



HURTIGRUTEN

Astronomy Voyage

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Happy Equinox!



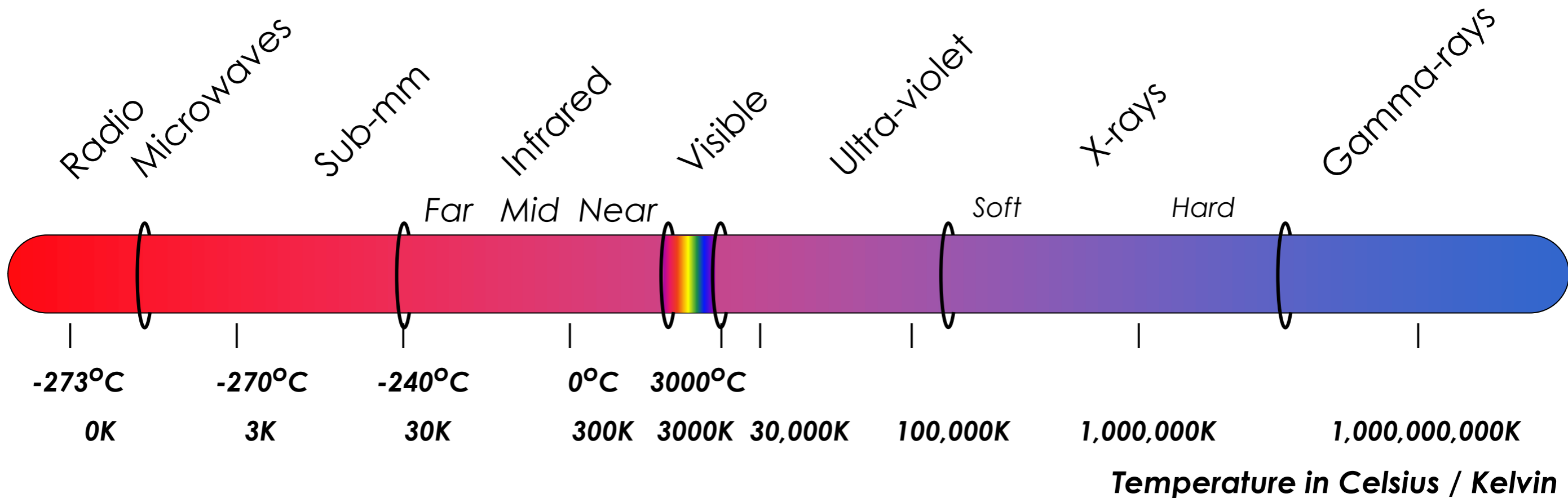
LECTURE PROGRAMME

- Tonight's Night Sky
- Astrophotography
- The Aurora
- The Scale of the Universe
- The birth & death of stars & galaxies
- **The violent Universe**
- **Modern Astronomy: Life as a
Astronomer & Tools of the Trade**
- **Why We Are Here: A 13.8-billion
year-old story**

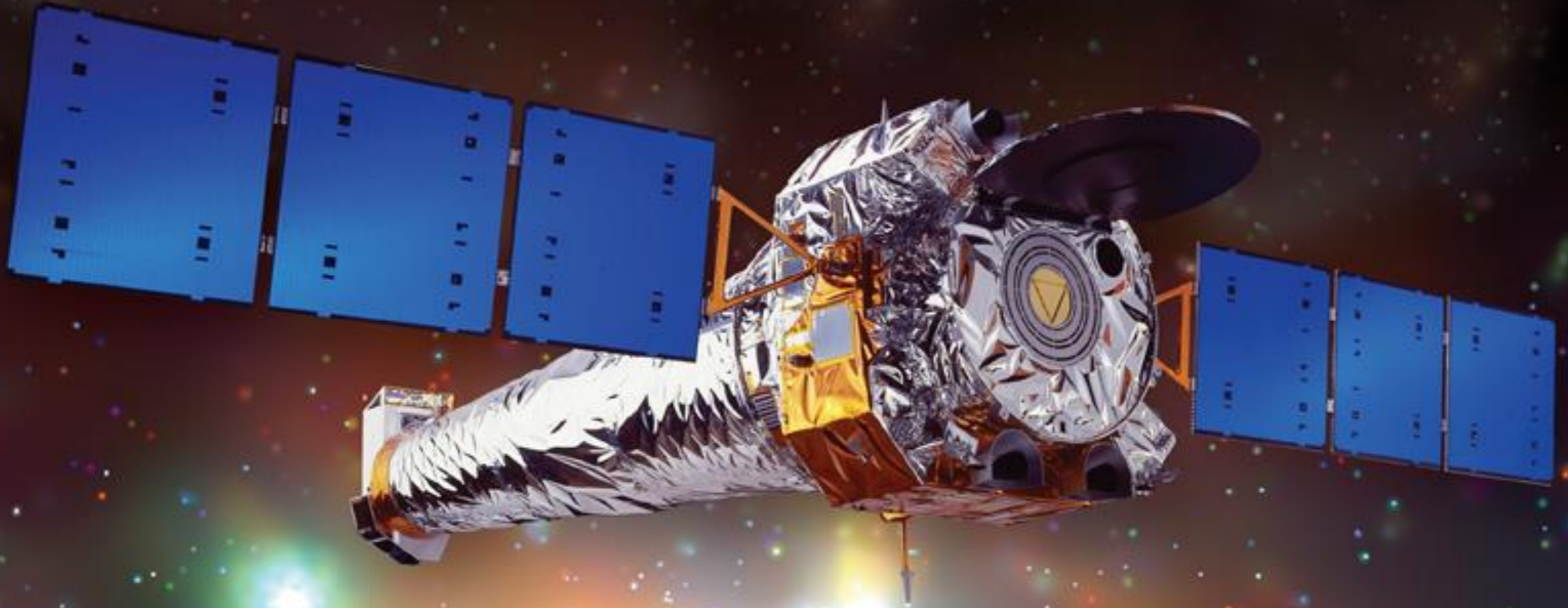


The Electromagnetic Spectrum

Gas at different temperatures, emit light at different wavelengths.



