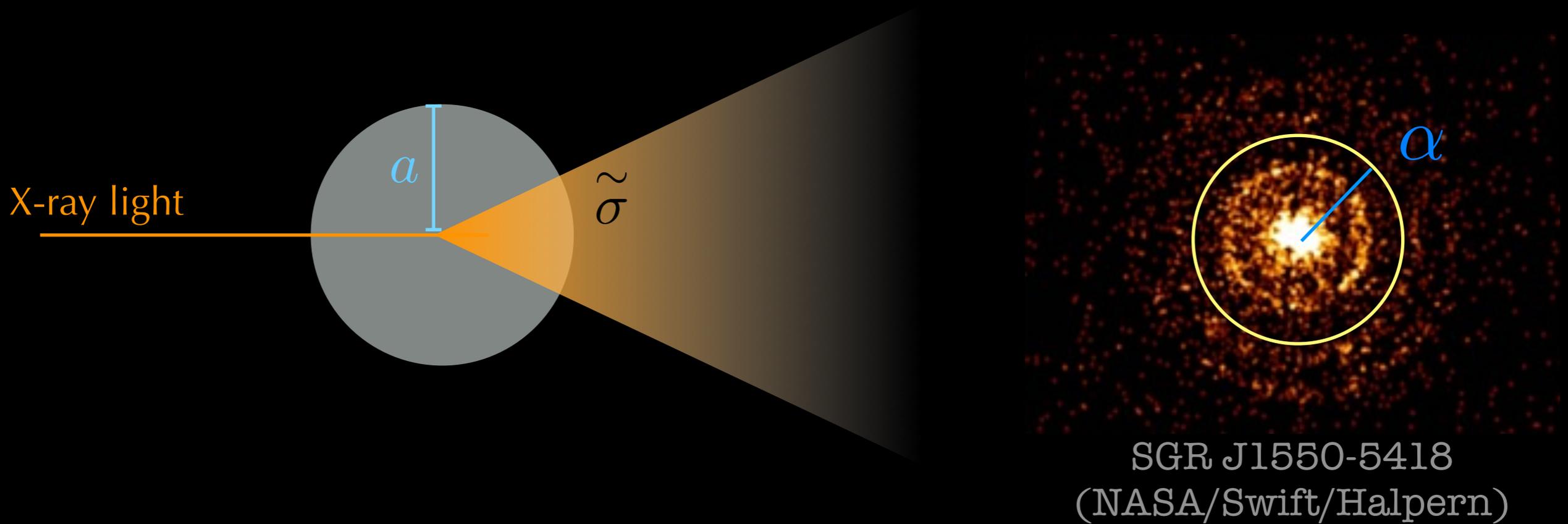
# Chandra Galactic Center X-ray Visionary Project



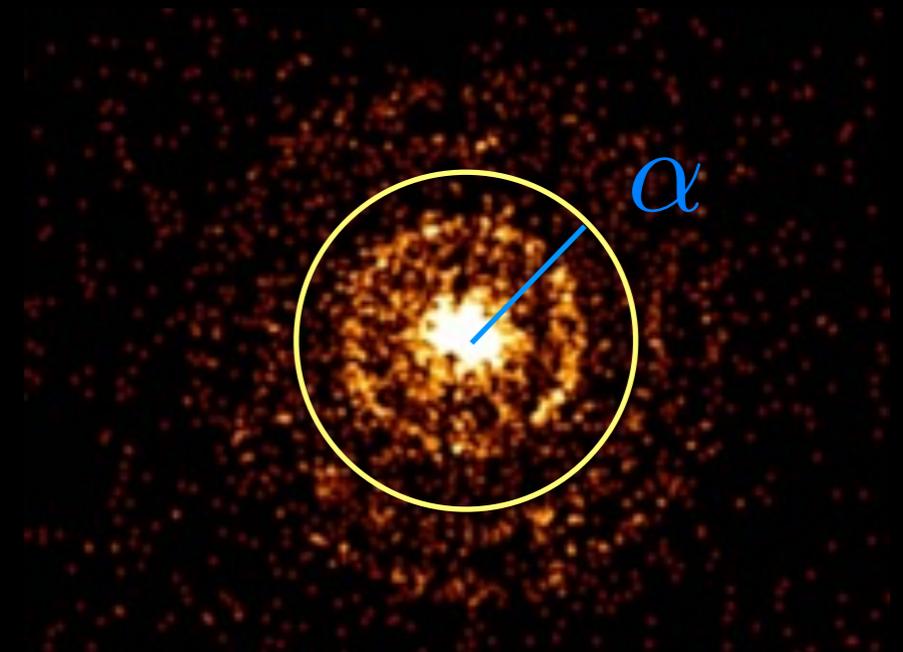
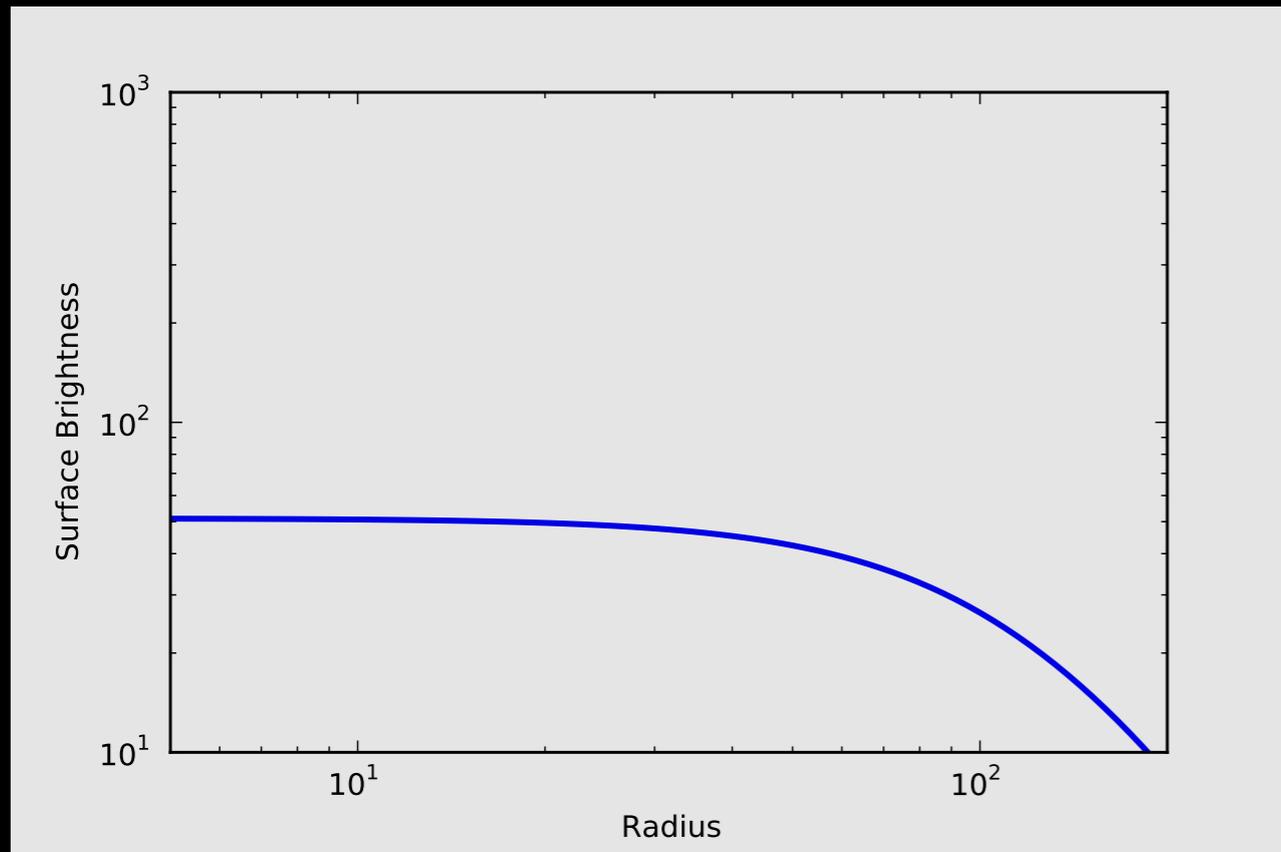
The background of the slide is a deep space image showing a dense field of stars. A prominent, bright yellowish-white star is located in the upper-left quadrant, surrounded by a diffuse, glowing halo of light. This halo is composed of numerous smaller, fainter stars and interstellar dust, creating a complex, multi-colored pattern of light. The overall color palette is dominated by dark blues and blacks, with scattered points of light in various colors including white, yellow, orange, and red. The text "Information in dust scattering halos" is centered in the lower half of the image in a white, serif font.

