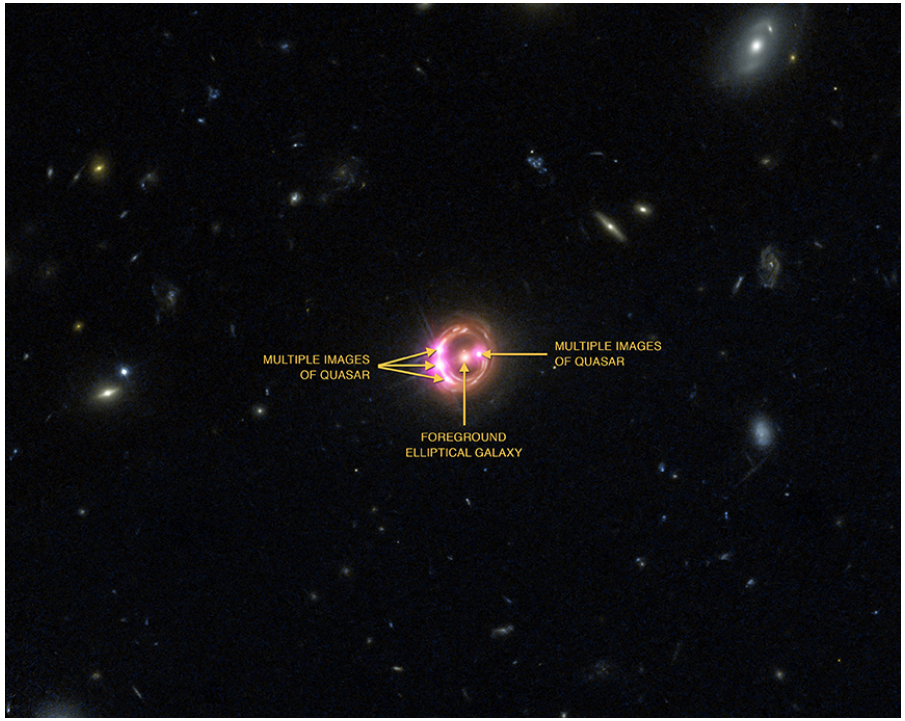
Chandra Science Highlight

RX J1131-1231: Chandra & XMM-Newton Provide Direct Measurement of Distant Black Hole's Spin



Multiple images of a distant quasar are visible in this combined view from NASA's Chandra X-ray Observatory (pink) and the Hubble Space Telescope (red, green and blue).

- Gravitational lensing by an intervening galaxy has created four different, magnified images of the quasar, which is powered by a supermassive black hole accreting matter
- The combined Chandra spectra enabled detection of X-rays coming from the inner region of the black hole's accretion disk, only about 3 times the radius of the black hole's event horizon.
- The X-ray spectra indicate that space-time at the black hole's event horizon is spinning extremely rapidly, corresponding to a rotation speed greater than half the speed of light.
- The rapid spin indicates that the black hole has grown through major mergers of galaxies, rather than through many small accretion episodes.

Scale:
Image is 1.2 arcmin on a side (about 1.6 million light years).

Distance Estimate:
6 billion light years (red shift z = 0.658)

Reference: Reis, R.C., et al, 2014 Nature, 507, 207–209 (13 March 2014)

Credit: X-ray: NASA/CXC/Univ of Michigan/R.C.Reis et al; Optical: NASA/STScI

Instrument: Chandra ACIS Observation

CXC Operated for NASA by the Smithsonian Astrophysical Observatory

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