NASA's Chandra



00.07





ESA's XMM-Newton



Visible Light

Crab Nebula >

Pleiades >

Moon >

Aldebaran >

} Hyades

Betelgeuse >

Orion's belt }

Orion Nebula >

< Rigel

< Sirius

Visible Light

Crab Nebula >

Pleiades >

Moon >

Aldebaran >

} Hyades

Betelgeuse >

Orion's belt }

Orion Nebula >

< Rigel

< Sirius

X-ray Light

Crab Nebula >

Pleiades >

Moon >

Aldebaran >

} Hyades

Betelgeuse >

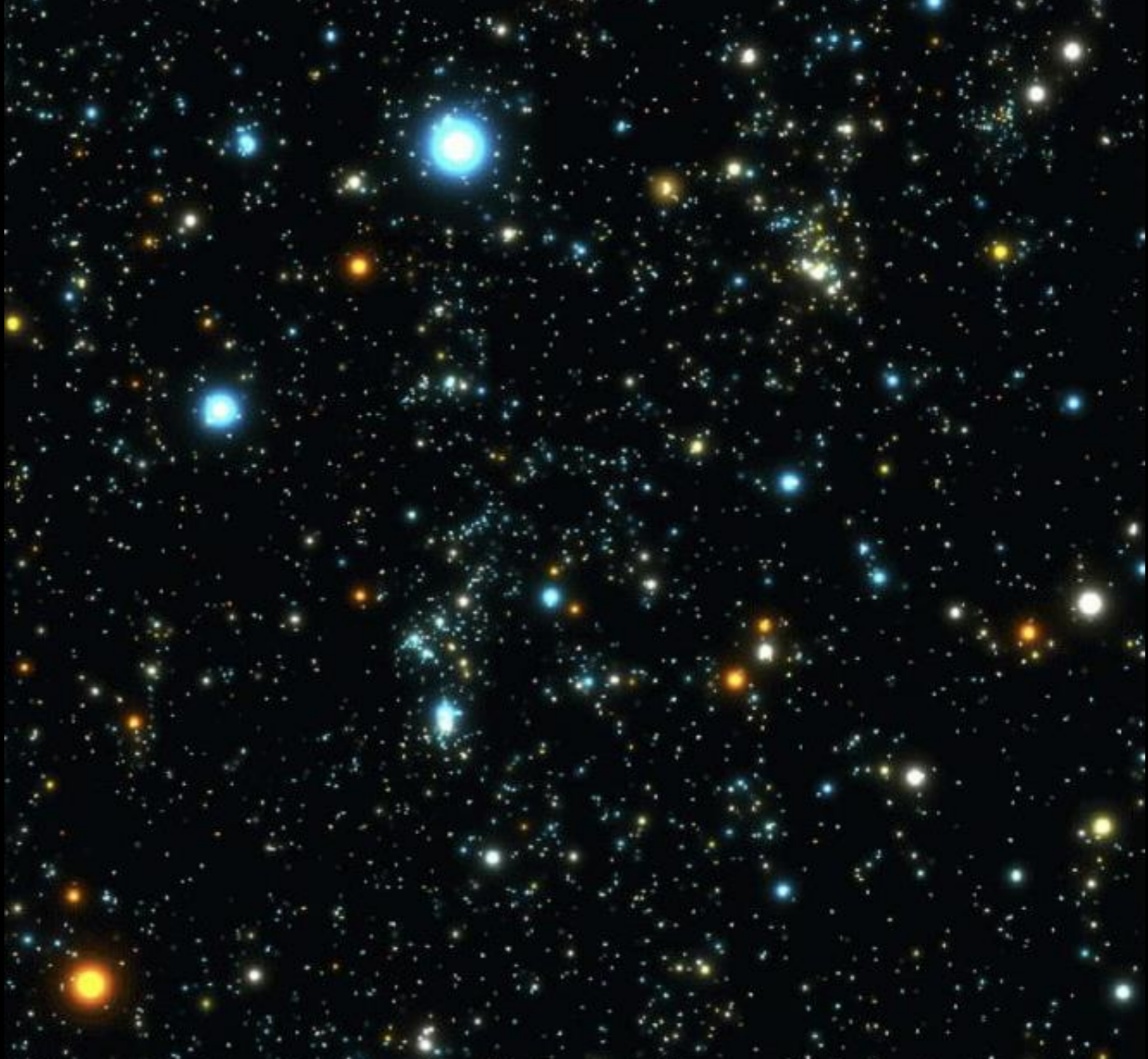
Orion's belt }

Orion Nebula >

< Rigel

< Sirius

X-ray
Light



The Sun through an X-ray telescope

Magnetic