Information in dust scattering halos

# X-ray scattering is a diagnostic tool for ISM structure

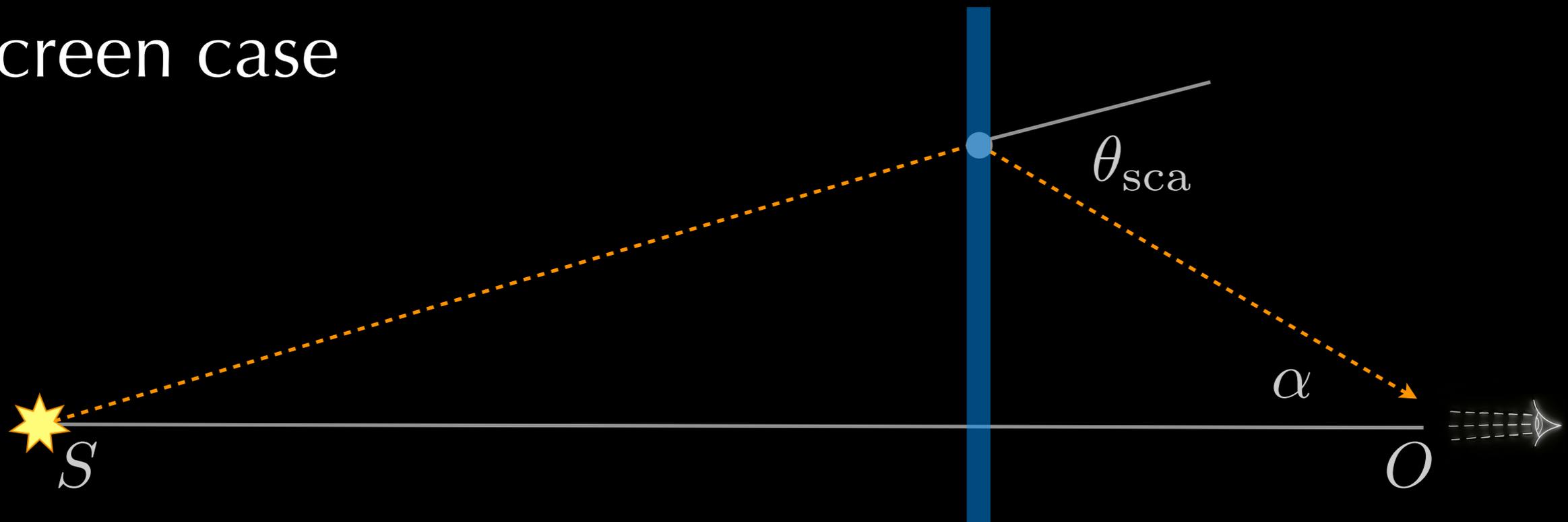


# X-ray scattering is a diagnostic tool for ISM structure

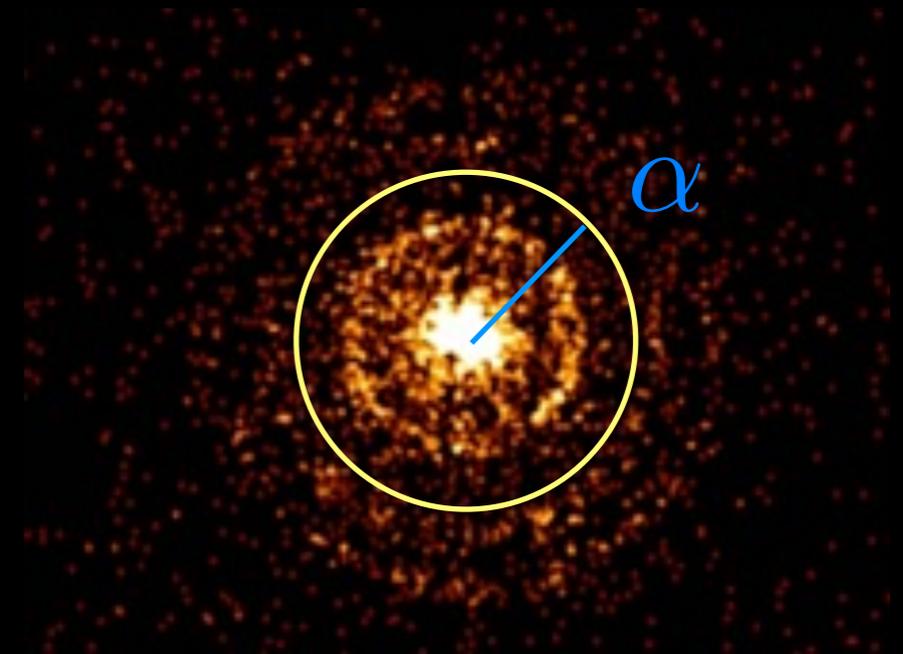
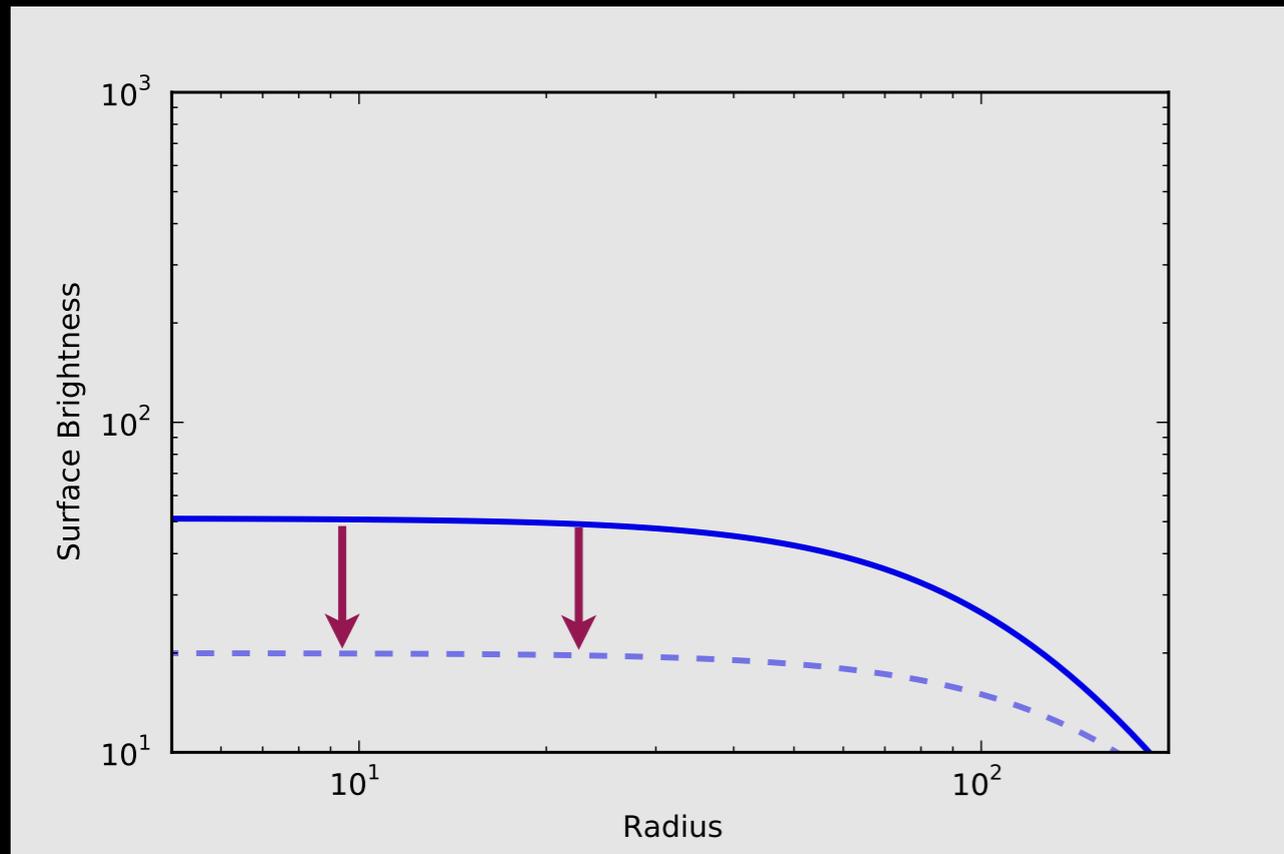


SGR J1550-5418  
(NASA/Swift/Halpern)

## Screen case

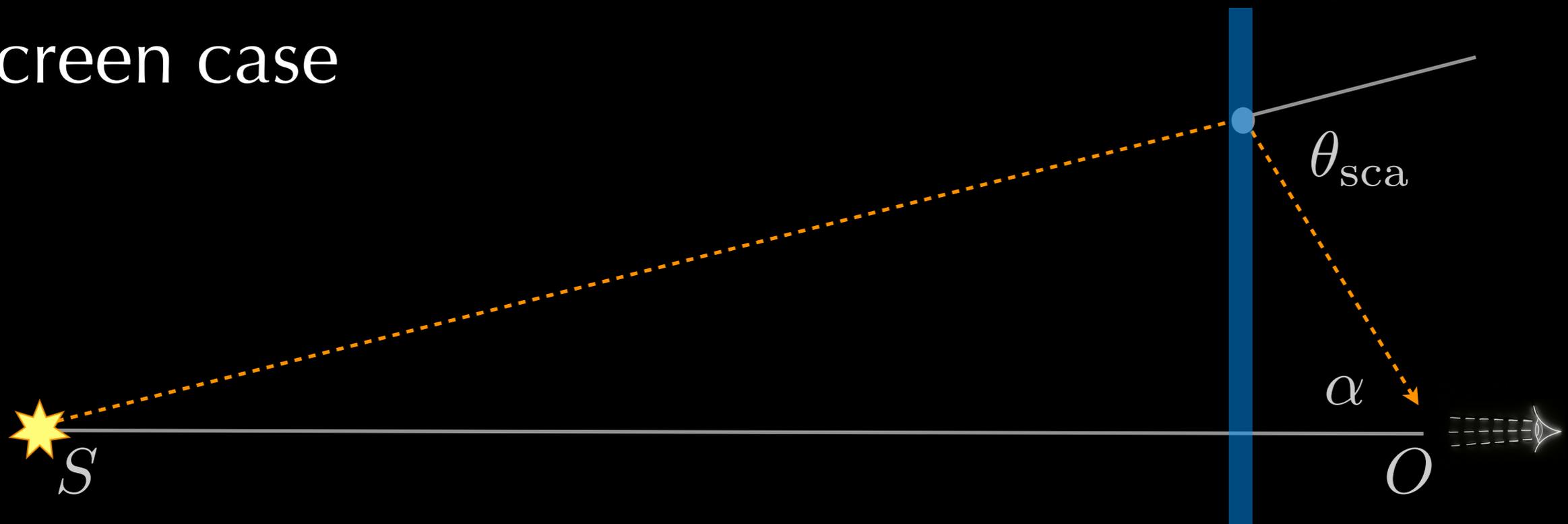


# X-ray scattering is a diagnostic tool for ISM structure

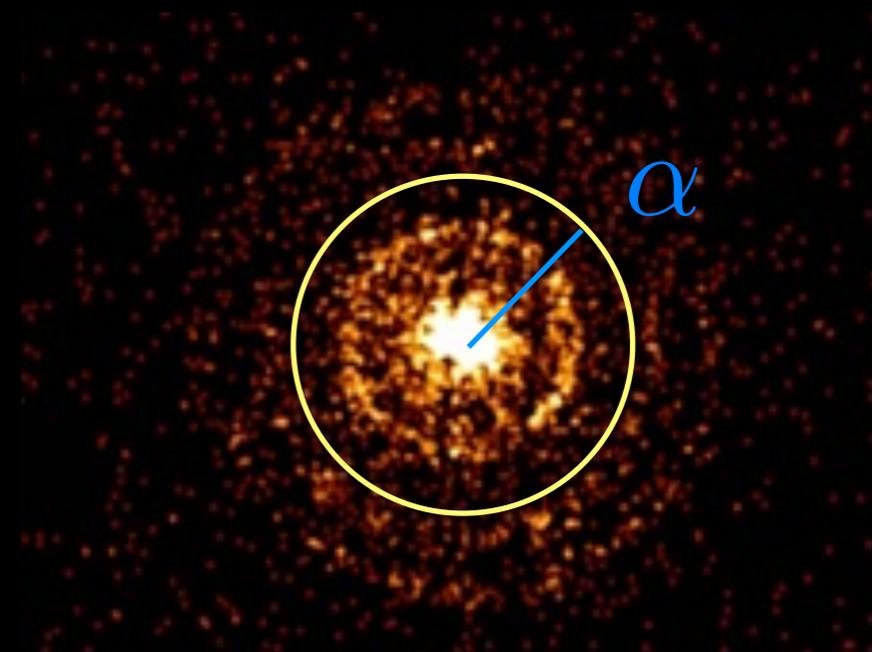
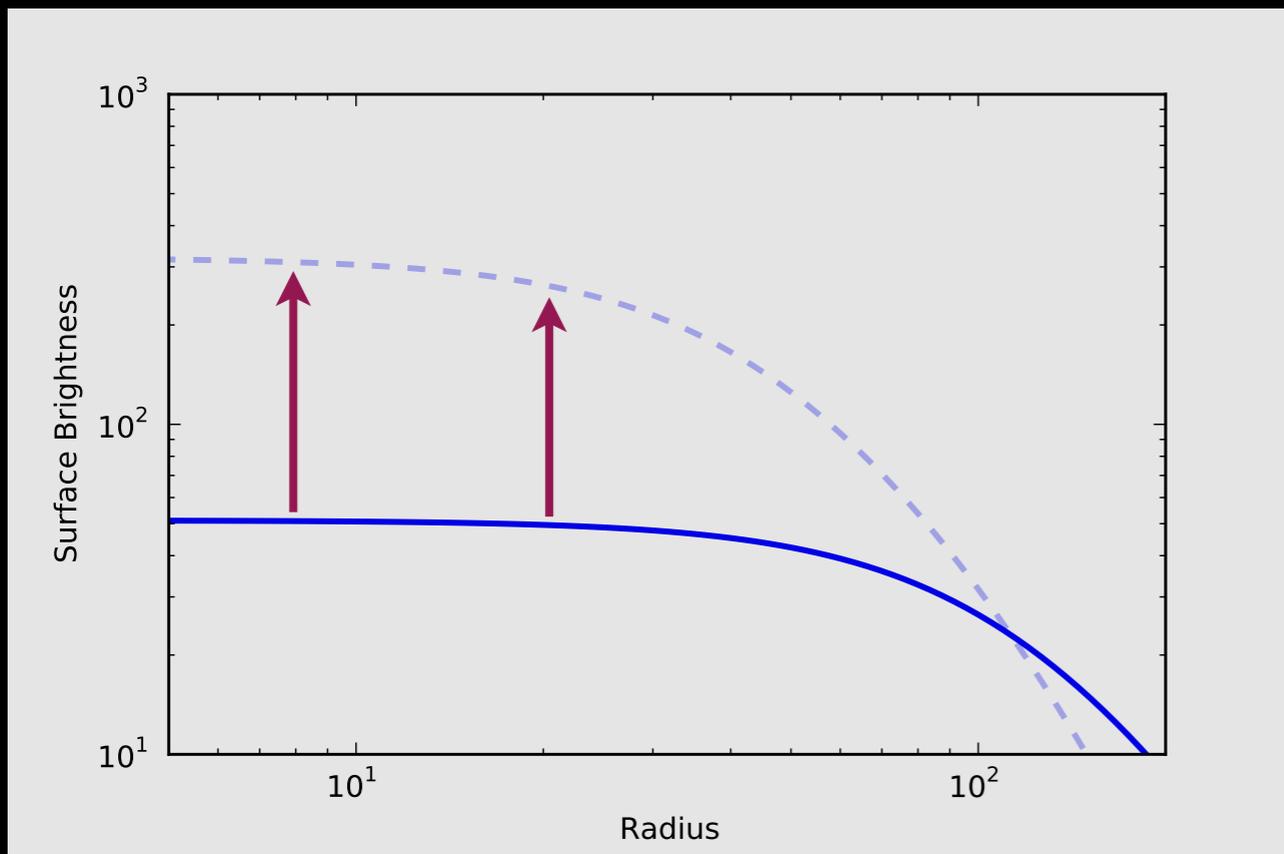


SGR J1550-5418  
(NASA/Swift/Halpern)

