Constraining black hole formation with VLBI astrometry

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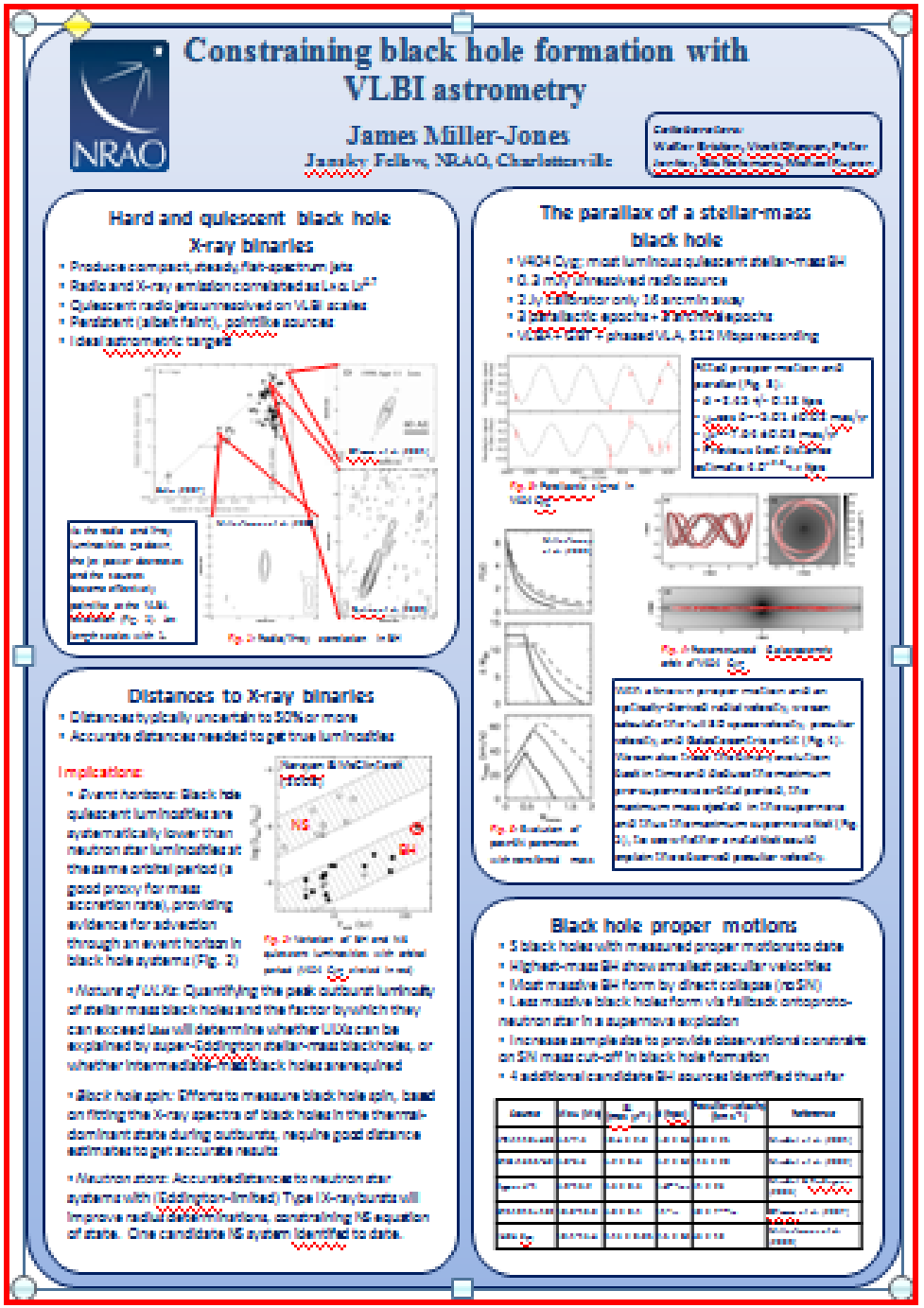
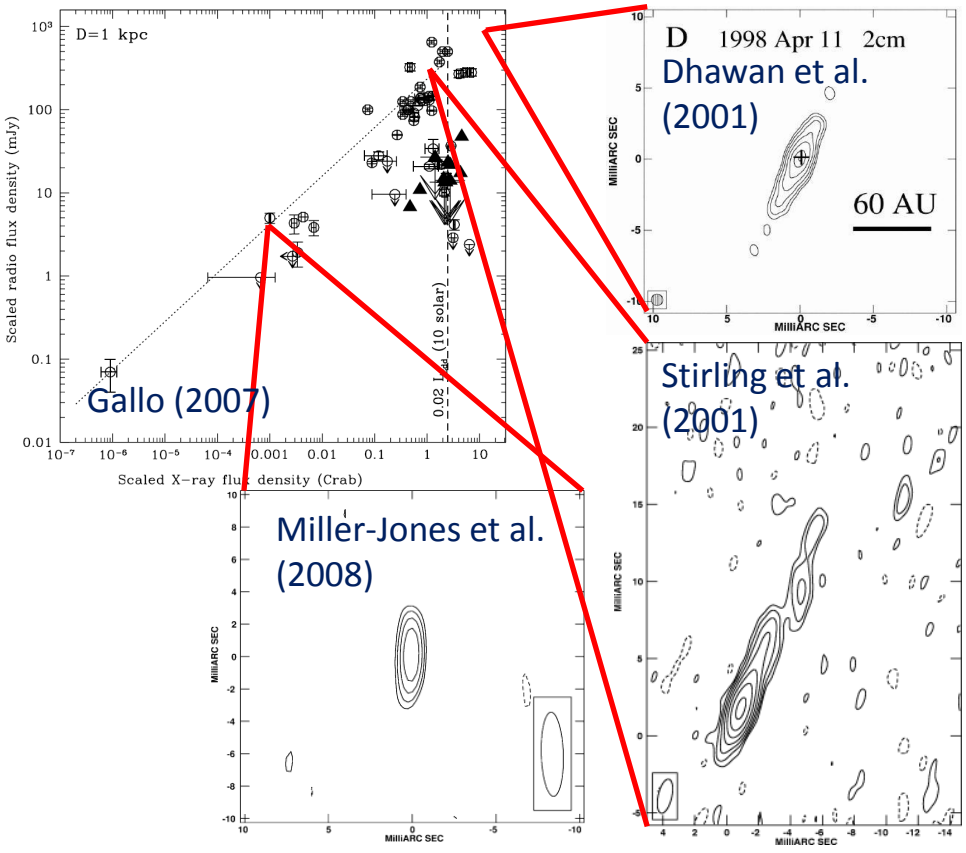
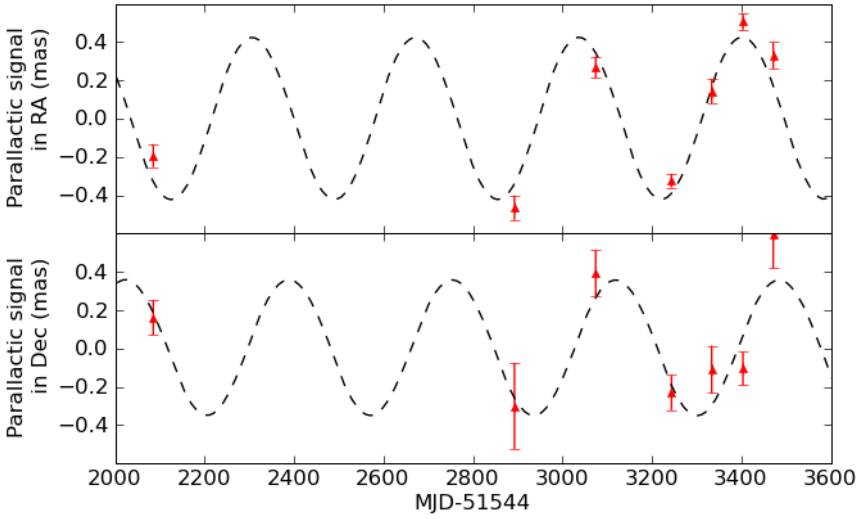


X-ray binary astrometry

- Hard state/quiescent sources pointlike, persistent radio emitters => ideal astrometric targets
- Distances typically uncertain to 50%
- Distances needed for:
  - Accurate luminosities
    - Event horizons
    - ULXs
  - Fitting BH spin



A parallax to a stellar-mass black hole



- Brightest BHXB in quiescence
- 0.3mJy radio source
- Parallax and proper motion
- Closer than found by other, model-dependent methods

- Reconstruct full 3D space velocity, Galactocentric orbit
- Peculiar velocity gives constraints on natal kick
- Sample of BH kicks to probe BH formation