field
loops





Cas A

2000



Cas A

2002



Cas A

2004



Cas A

2007



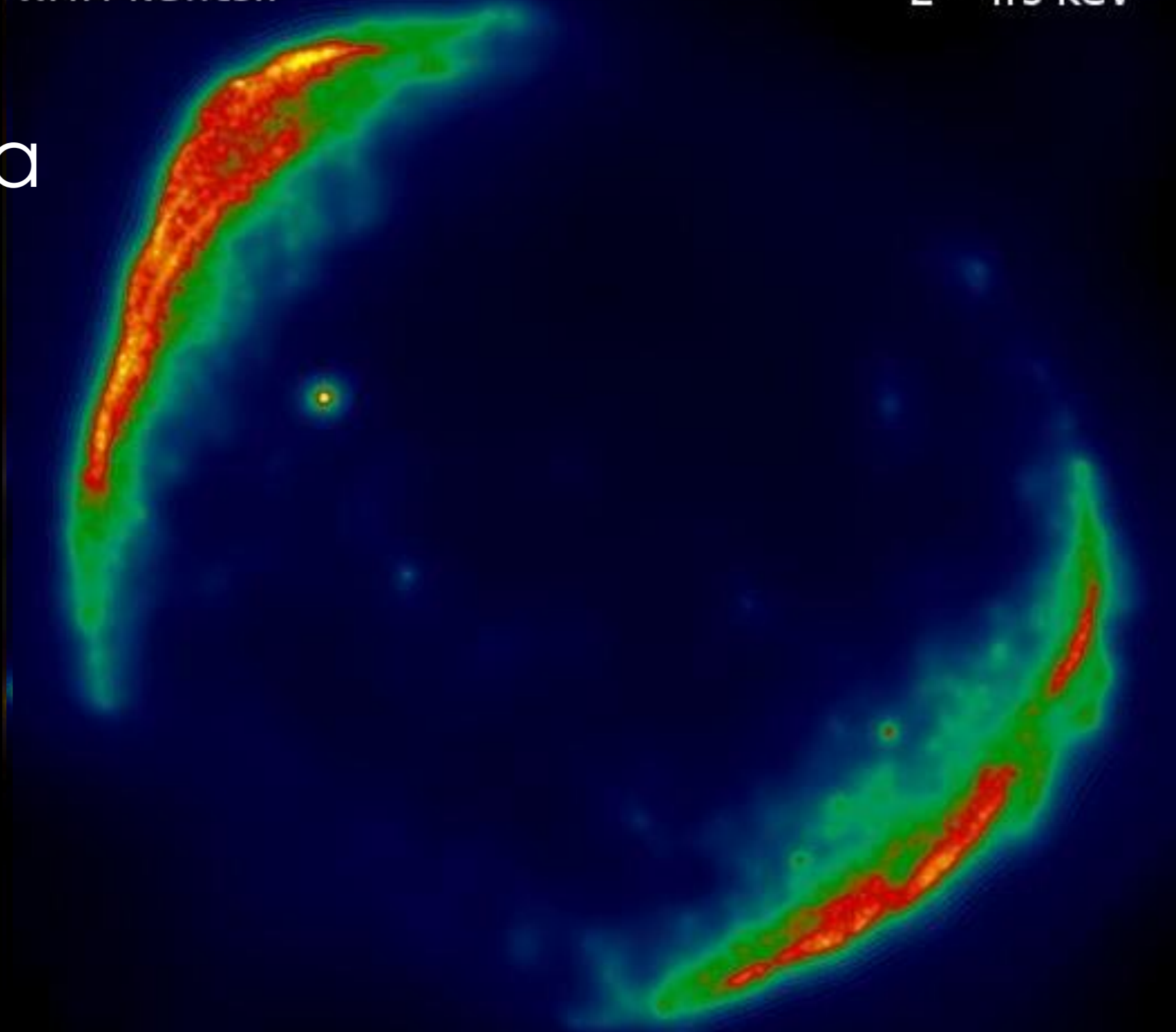
Cas A

2007

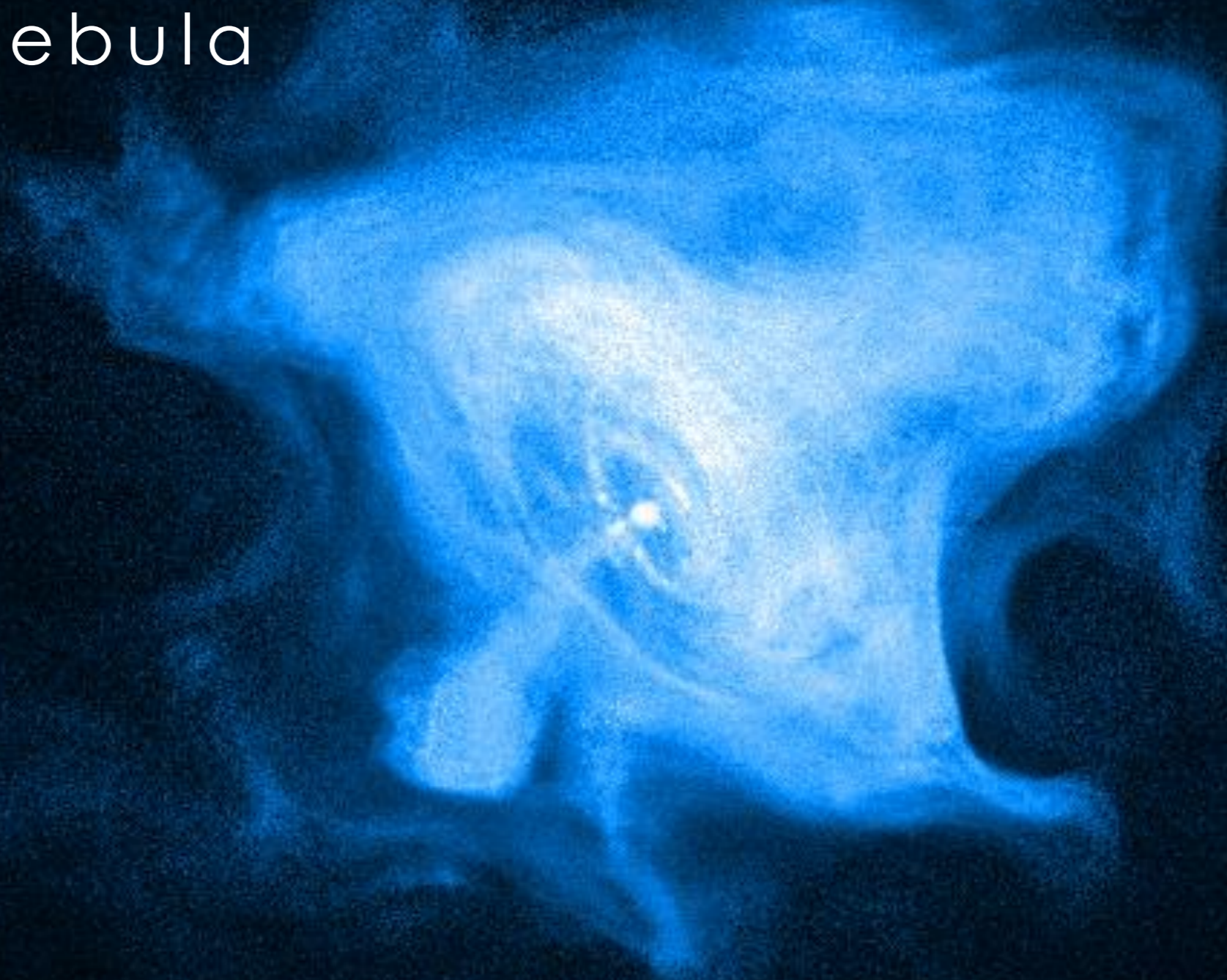
XMM Newton

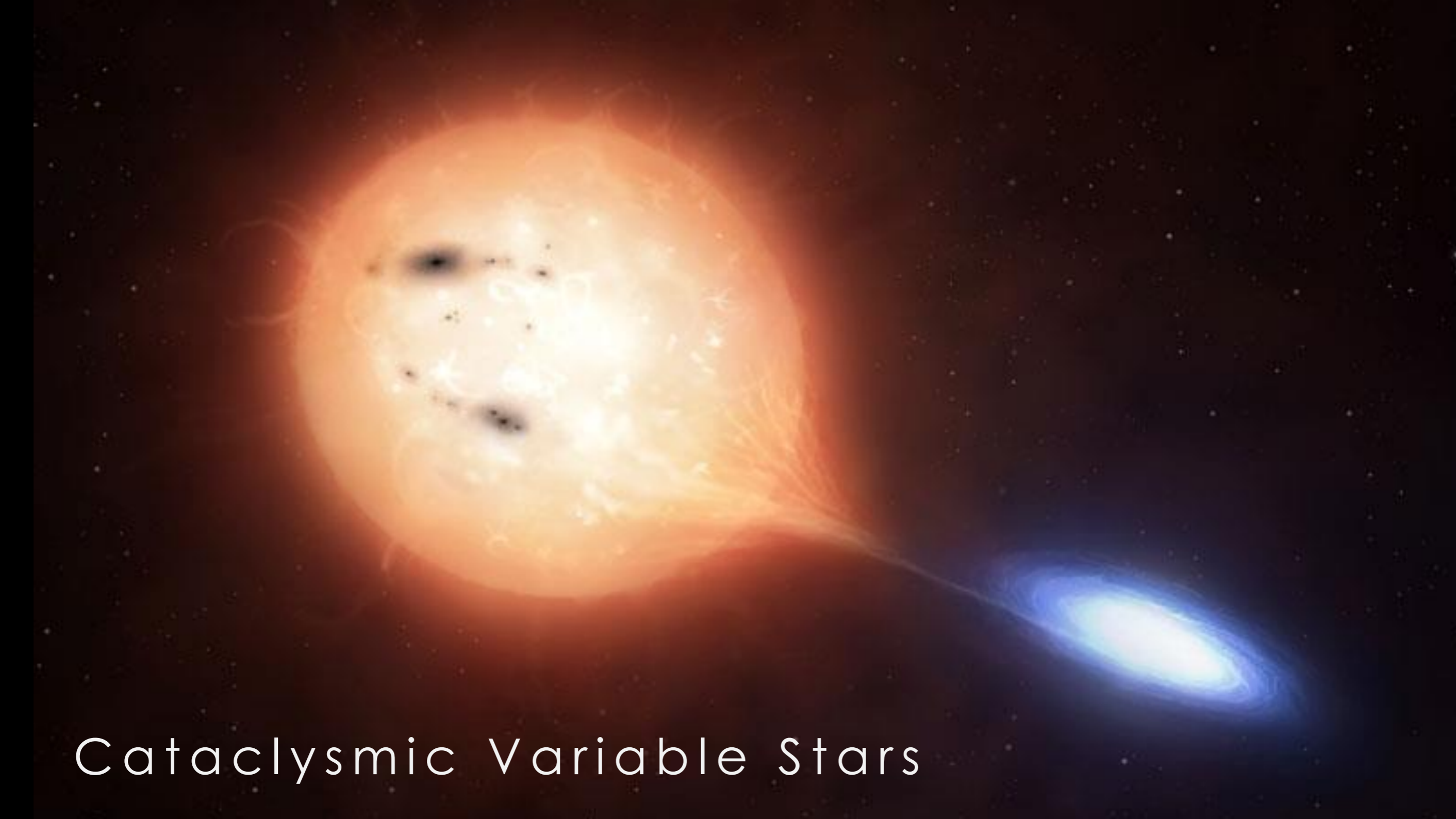
2 - 4.5 keV

Supernova
Remnant
SN1006



Crab Nebula