Screen case

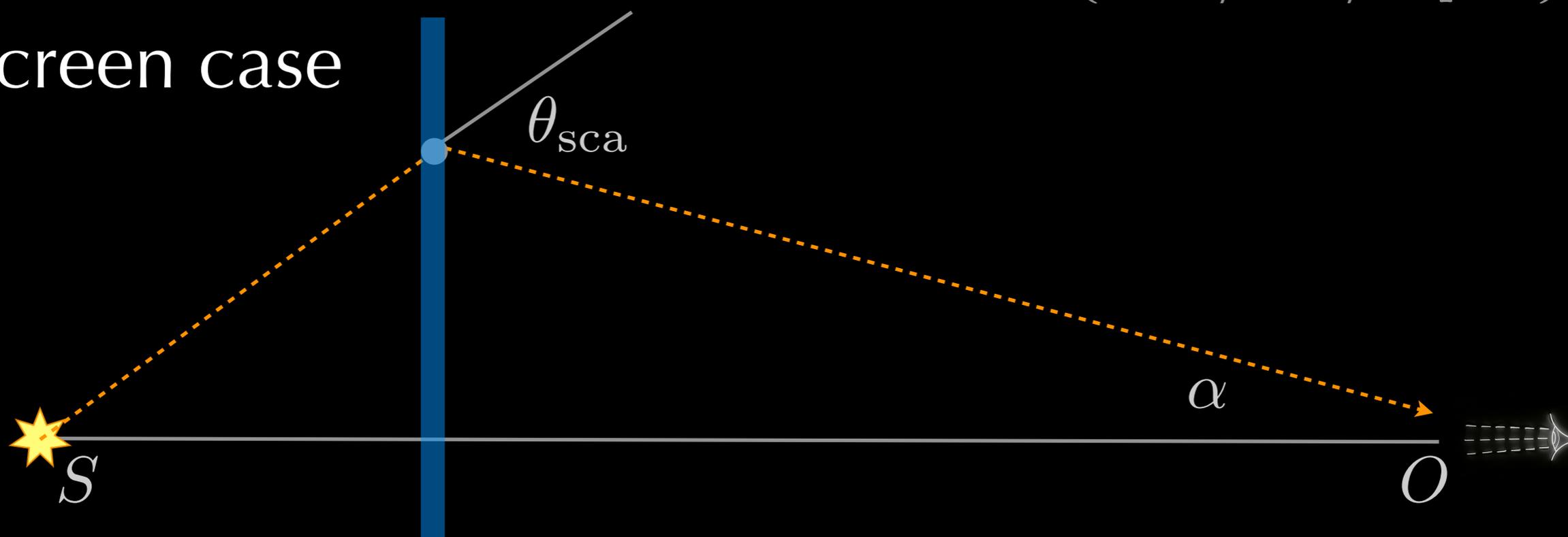


# X-ray scattering is a diagnostic tool for ISM structure

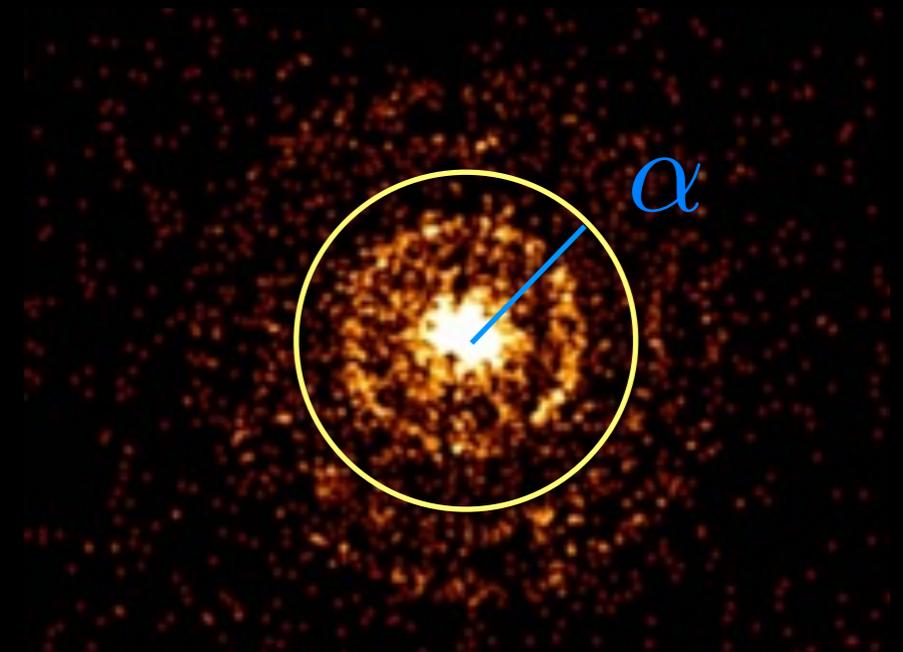
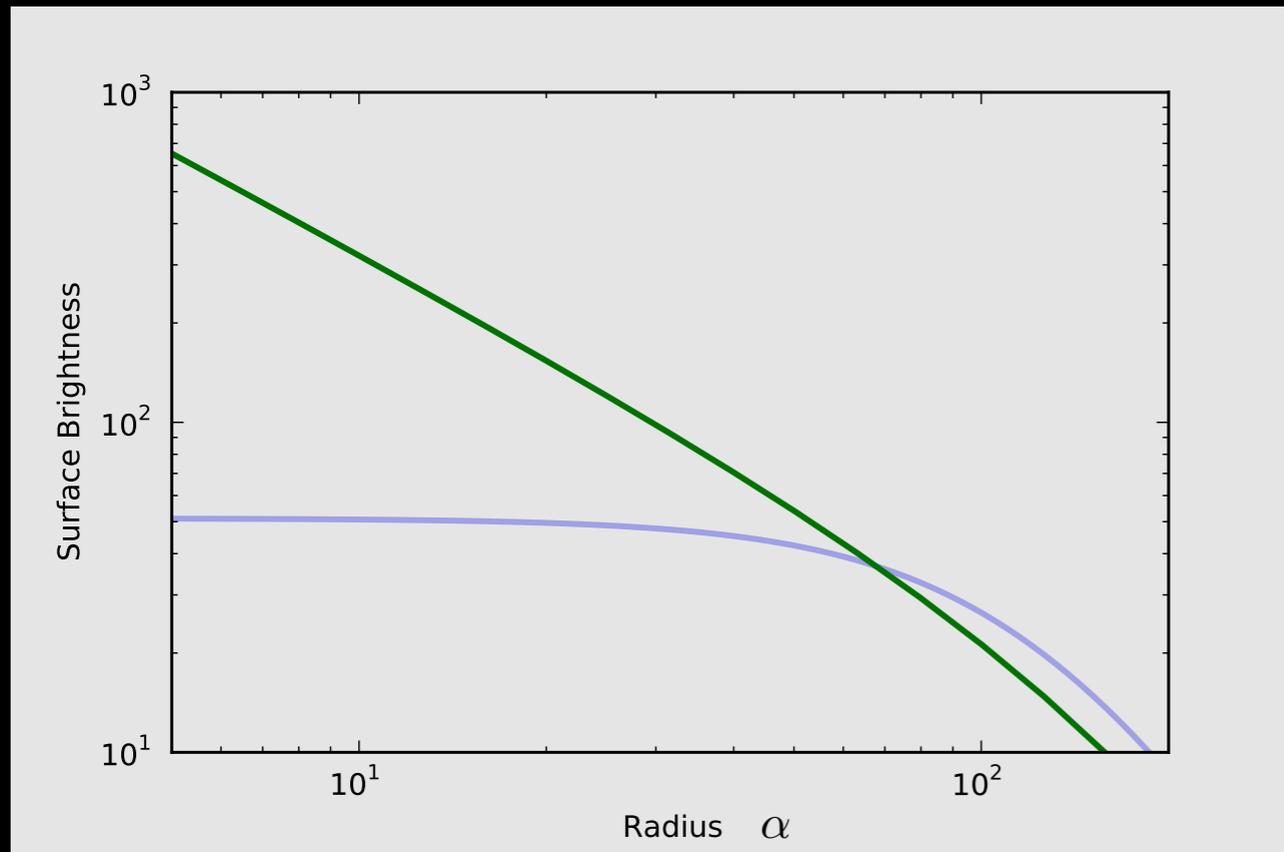


SGR J1550-5418  
(NASA/Swift/Halpern)

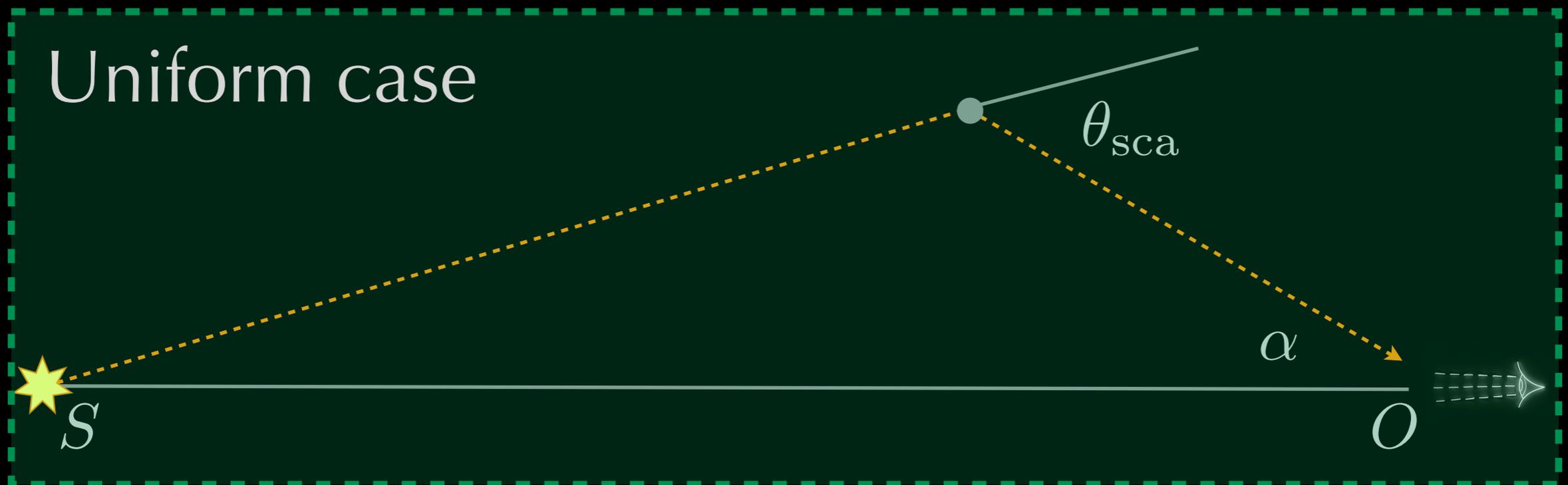
## Screen case



# X-ray scattering is a diagnostic tool for ISM structure

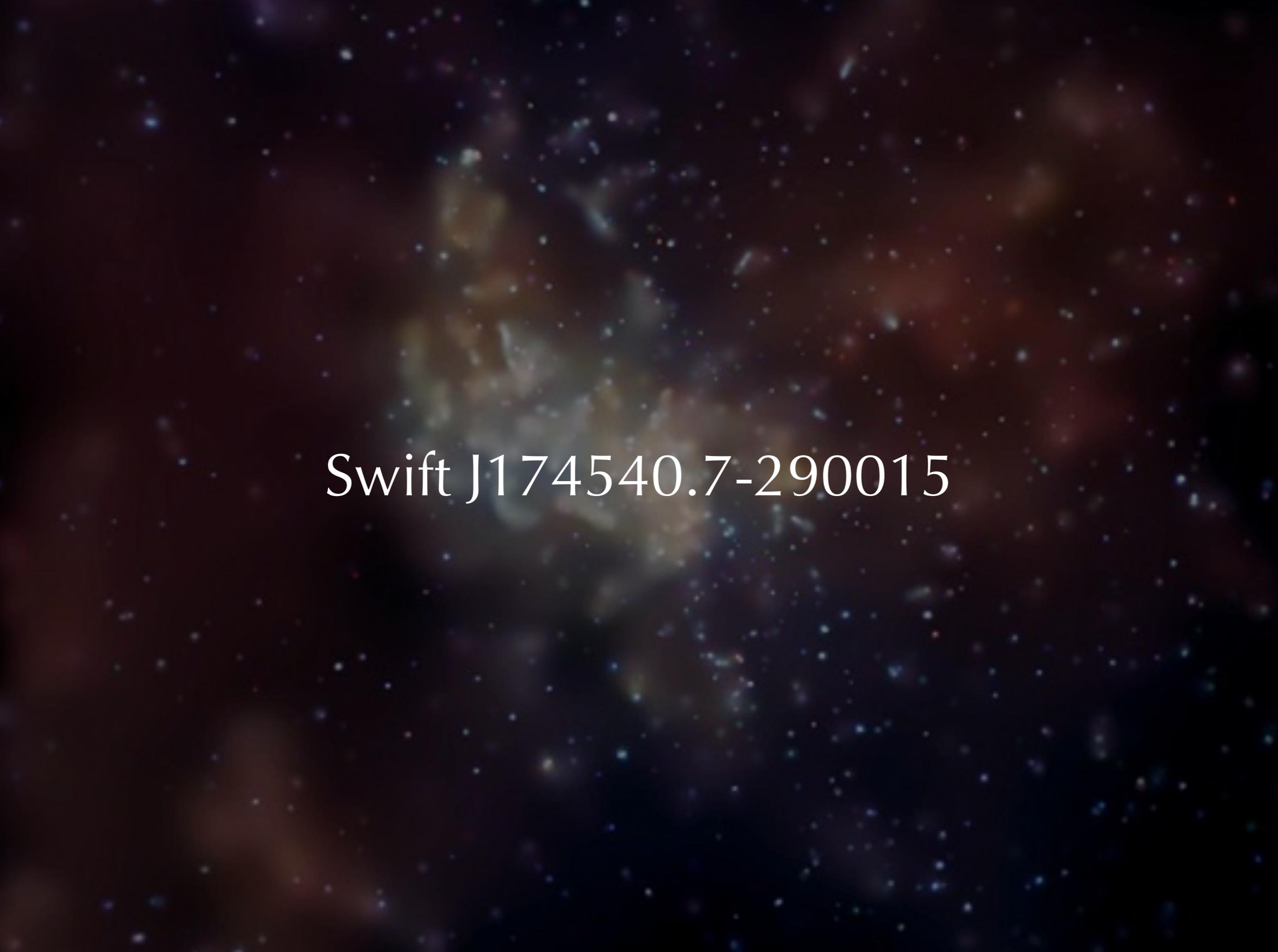


SGR J1550-5418  
(NASA/Swift/Halpern)



