Observations of nearby AGN with MIDI

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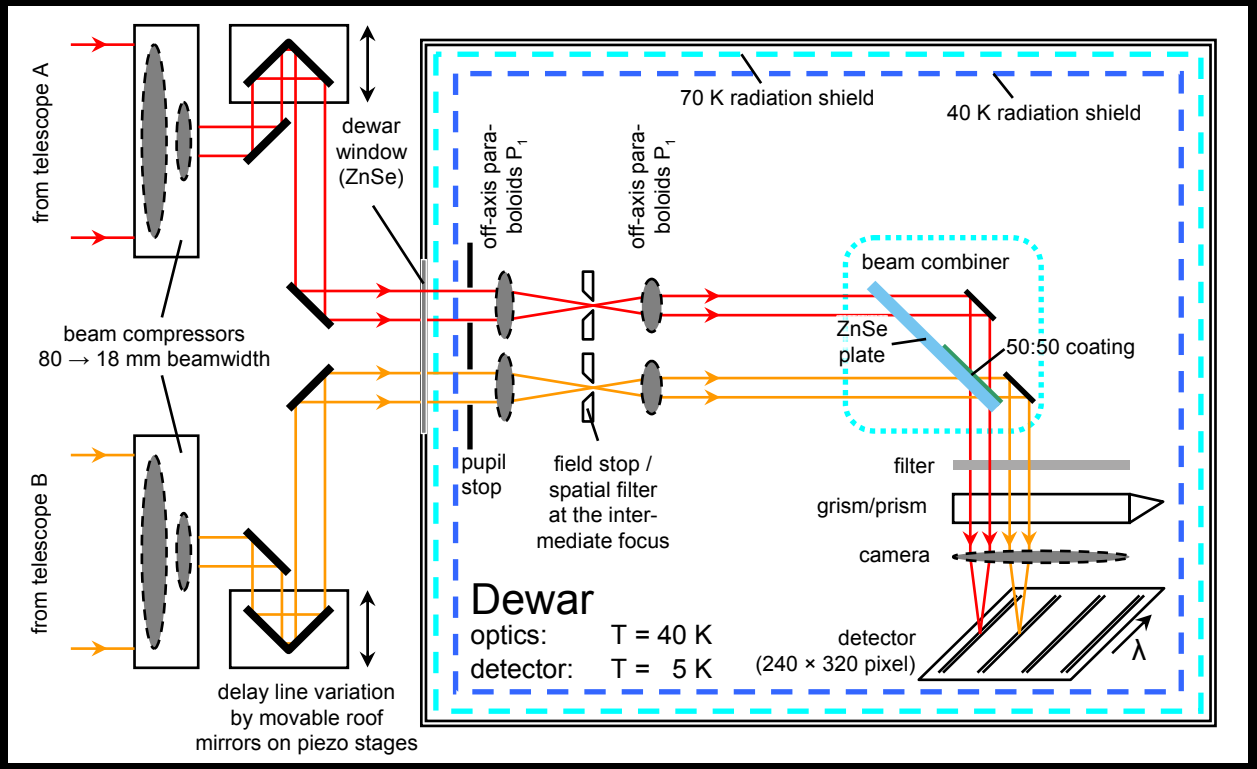
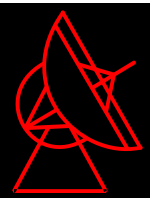
The MIDI instrument

- 2 beam Michelson interferometer
- Dispersed fringes (8 to 13 μm, R = λ / δλ ~ 30)
  - ↳ only differential phases



AGN observations with MIDI



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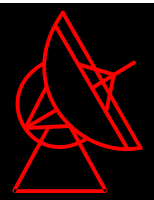
1	*NGC 1068 (M77)*	*Sy 2.0*	*16.5 Jy*	*well resolved (disk plus extended component)*
2	NGC 1365	Sy 1.8	0.5 Jy	partially resolved (elongated)
3	IRAS 05189-2524	Sy 2.0	0.6 Jy	faint detection only (elongated?)
4	MCG -05-23-016	Sy 2.0	0.6 Jy	partially resolved
5	Mrk 1239	Sy 1.5	0.6 Jy	essentially unresolved
6	NGC 3783	Sy 1.0	0.6 Jy	partially resolved
7	NGC 4151	Sy 1.5	1.2 Jy	well resolved
8	3C 273	QSO / Sy 1.0	0.3 Jy	possibly resolved (elongated?)
9	Centaurus A	FR I	1.2 Jy	well resolved (disk plus unresolved core)
10	IC 4329A	Sy 1.2	1.0 Jy	unresolved
11	*Circinus*	*Sy 2.0*	*10.2 Jy*	*well resolved (disk plus extended component)*
12	NGC 7469	Sy 1.2	0.7 Jy	well resolved