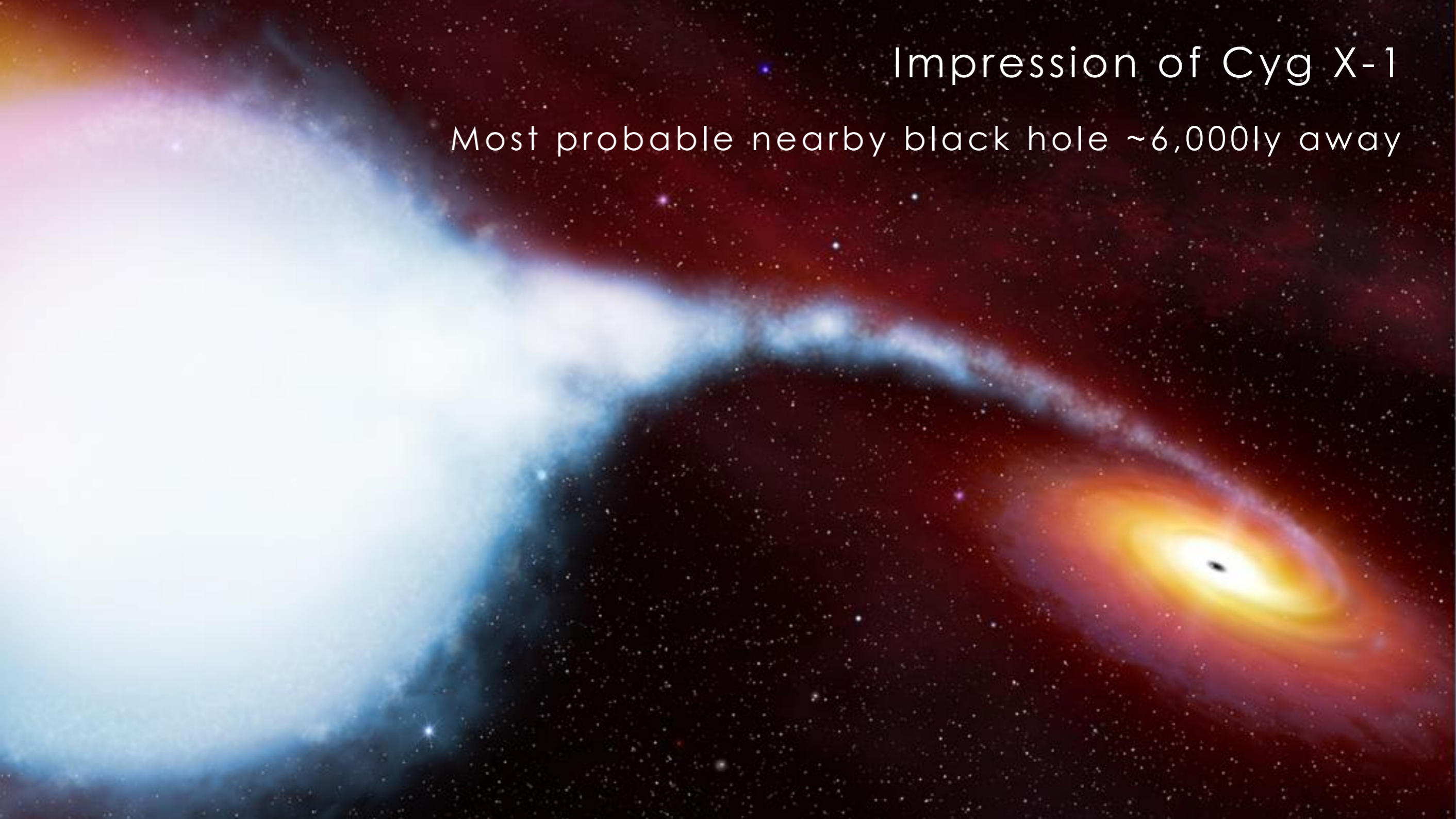
Cataclysmic Variable Stars

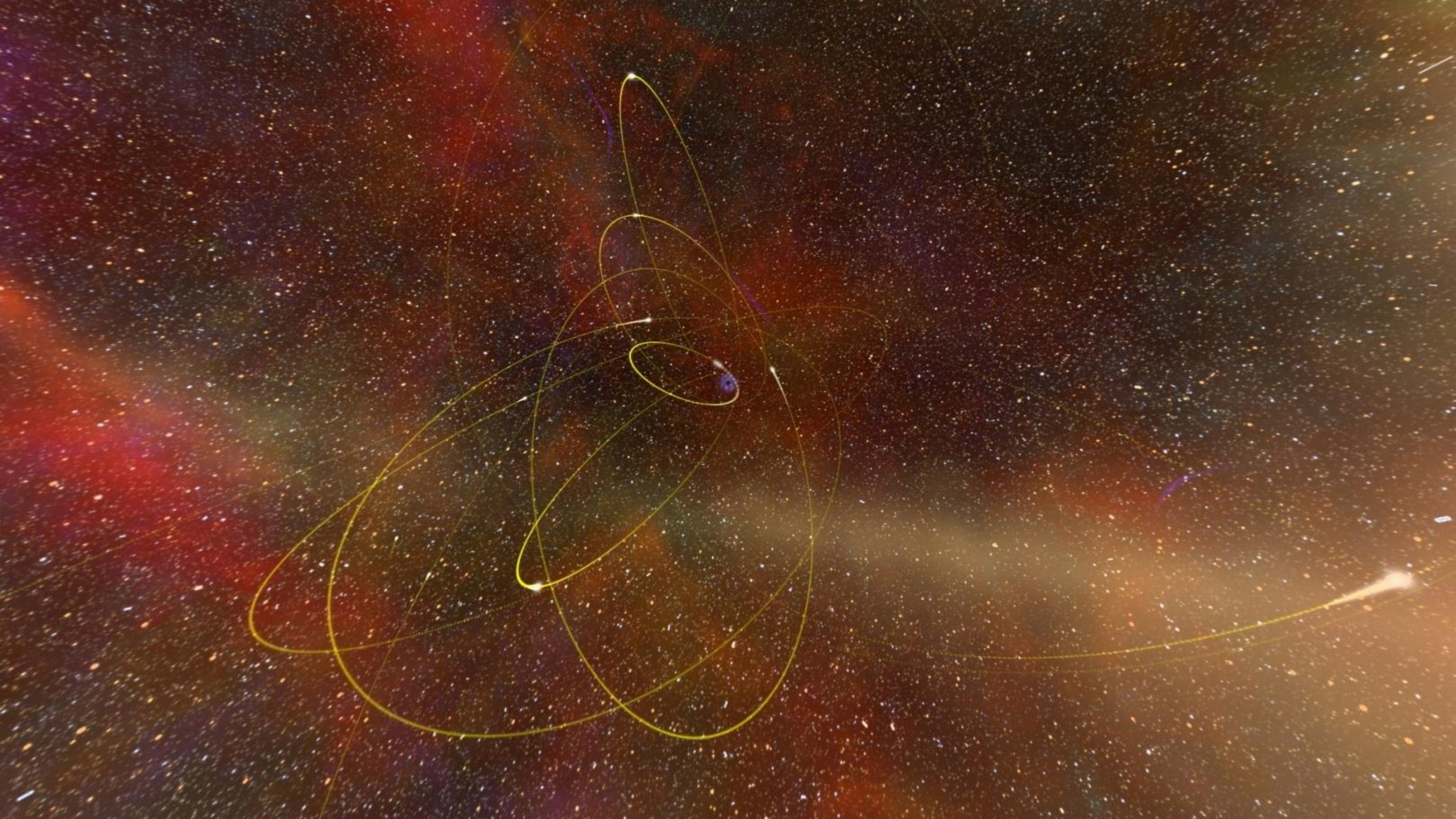
Black Holes

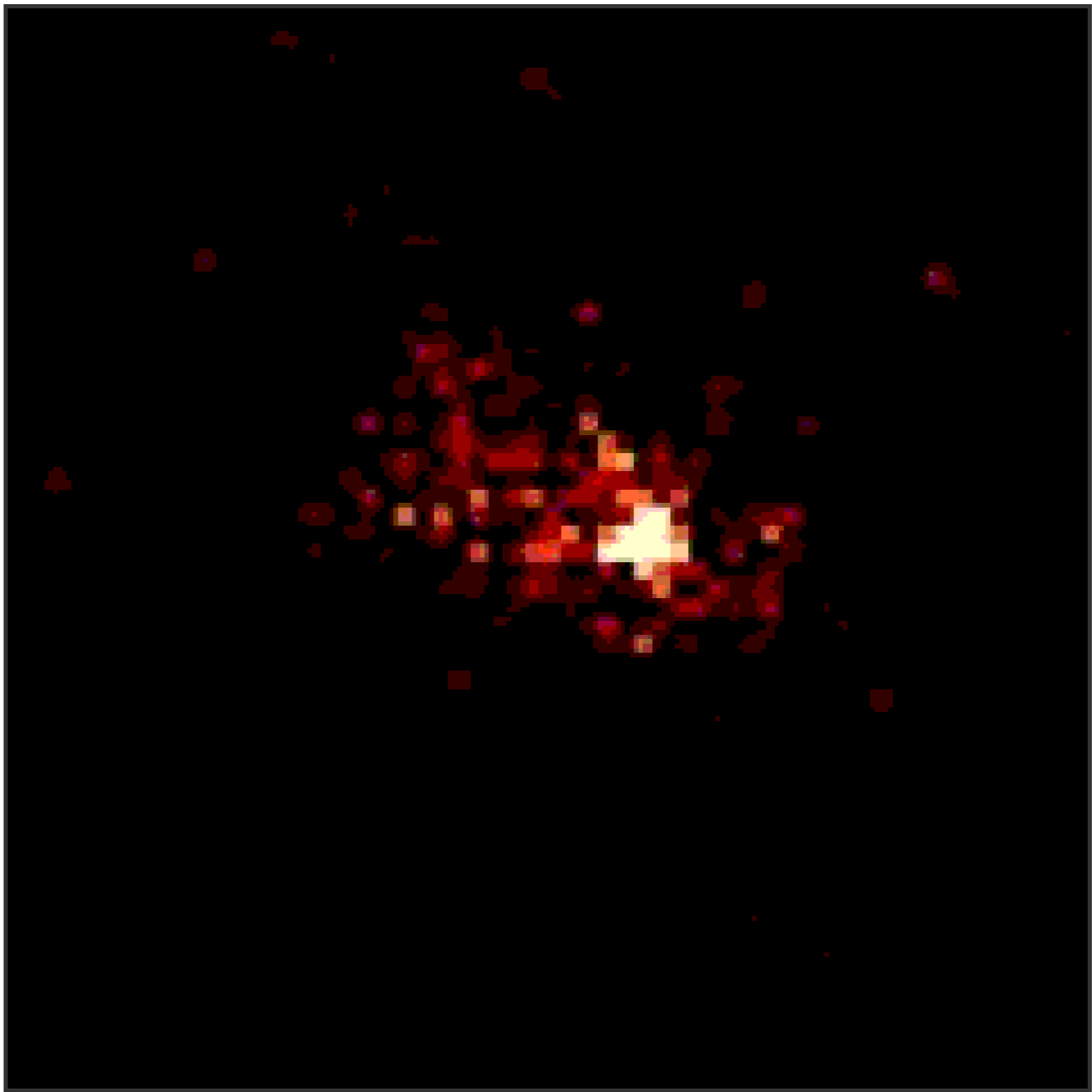


Impression of Cyg X-1

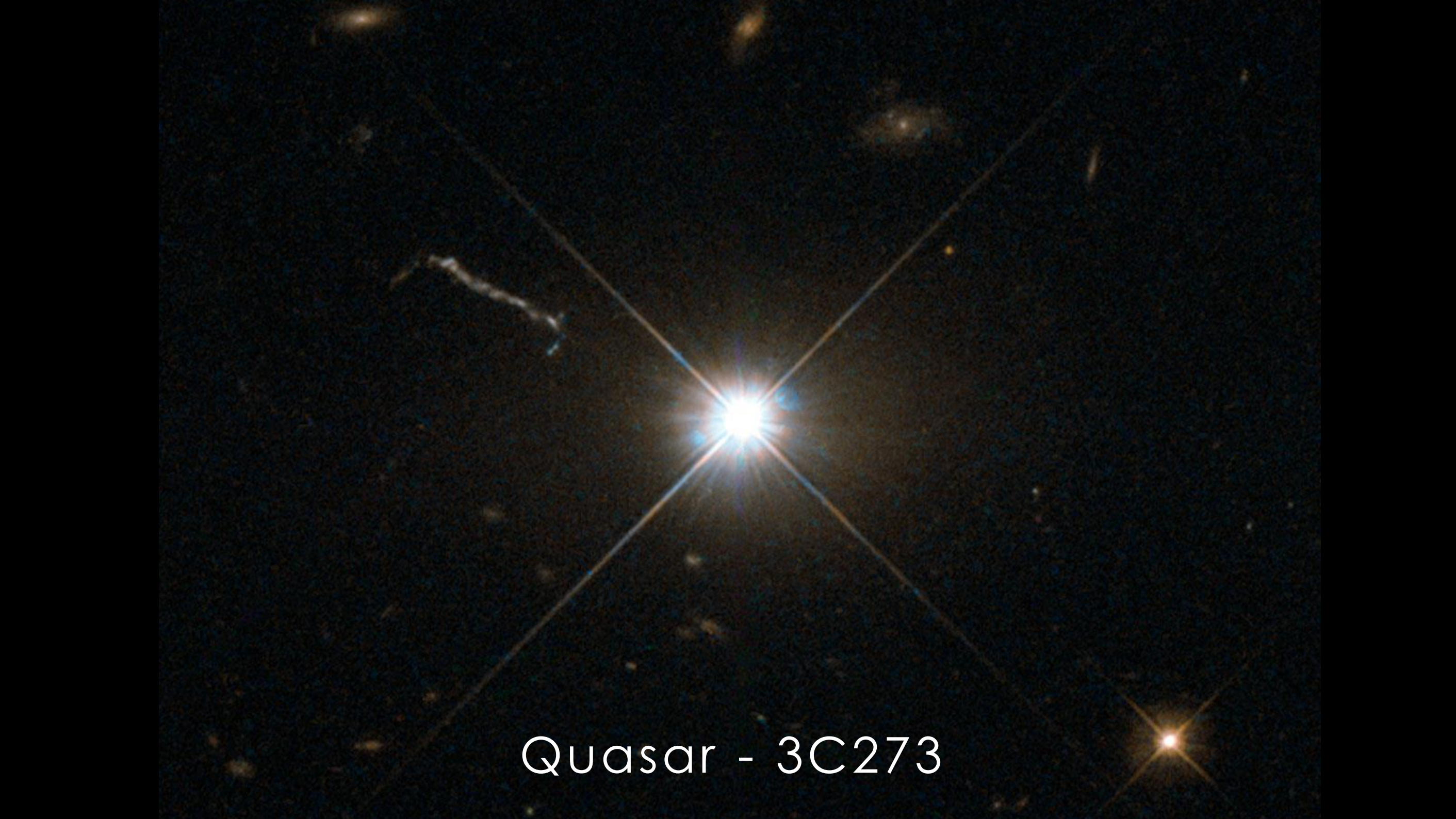
Most probable nearby black hole ~6,000ly away