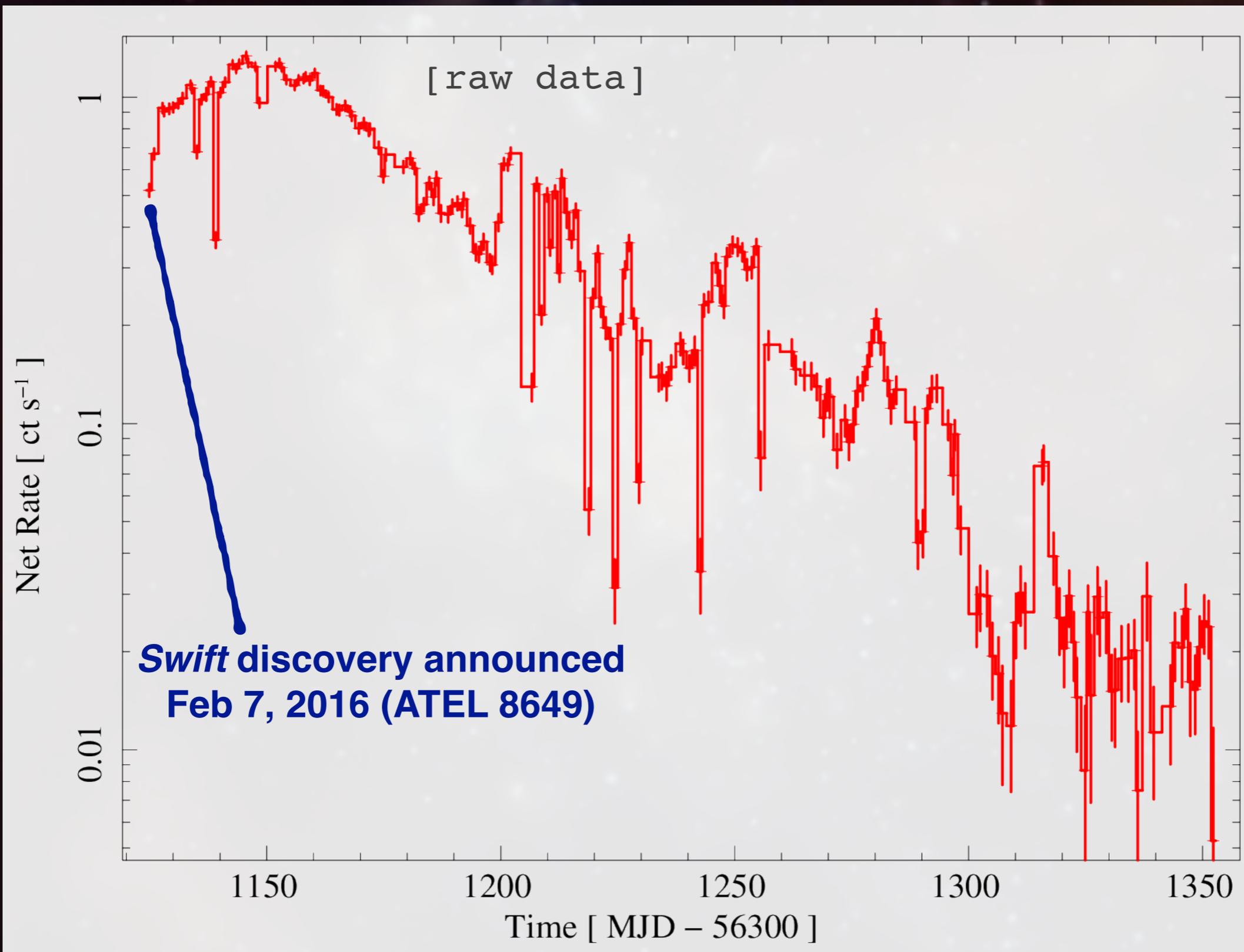


Use **X-ray transients** in the Galactic Center  
to **map foreground dust structure** affecting X-ray images  
so we can **apply this knowledge to Sgr A\***

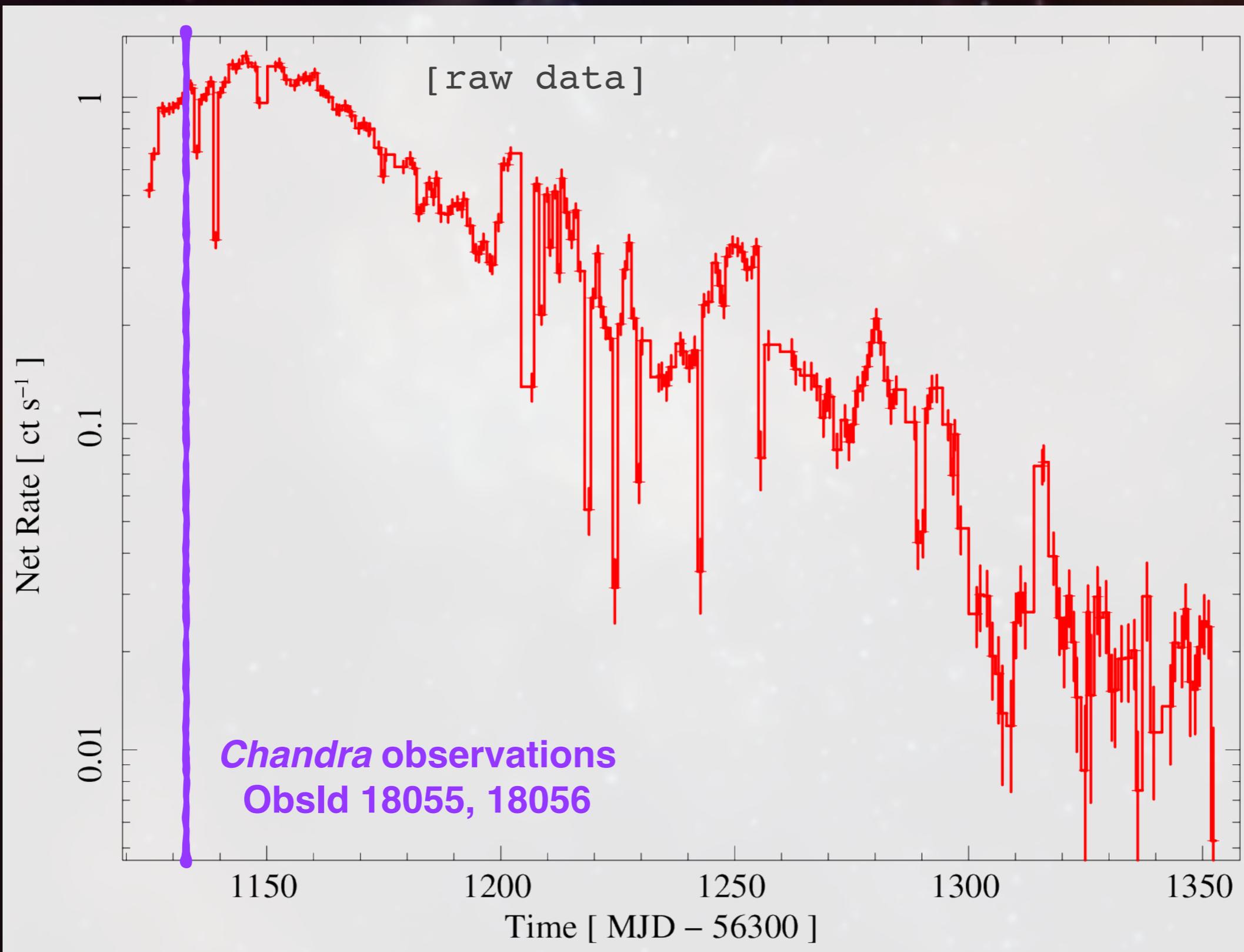


Swift J174540.7-290015

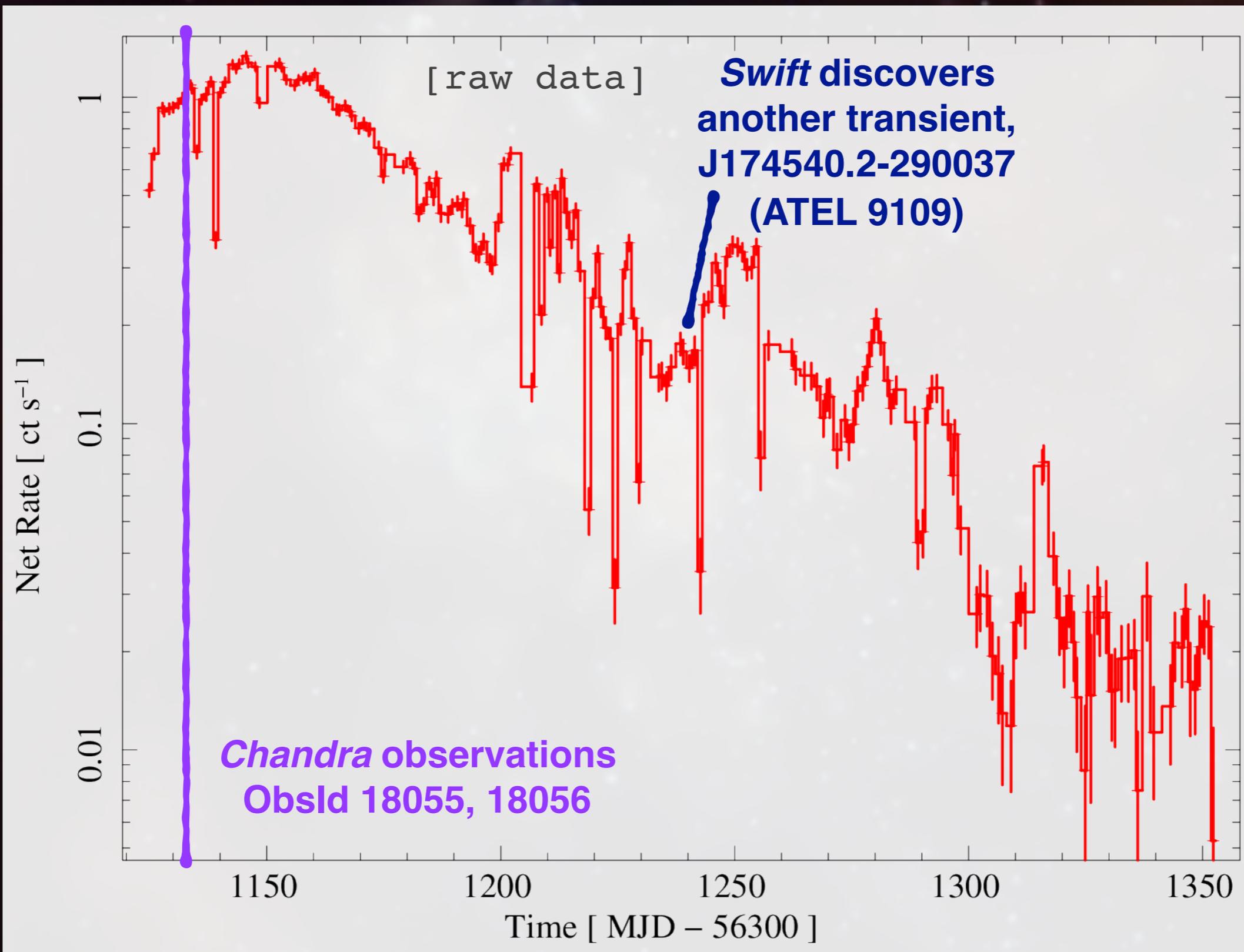
# Swift Galactic Center monitoring campaign