→ Now total of 16 AGN successfully observed

AGN observations with MIDI



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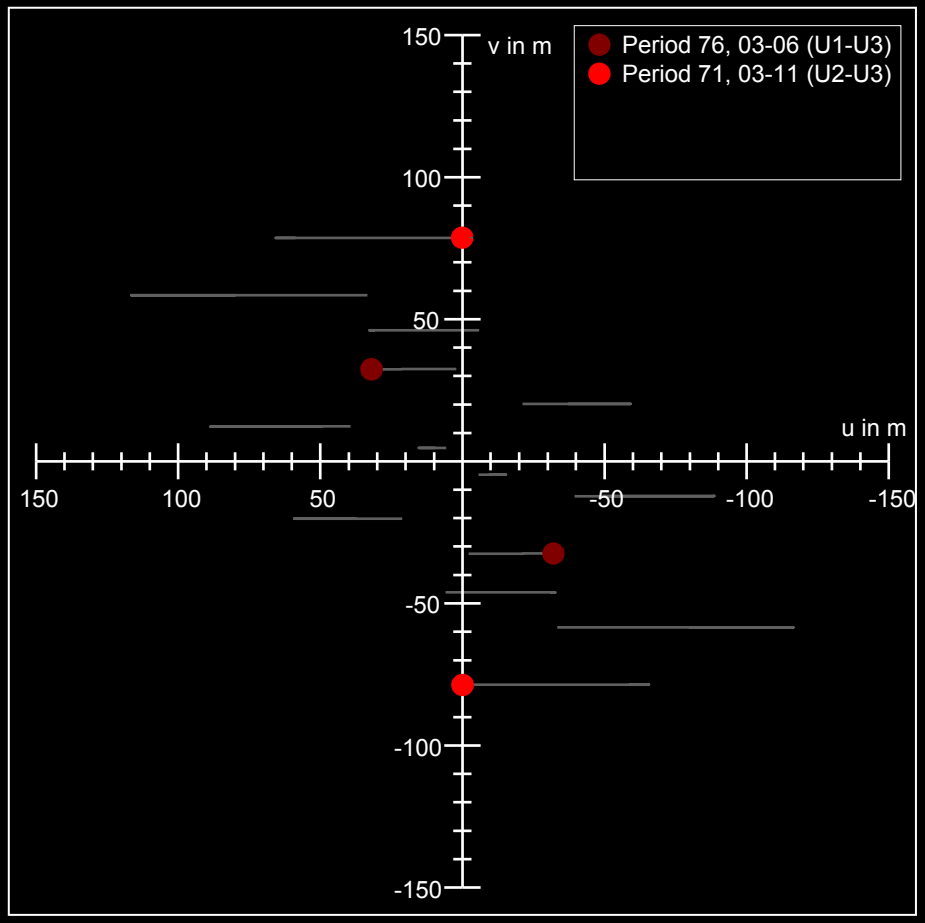
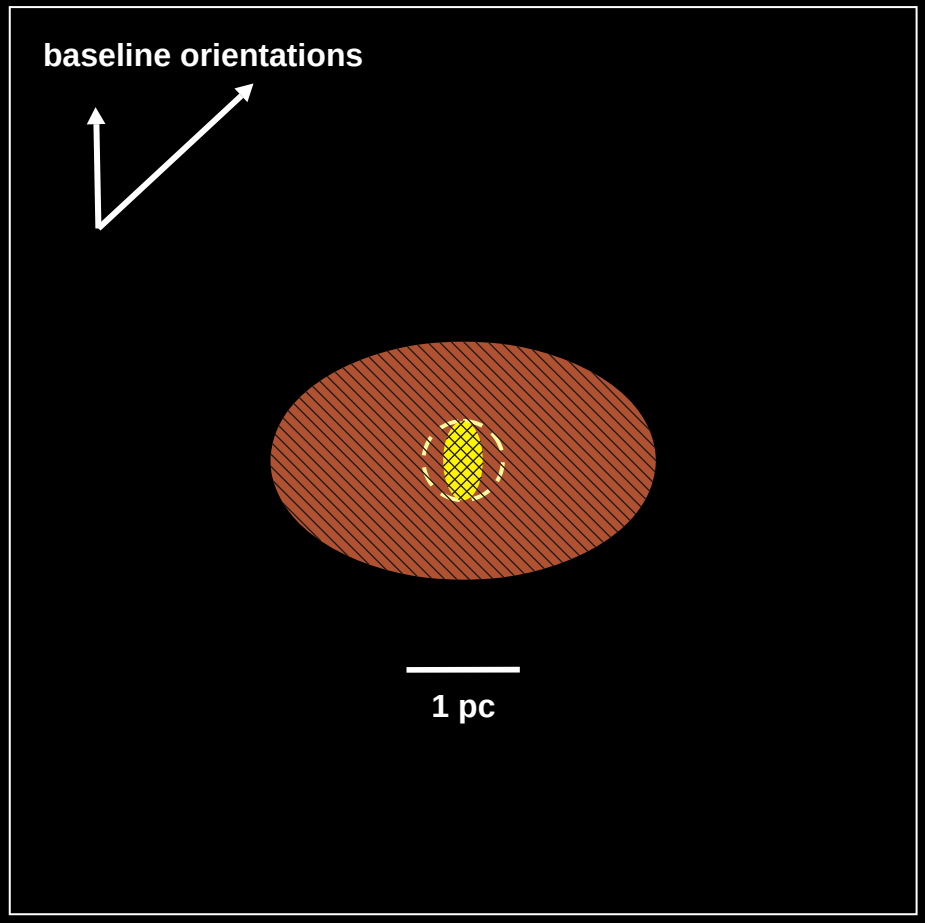
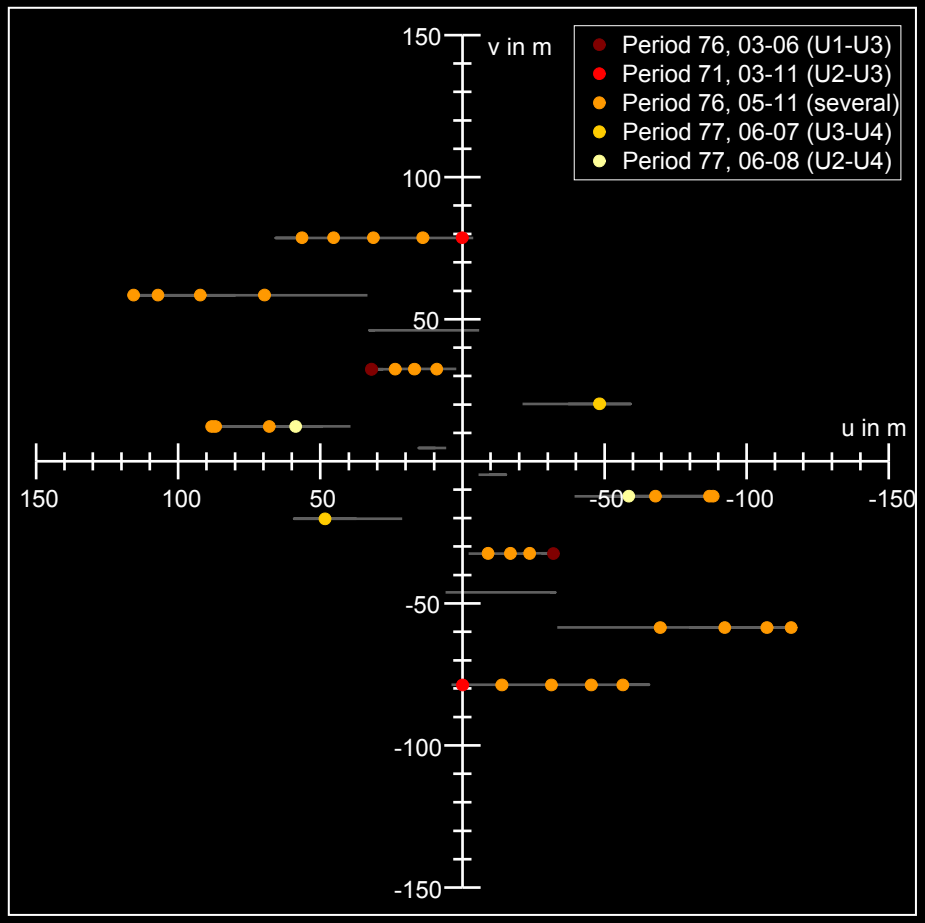
NGC 1068