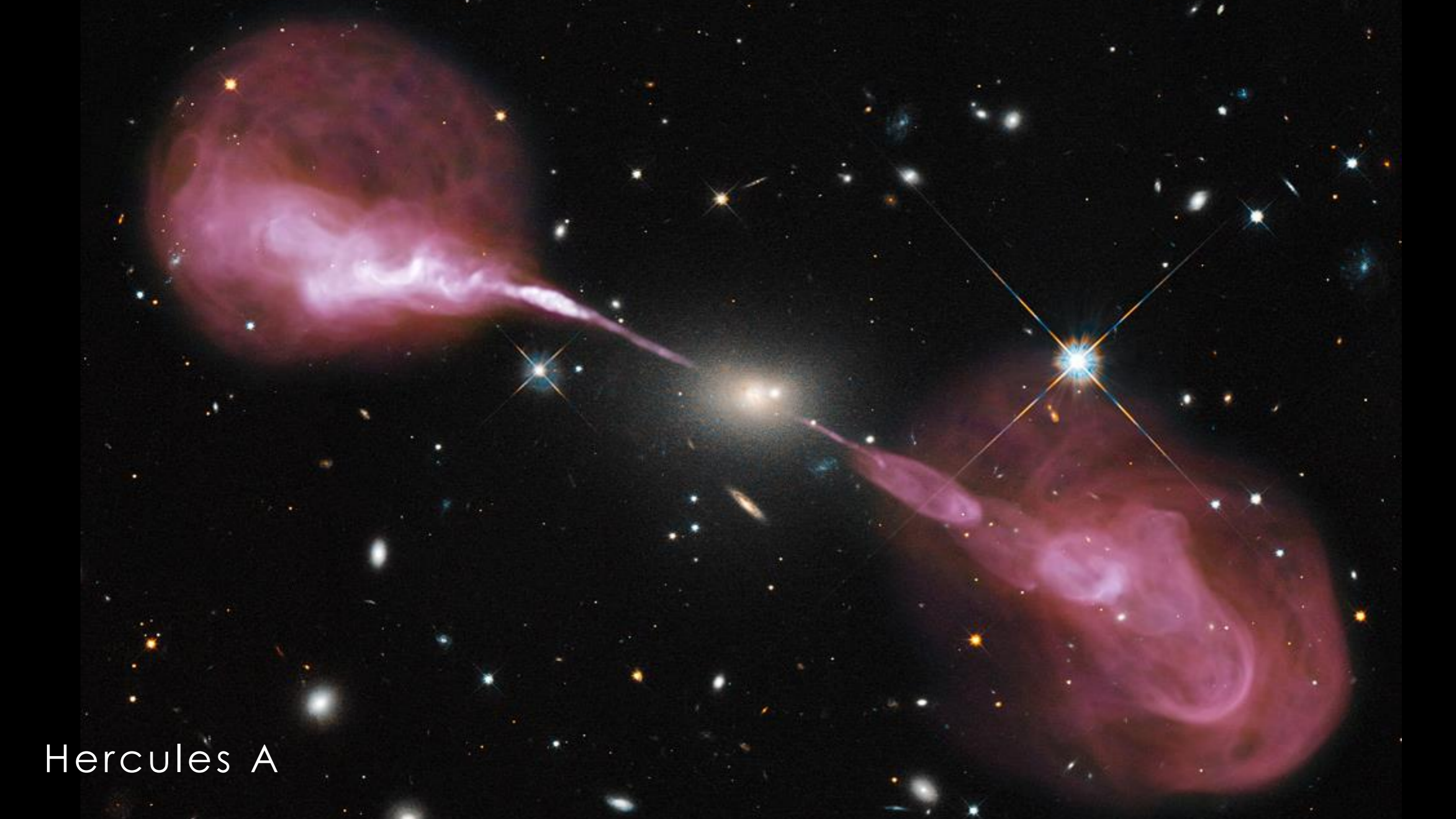




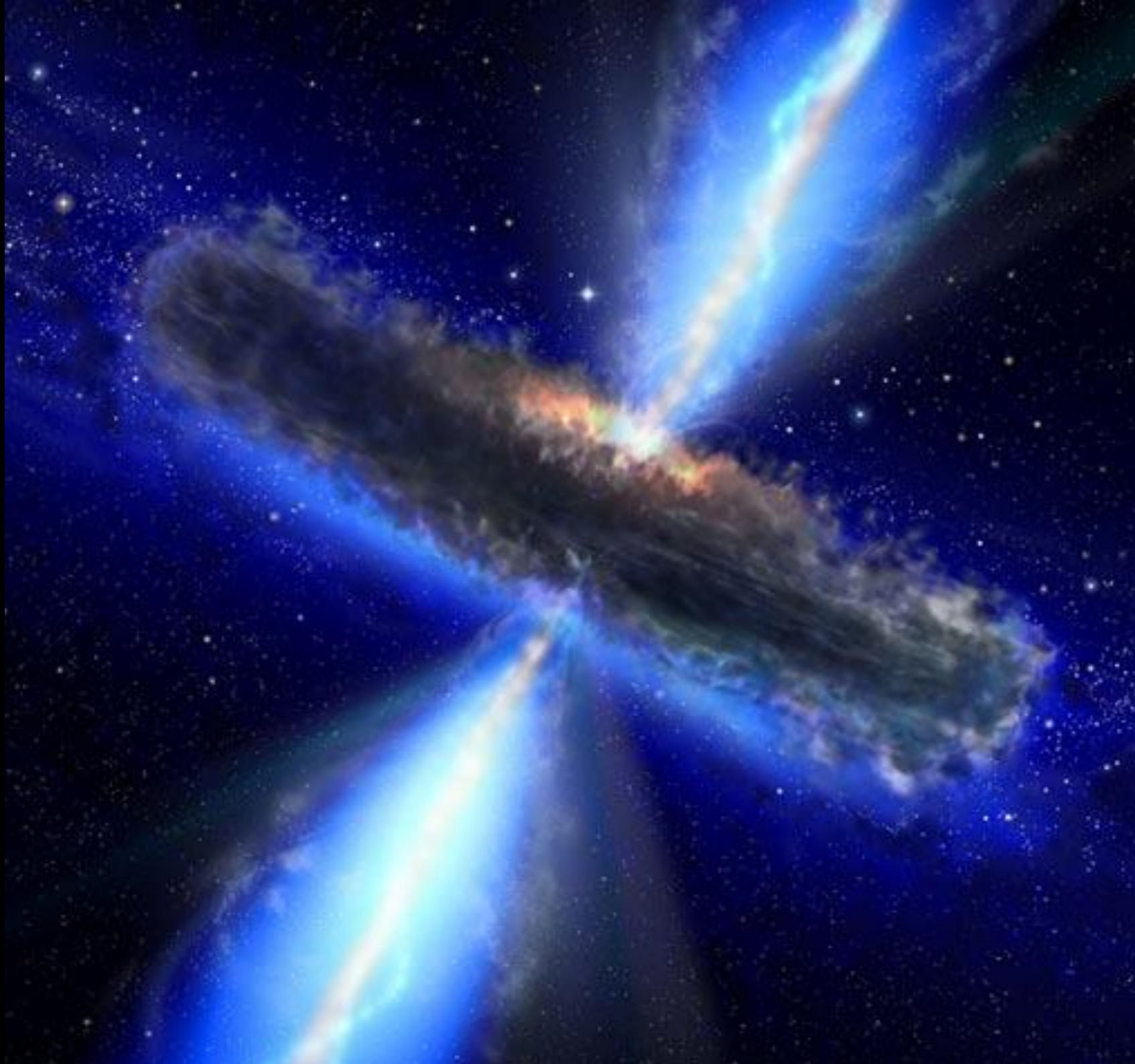


An astronomical image of the quasar 3C 273. The central feature is a very bright, white-yellow point source with a prominent four-pointed diffraction pattern. A faint, blueish-white jet extends from the center towards the upper-left quadrant. The background is dark with scattered stars and faint galaxies. A white text label 'Quasar - 3C273' is positioned at the bottom center. A smaller, bright yellow star with a four-pointed diffraction pattern is visible in the lower-right corner.