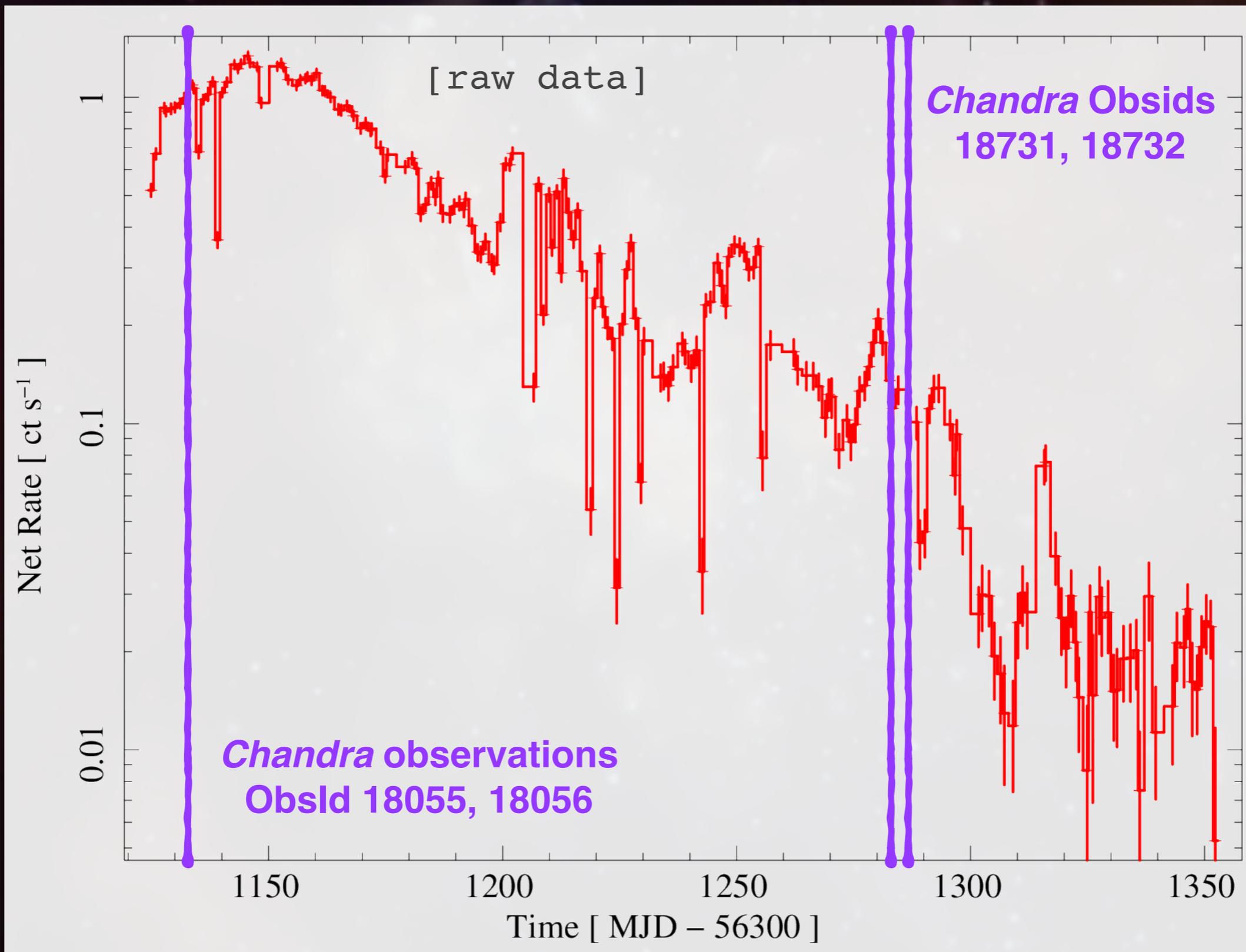
# Swift Galactic Center monitoring campaign

