Introduction:

The snapshot survey was conducted for a few of the more interesting systems discovered as part of our Chandra snapshot survey of quasar jet systems. What follows is an update on several of these sources, which to varying degrees are all works in progress.

New observations

PKS 0920-397

- A quasar at z = 1.210 with a long radio jet arcing to a pair of hot spots (top right) with the plane of the sky.
- The X-ray emission...  
  -...stretches throughout the northern jet
  -...is in a broad wash of emission around the jet, and a similar broad emission around the southern jet.
  -...detects an extended optical source at first northern hot spot
- Preliminary spectral modeling:  
  -...consistent with power law X-ray emission
  -...dominated by synchrotron emission
  -...combined with inverse Compton process
  -...strongest upstream of radio hot spot
- Weakens rapidly after first radio hot spot peak
  -...emission continues to the southern jet
- Hence, a broad wash of emission around the jet, and a similar broad emission around another counter-jet.
- Future work:
  -...fully account for the broad X-ray emission
  -...further study the extended optical source

PKS 1055+201

- A quasar at z = 0.591 with a long radio jet arcing to a pair of hot spots (bottom right) with the plane of the sky.
- The X-ray emission...
  -...stretches throughout the northern jet
  -...remains strong when radio fades midway along jet, suggestive of inverse Compton process
  -...is bright upstream of radio hot spot
  -...weakens rapidly after first radio hot spot peak
  -...is in a broad wash of emission around the jet, and a similar broad emission around another counter-jet.
- HST detects an extended optical source at first northern hot spot
- Preliminary spectral modeling:  
  -...consistent with power law X-ray emission
  -...dominated by synchrotron emission
  -...combined with inverse Compton process
  -...strongest upstream of radio hot spot
- Weakens rapidly after first radio hot spot peak
  -...emission continues to the southern jet
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- Future work:
  -...fully account for the broad X-ray emission
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How should these features be interpreted?

- Core A, knot B:
  - Pro: VLBI snapshot hints at core-jet morphology within A; jet knot B should have a featureless spectrum
  - Problem: Optically-dominated, flat spectrum of B is unconfirmed for a knot; the optical knot-to-core flux ratio in the X-ray is about 100
- Core B, hot spot at A:
  - Pro: Self-absorbed core can explain the flatter spectrum of B; optical jet flux ratio more typical
  - Problem: VLBI structure at A is more complex than the simple core-to-knot B; large flux fraction of its flux comes from a single compact VLBI-scale hot spot, the spectrum of B shows no evidence of AGN or host galaxy features and its broad-band colors are unlike known BL Lac
- Feasible: A second, high-energy population of electrons in situ acceleration to produce synchrotron X-rays, or upstream Comptonization (Georgopoulou & Kazanas 2005, ApJ, 619, L99) by a decelerating jet

- Core A and B:
  - Pro: Accounts for flat radio spectra of both A and B
  - Problem: jet plus knot B is bright as B to core source A is 0.04.
- Feasible: Two related nuclei or an interacting system?

PKS 1421-37

- Previously unidentified, in a crowded field  
- A 15" optical source is at the position of the radio peak A (labeled below); with colors resembling quasars at 1 < z < 2  
- A 2.9" mag optical source coincides with the much weaker radio source B  
- Component B is also the strongest X-ray source (see below)  
- B has α, < 0.05 and lacks any strong optical spectral features  
- Region A has α, > 0.65 and includes a VLBI component c14 mas across which provides 0.75% of the 8.6 GHz flux

Chandra observation: Two red continuum image (right) and the optical image through the Chandra panel (left) of PKS 1421-37. Source A is a quasar at z = 1.04 (Gellord & Marshall, in prep)

The radio jet extends 5° south to the south and continues to a hotspot 2° from the core

X-ray emission follows the radio jet through the bend to the hot spot, peaking just before the hotspot (see figure above)

Like PKS 1055+201, there is some diffuse X-ray flux around the jet and the source, but the X-ray jet is not as bright as the radio jet

PKS 2010-490

A quasar at z = 1.04 with a long radio jet arcing to a pair of hot spots (top right) with the plane of the sky

The X-ray emission...
  -...stretches throughout the northern jet
  -...remains strong when radio fades midway along jet, suggestive of inverse Compton process
  -...is bright upstream of radio hot spot
  -...weakens rapidly after first radio hot spot peak
  -...is in a broad wash of emission around the jet, and a similar broad emission around another counter-jet.
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