Quasar - 3C273



Hercules A

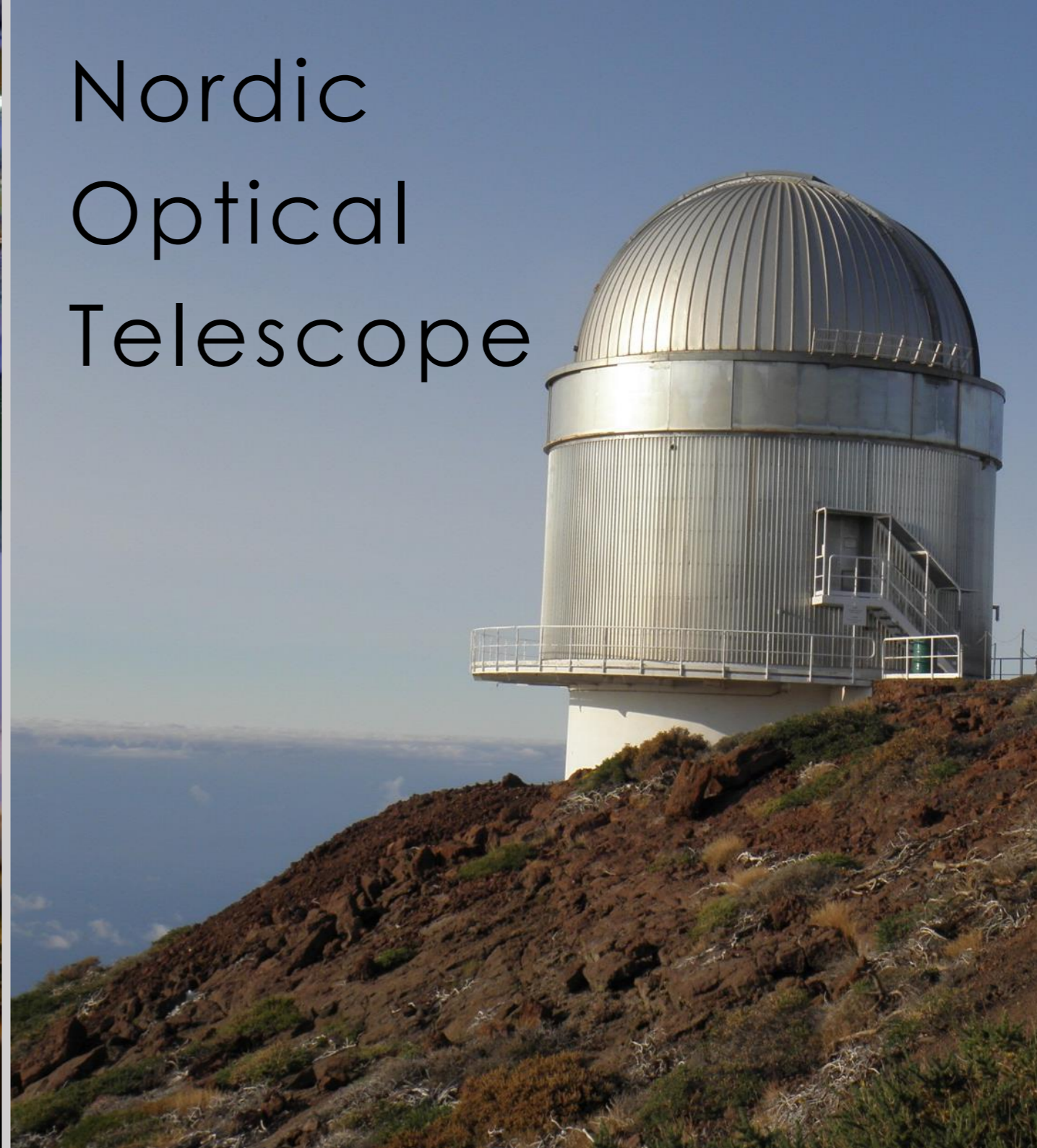


Active
Galactic
Nuclei

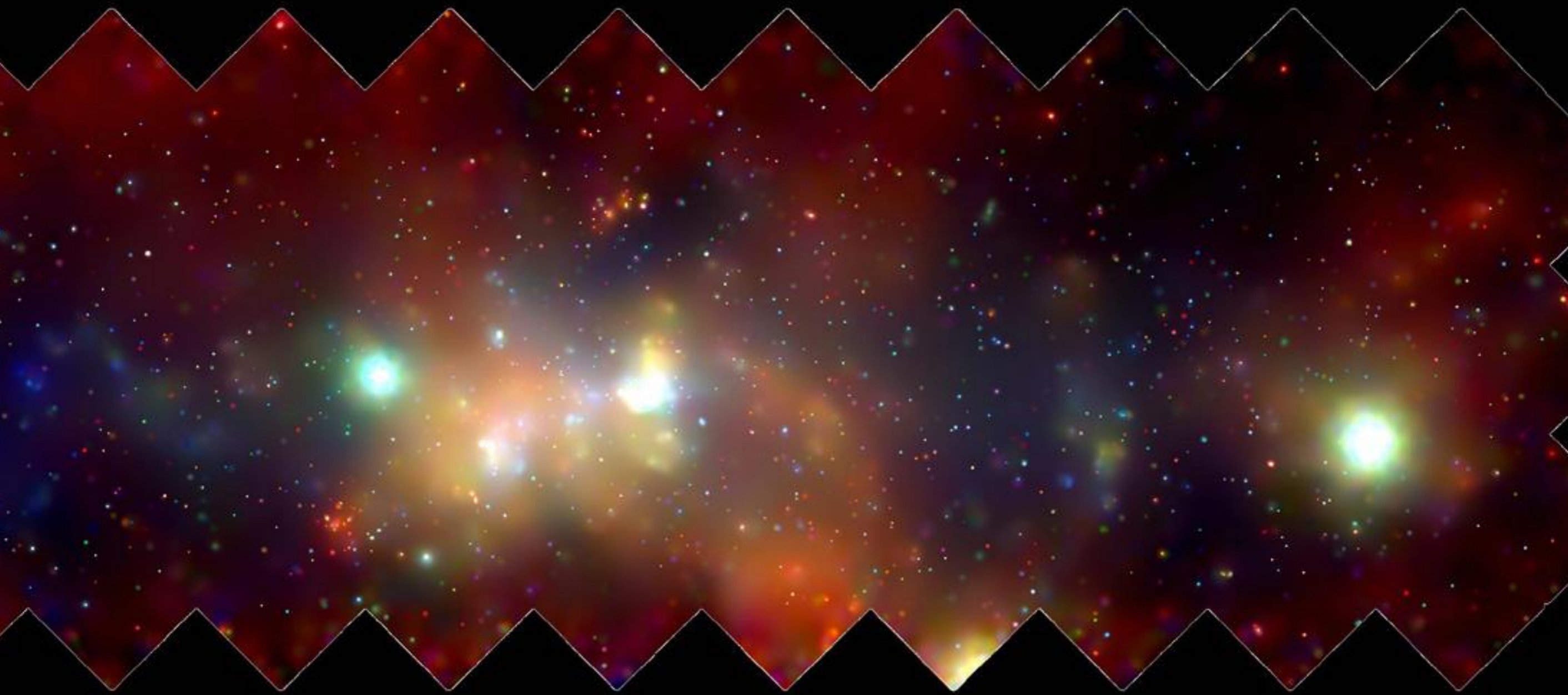
XMM-Newton



Nordic
Optical
Telescope



Chandra's view of the galactic centre



The Swift Space Telescope

detects a GRB every ~3-7 days

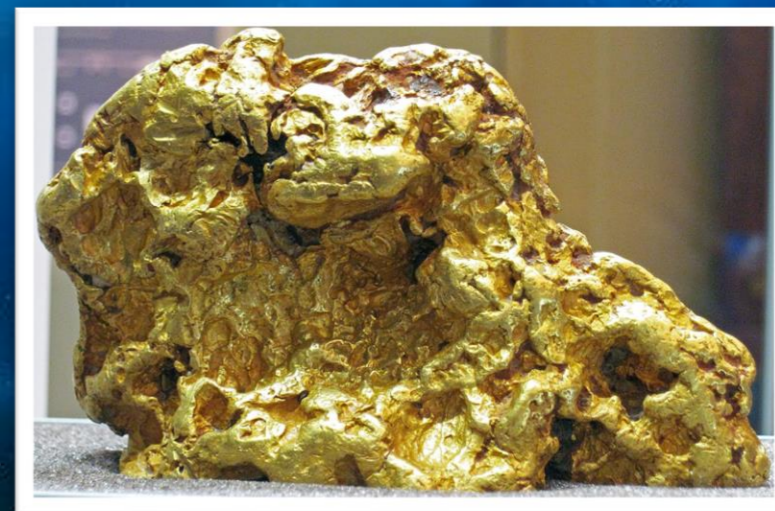