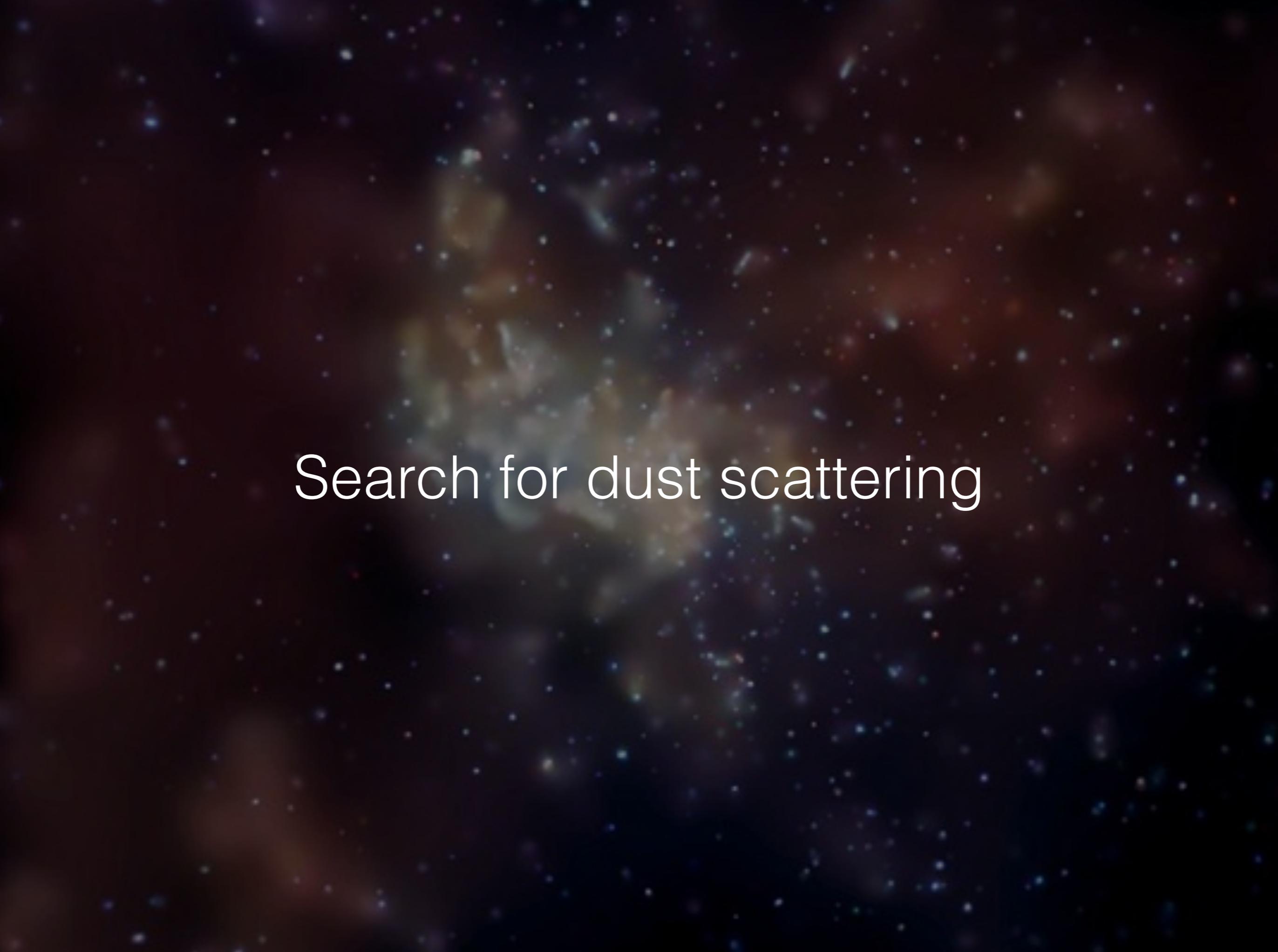


# Swift Galactic Center monitoring campaign

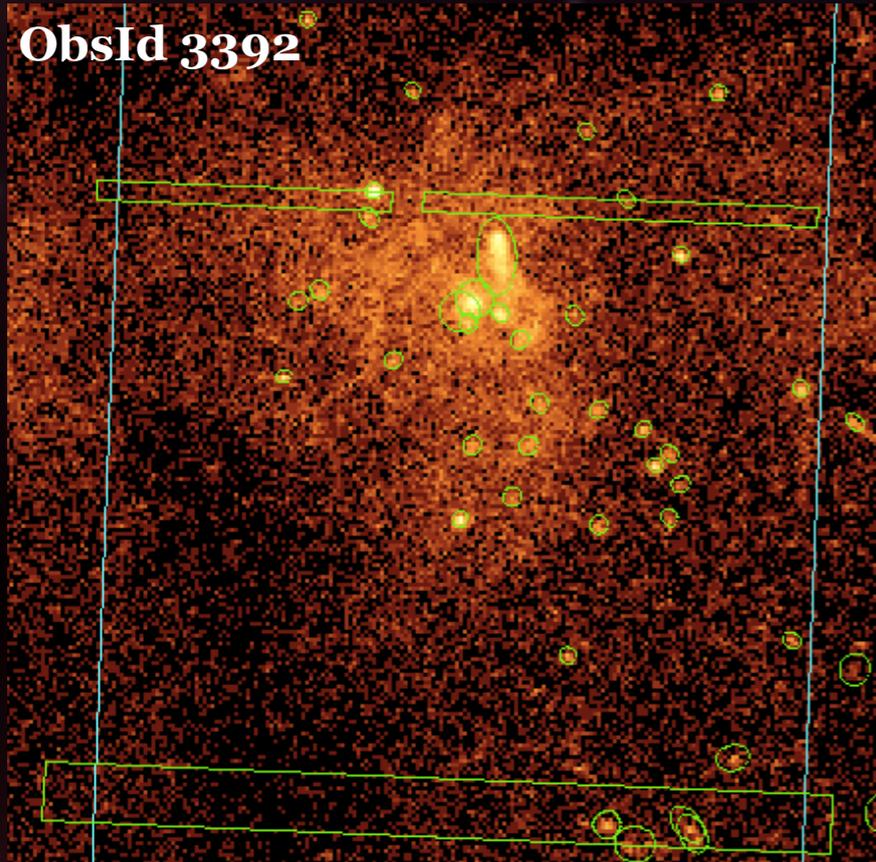


# Swift Galactic Center monitoring campaign

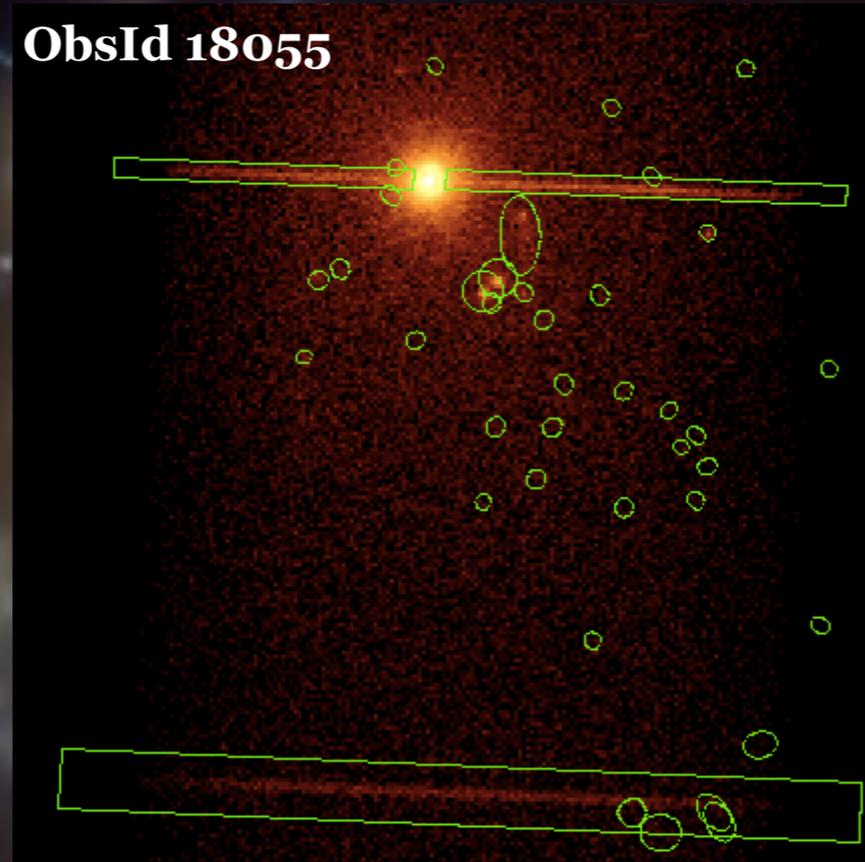




