Discovery of kiloparsec-scale semi-relativistic Fe Kα emission in NGC 5728

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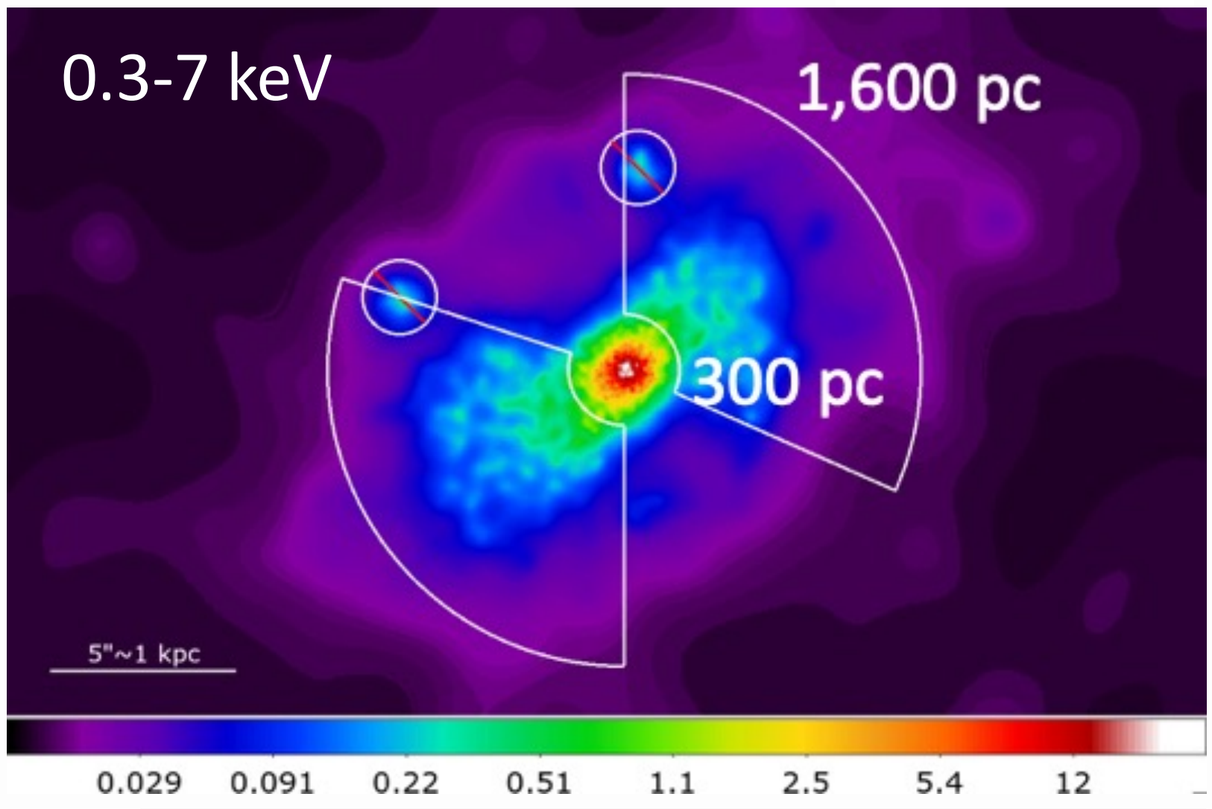
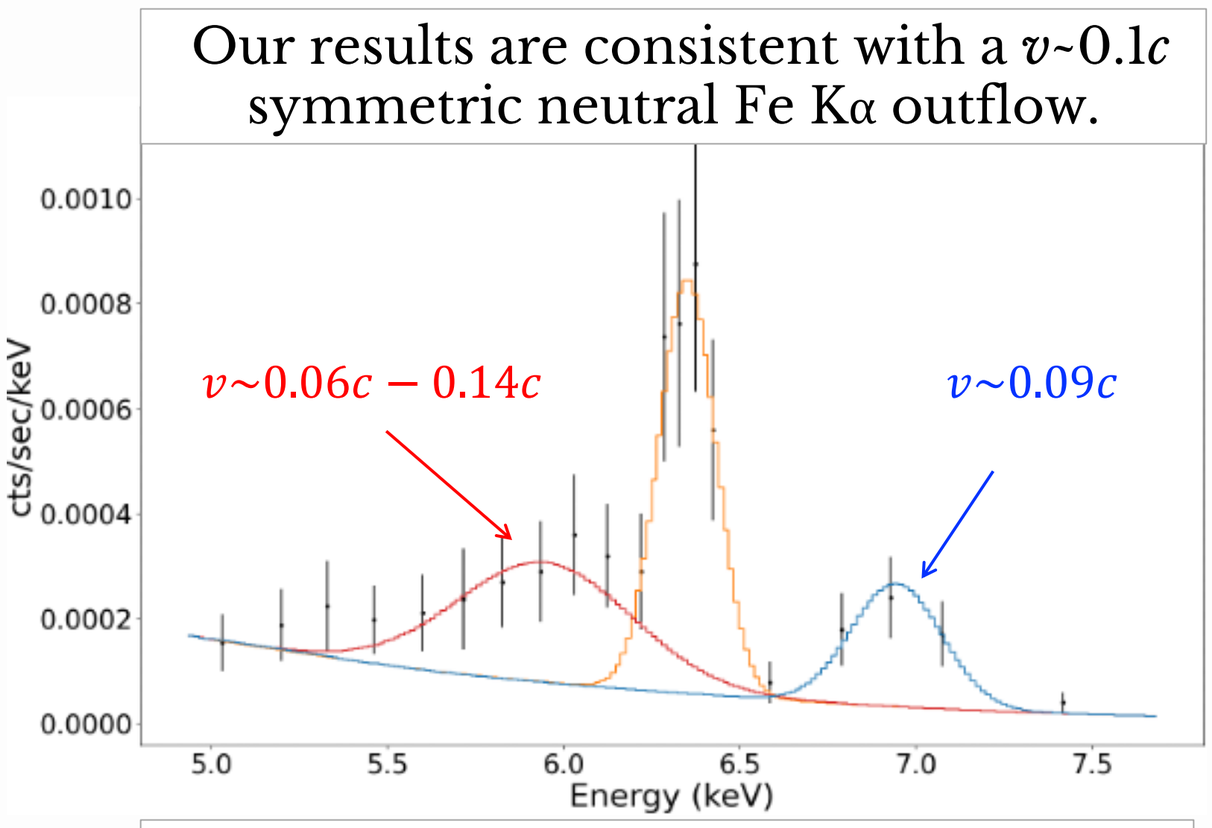
Chandra ACIS-S observations of the extended (300 pc-1600 pc) hard X-ray emission in NGC 5728 reveal **spectrally- and spatially-resolved features in the Fe Kα complex, both redward and blueward of the neutral Fe line at 6.4 keV.**

- A power-law continuum + narrow 6.4 keV line model fit yields significant detections of the red and blue wings, at 5.4σ and 3.7σ, respectively.
- Fits to a suite of physical models confirm a ≥3σ red wing that can only be attributed to a redshifted 6.4 keV line. The blue wing may be partially diminished by highly ionized Fe XXV and Fe XXVI lines at the rest frame, yielding residuals between 1.4σ and 3.7σ, depending on the model.
- These outflow velocities are ~100 times larger than those detected in optical spectroscopy, **potentially dominating the kinetic feedback power.**

Broader Implications: Models for effective AGN feedback suggest that a minimum of 5% of the AGN bolometric luminosity is required to unbind the host ISM, while disrupting molecular clouds to suppress star formation could be achieved with as little as 0.5%. Optical and molecular large-scale outflows may extend to ~kiloparsec scales but appear to lack sufficient kinetic power to disrupt the host ISM. Since the kinetic power carried by AGN winds scales with v^3, the wings in NGC 5728 could carry 10-200 times the kinetic power of optical ionized outflows, potentially dominating AGN feedback in the local Universe.



Our results are consistent with a v~0.1c symmetric neutral Fe Kα outflow.



The red and blue wings are spatially extended (r~1 kpc) along the optical bicone axis