Gamma Ray Bursts

A burst of gamma rays indicate a black hole has been formed...

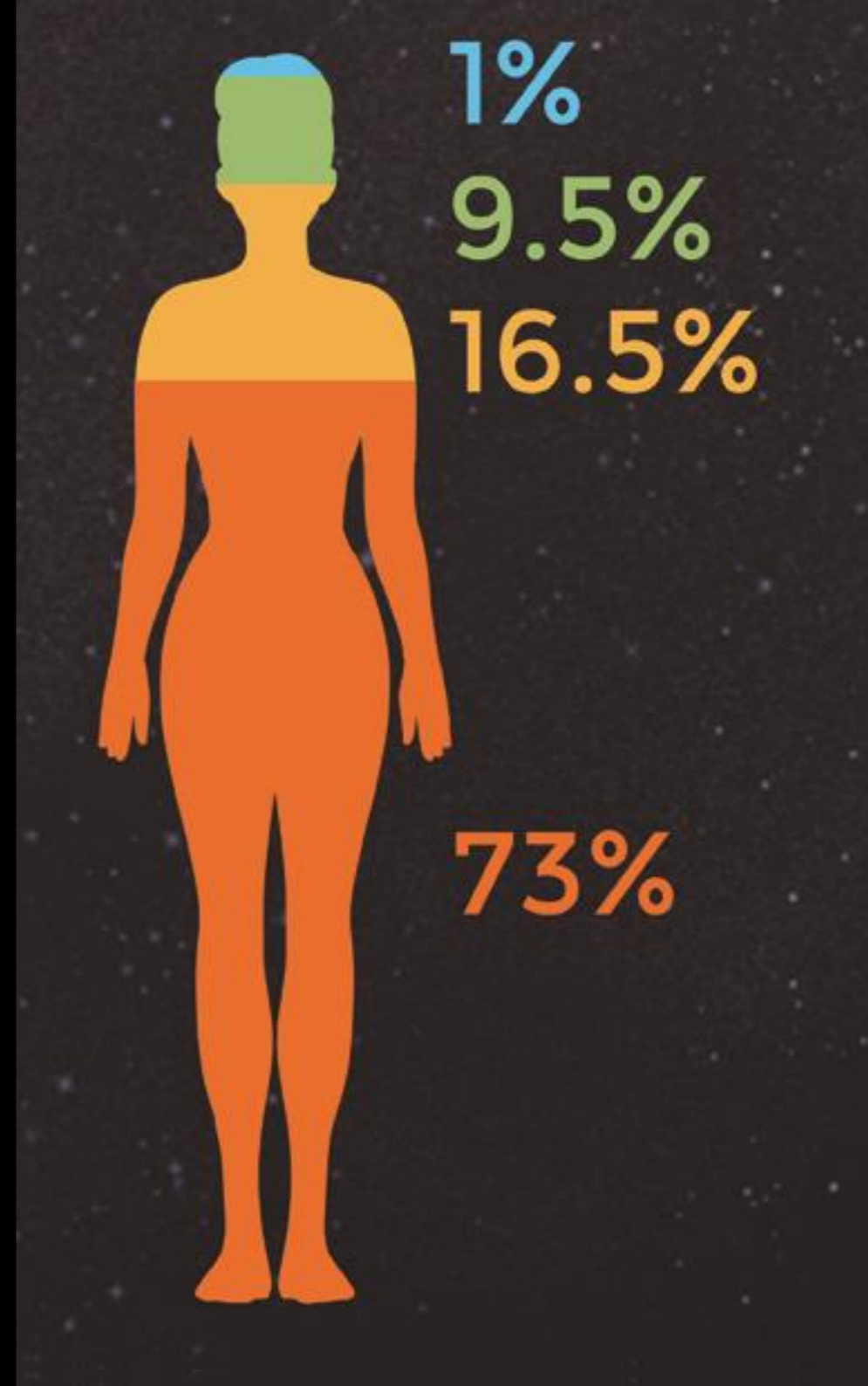


Artwork: Mark Garlick /
University of Warwick





You are made out of elements created in these astrophysical processes





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