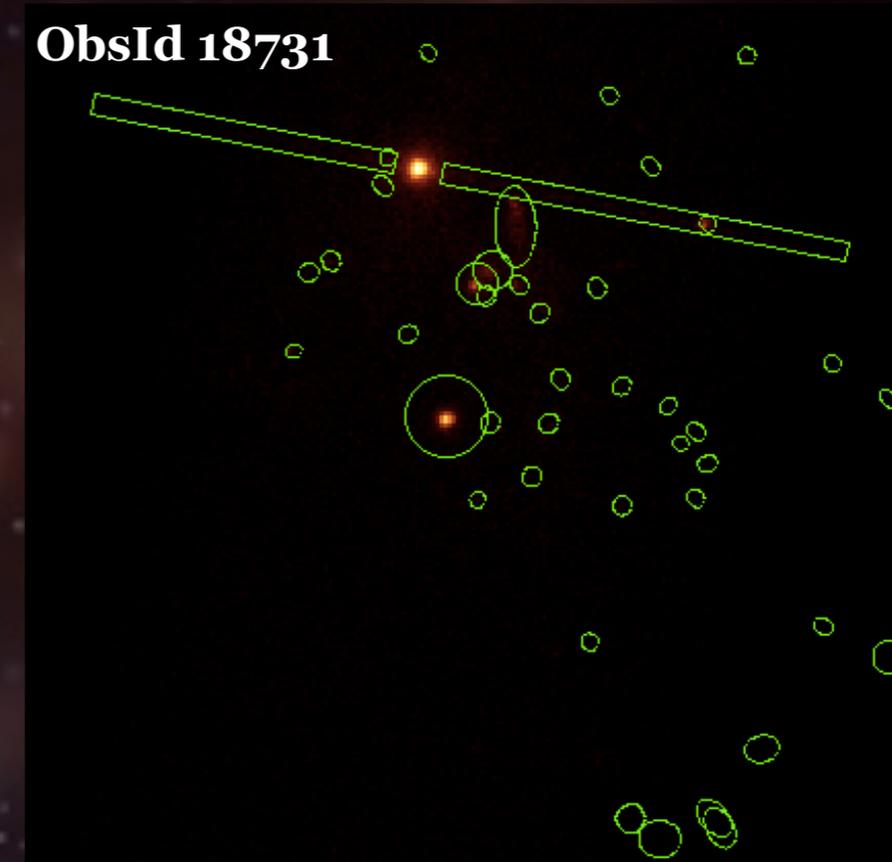
Search for dust scattering



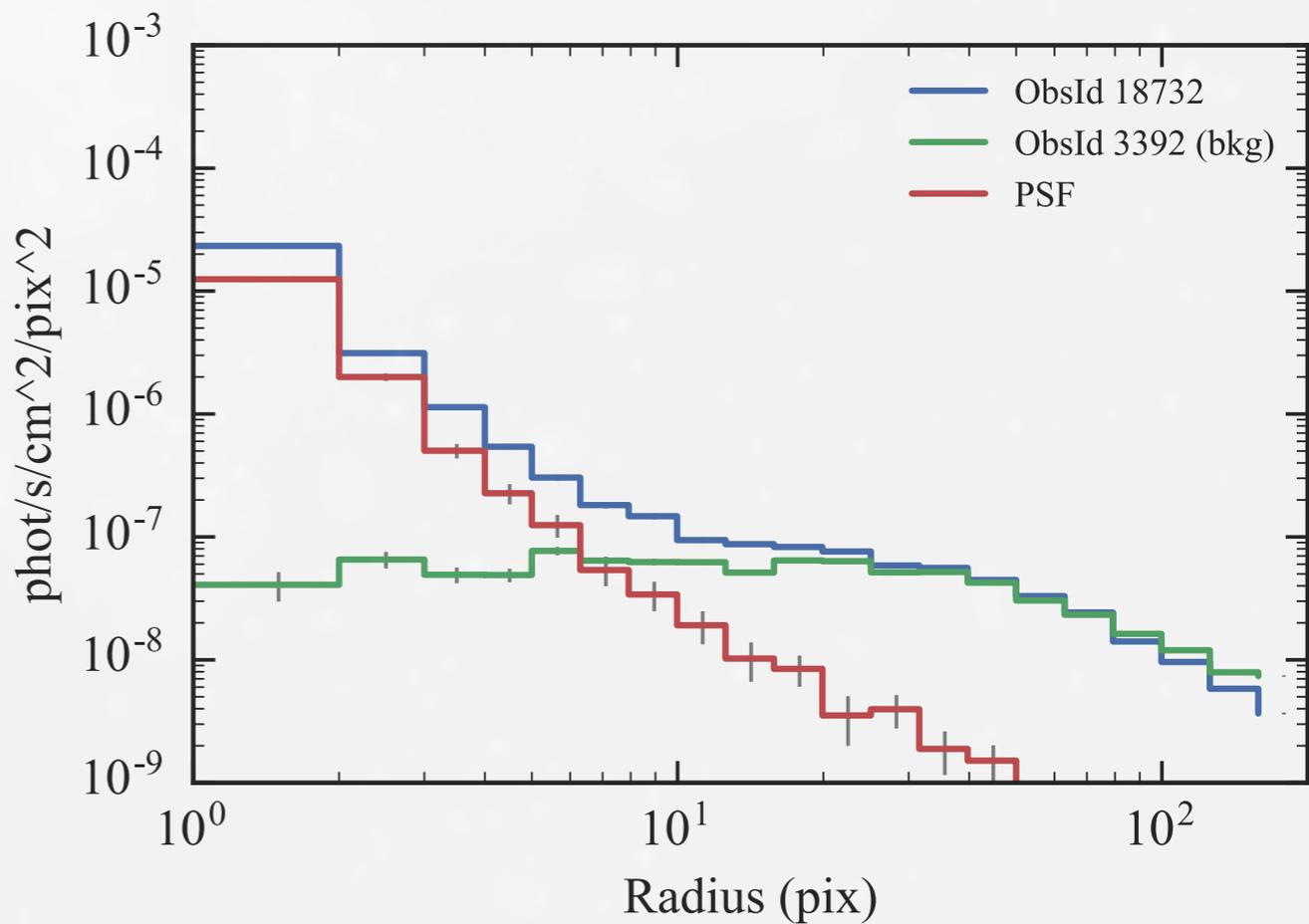
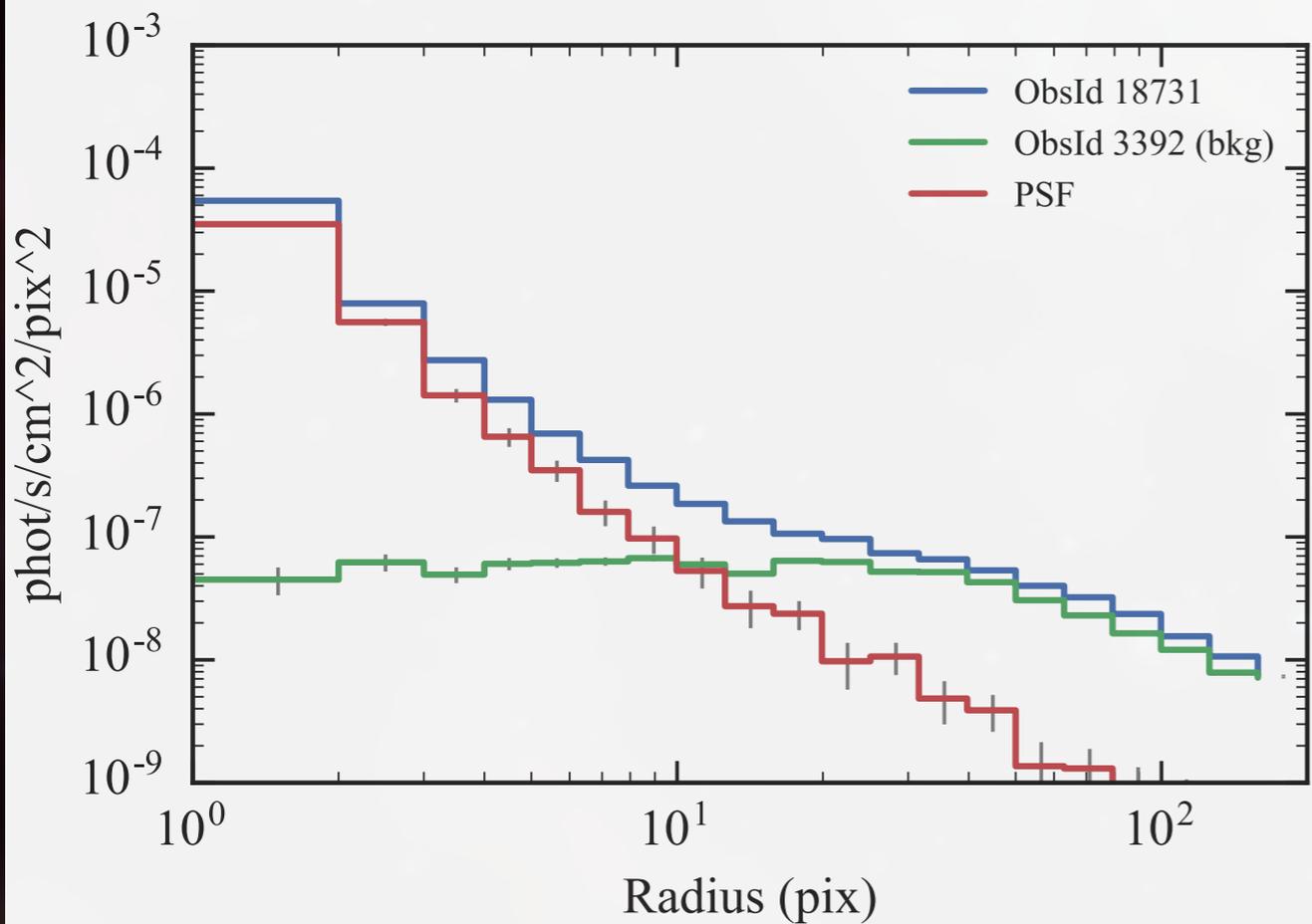
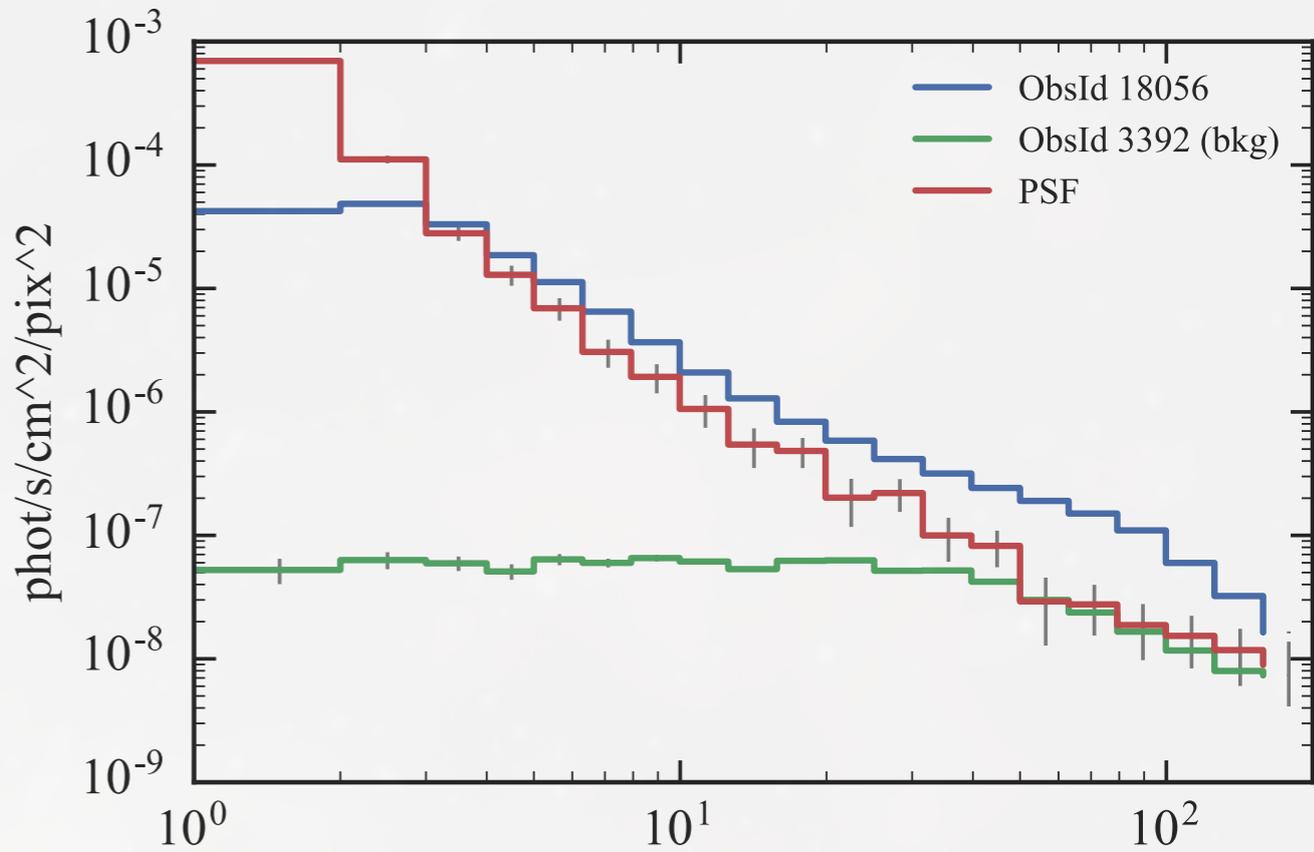
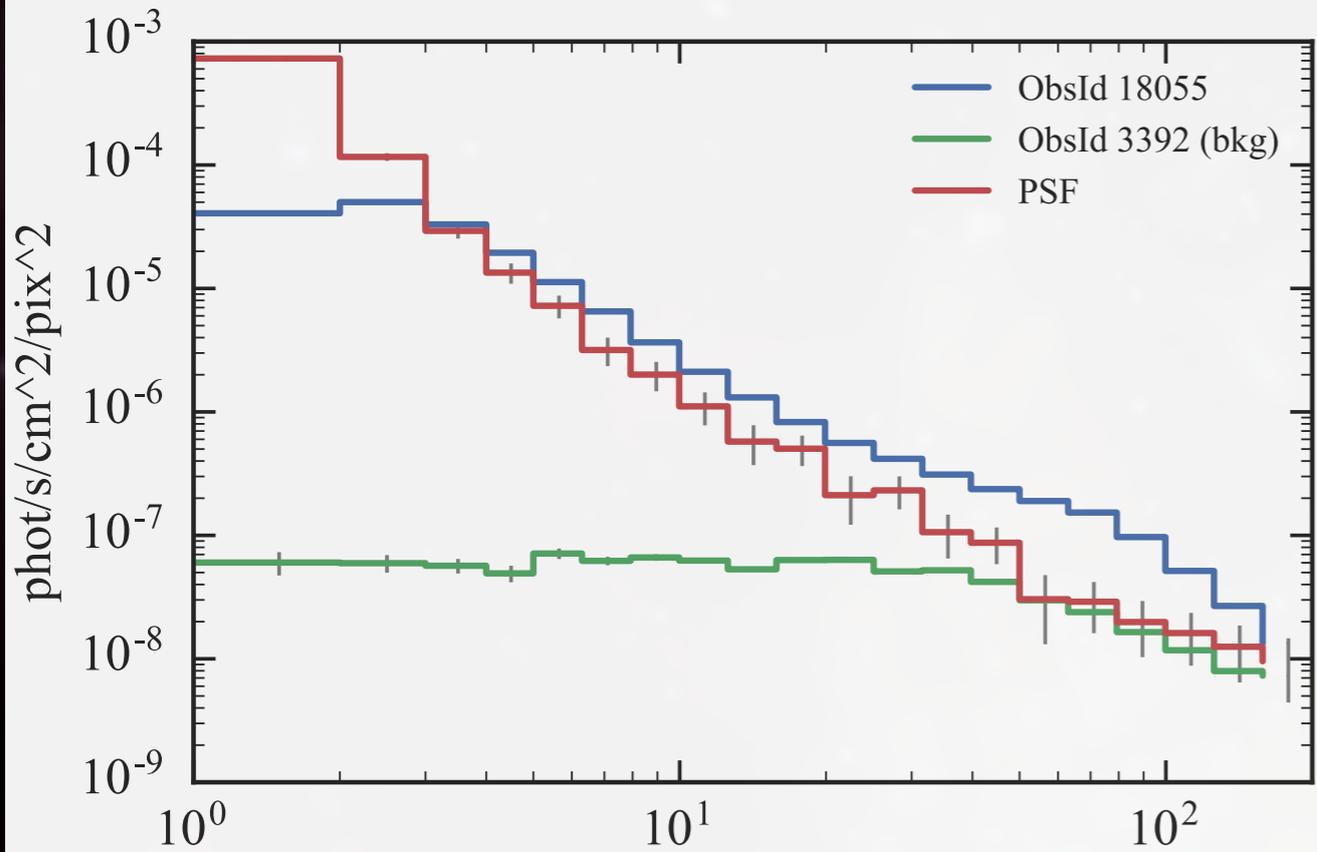
background

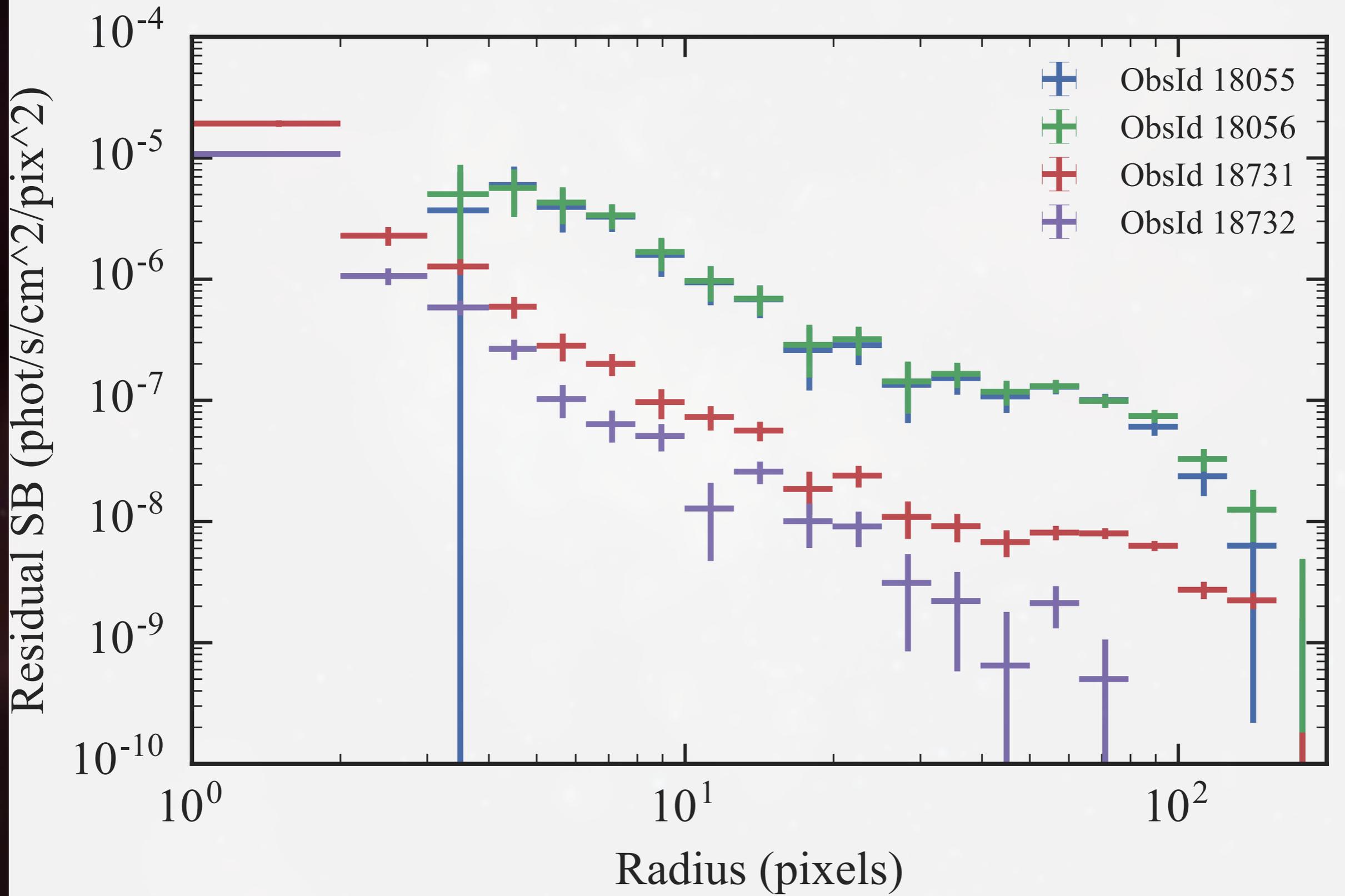


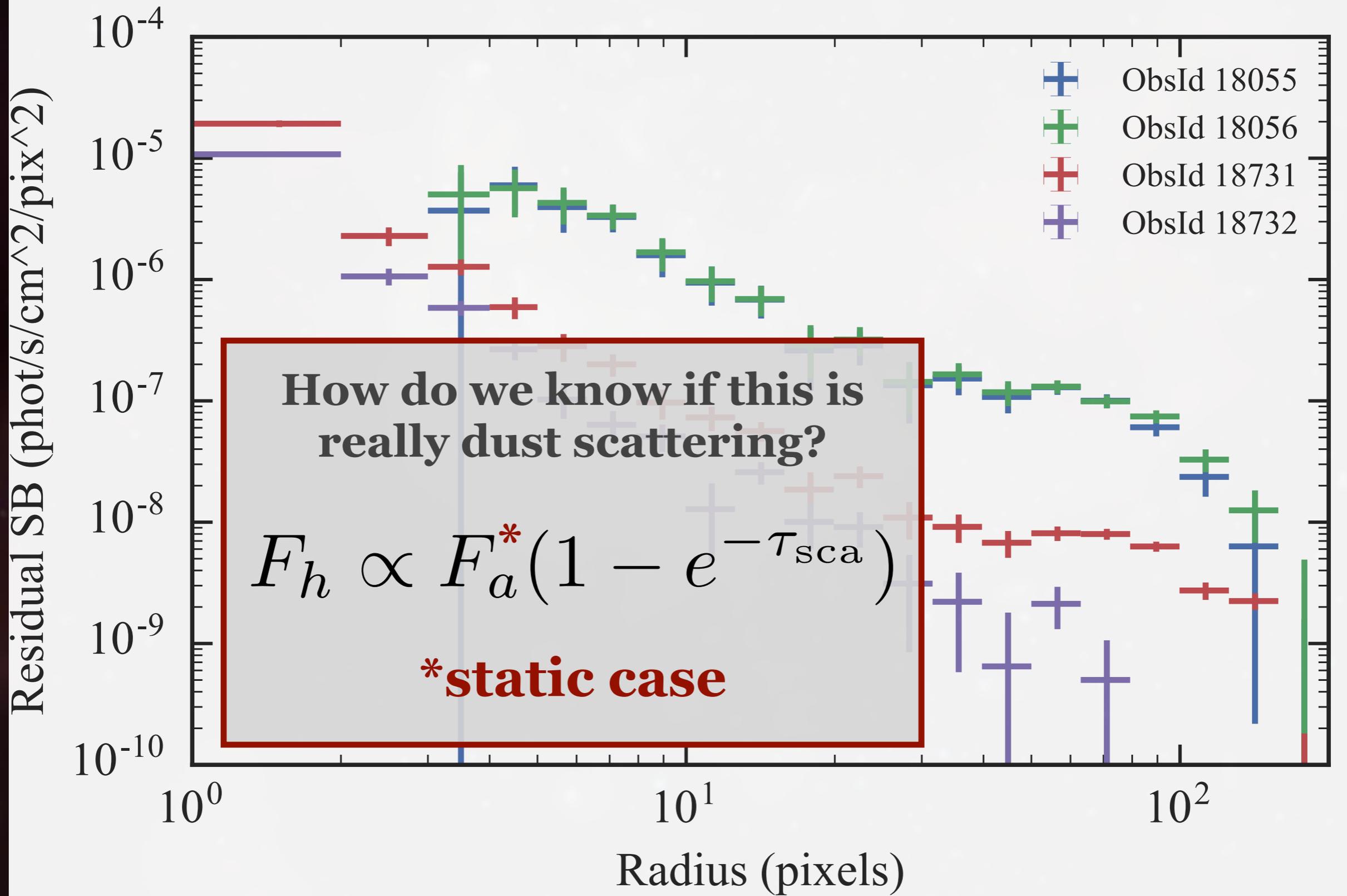
J174540.7-290015 profiles

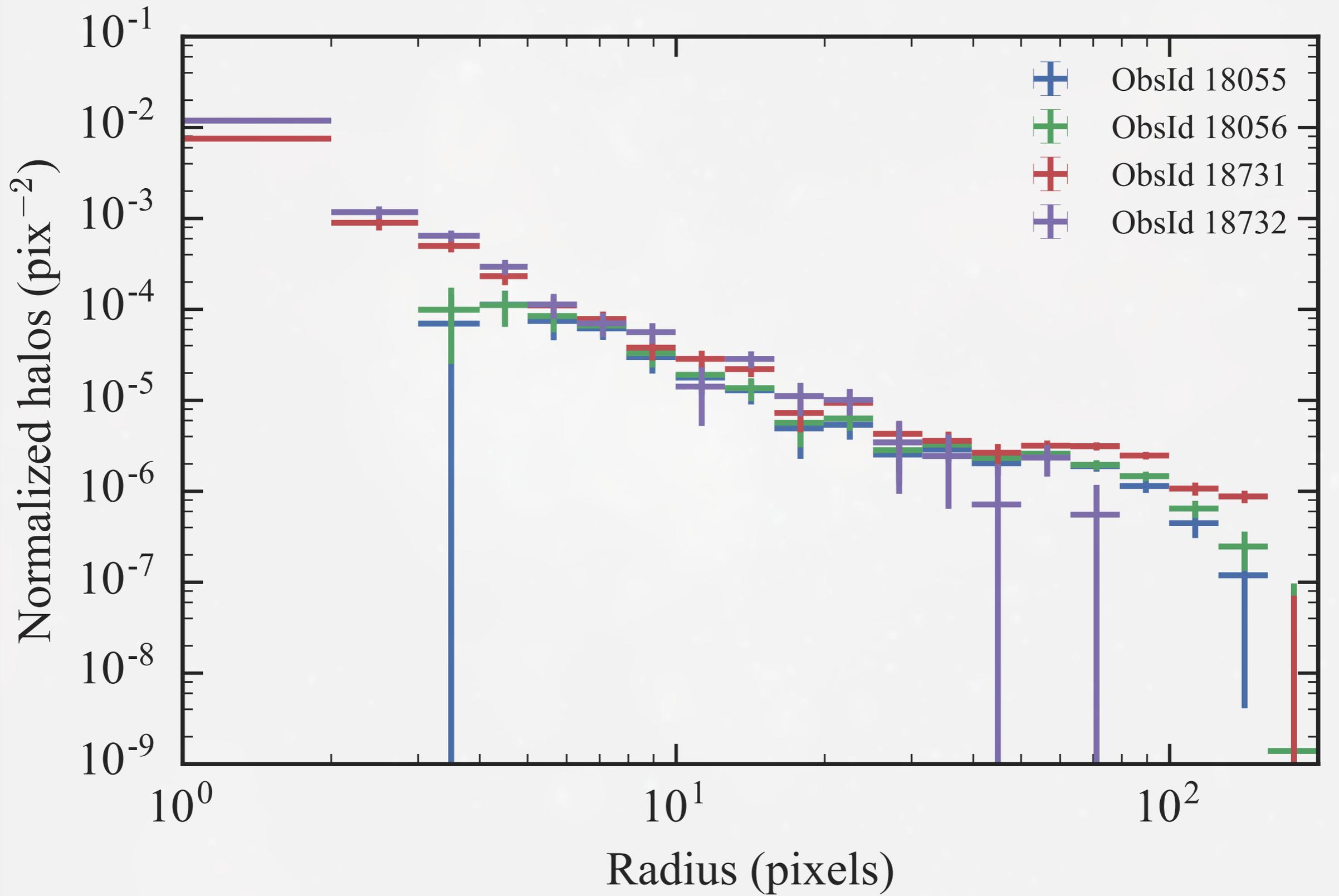


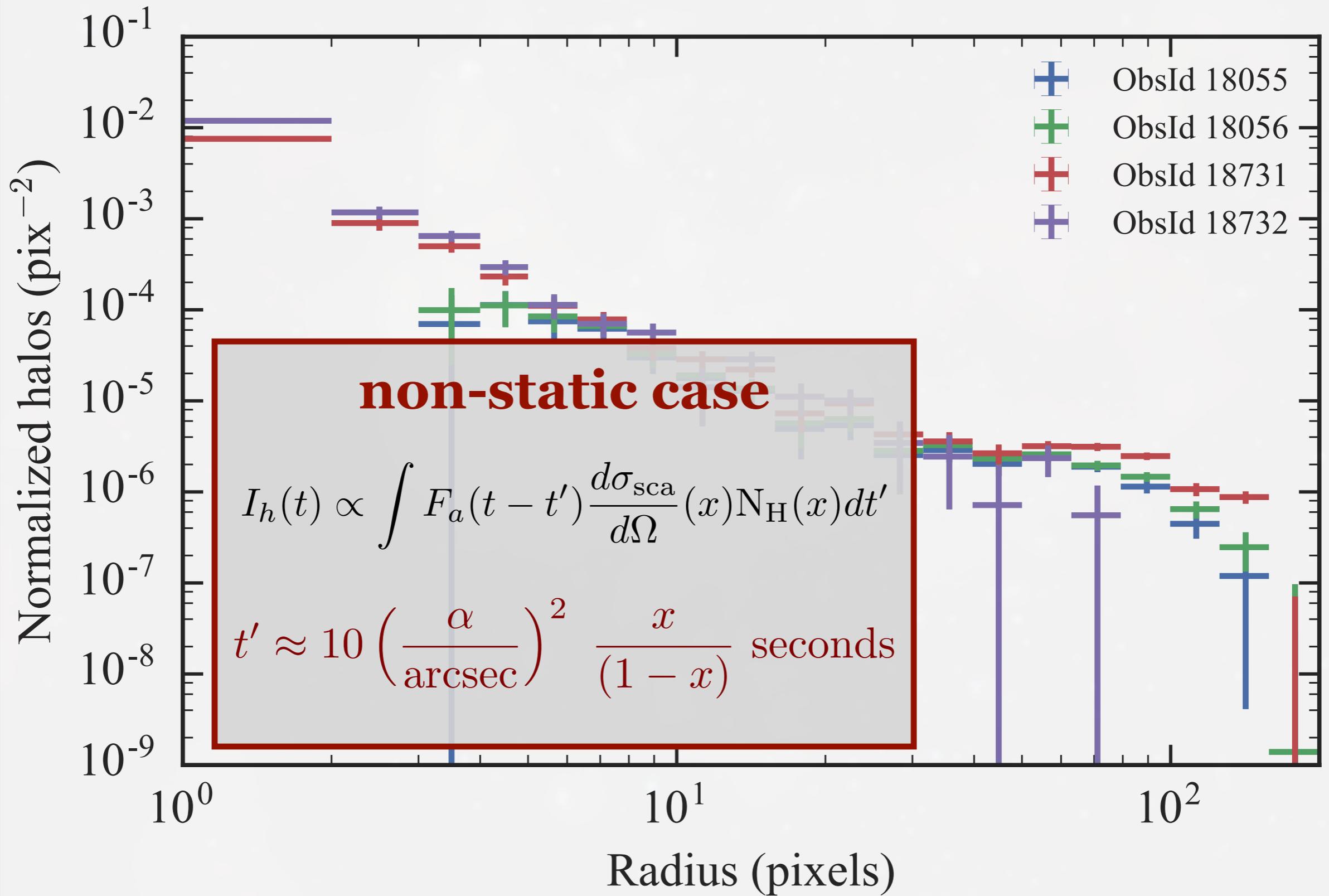
PSF constructed with  
a low-NH source as template  
(QSO B1028+511)

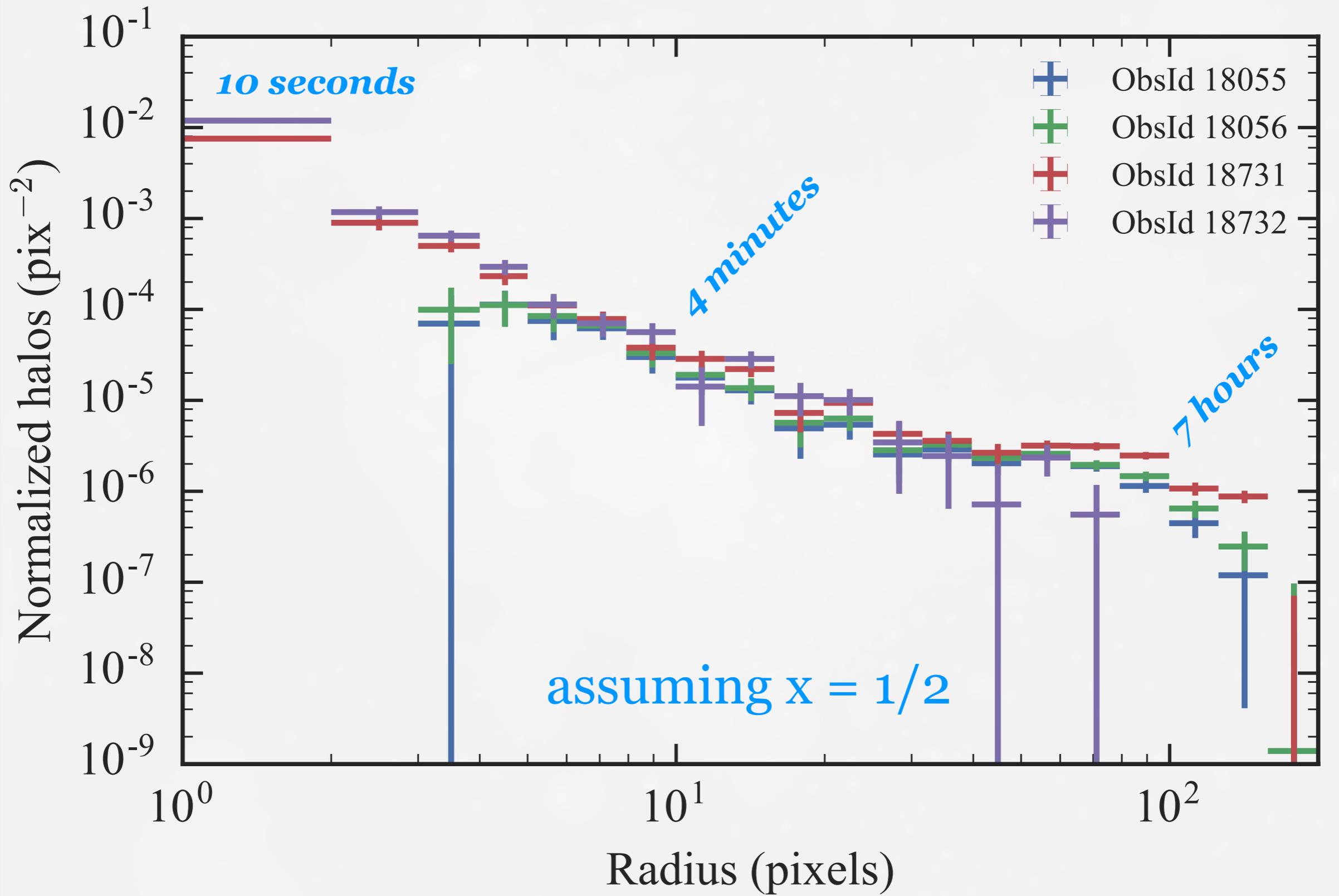












The background of the slide is a deep space photograph. It features a dense field of stars of various colors, including blue, white, and red. In the center-left area, there is a large, bright, yellowish-white nebula with a complex, filamentary structure. The overall scene is dark, with the stars and nebula providing the primary light source.

# Summary

**Residual surface brightness**  
around SWIFT J174540.7-290015  
is **consistent with X-ray scattering**  
from foreground dust

The background of the slide is a deep-field astronomical image showing a vast field of stars. The stars are densely packed in some areas and more sparse in others. A prominent feature is a large, diffuse, and somewhat irregularly shaped region of enhanced brightness in the center-left area, which is the source of the text. This region has a yellowish-white core that fades into a blueish-purple glow. The rest of the field is filled with individual stars of various colors, including blue, white, and red, set against a dark, almost black background.

**Residual surface brightness**  
around SWIFT J174540.7-290015  
is **consistent with X-ray scattering**  
from foreground dust

Go into the **time domain**  
to pin down **locations** of foreground dust

**Residual surface brightness**  
around SWIFT J174540.7-290015  
is **consistent with X-ray scattering**  
from foreground dust

Go into the **time domain**  
to pin down **locations** of foreground dust

Compare to **radio** and **infrared** datasets

**Residual surface brightness**  
around SWIFT J174540.7-290015  
is **consistent with X-ray scattering**  
from foreground dust

Go into the **time domain**  
to pin down **locations** of foreground dust

Compare to **radio** and **infrared** datasets

**Apply** dust scattering effects to **Sgr A\***

**Residual surface brightness**  
around SWIFT J174540.7-290015  
is **consistent with X-ray scattering**  
from foreground dust

Go into the **time domain**  
to pin down **locations** of foreground dust

Compare to **radio** and **infrared** datasets

**Apply** dust scattering effects to **Sgr A\***

**Thank you**