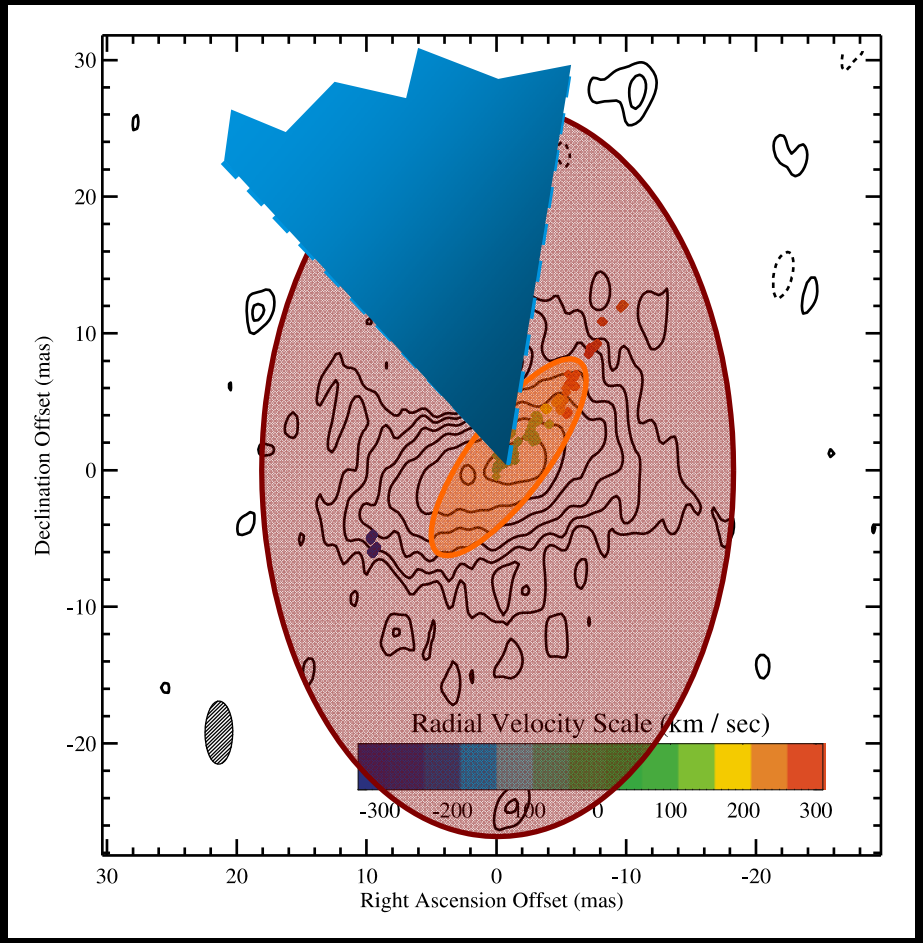




Jaffe et al. 2004

NGC 1068





Raban et al. 2009

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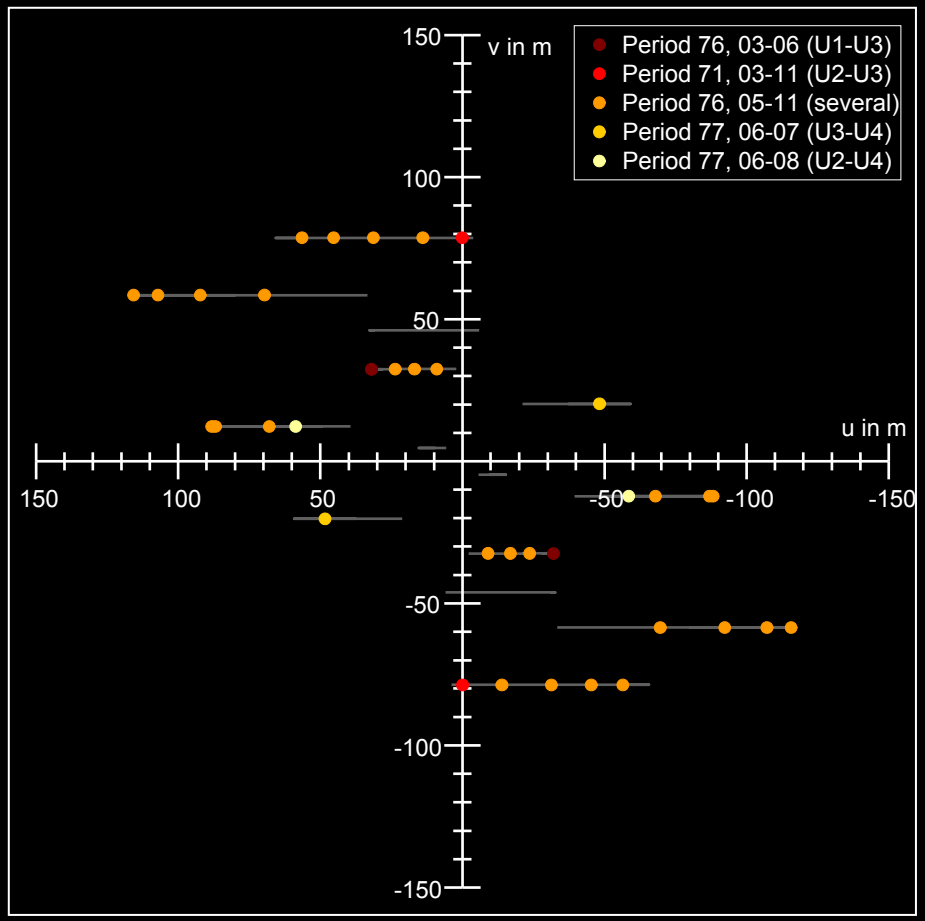
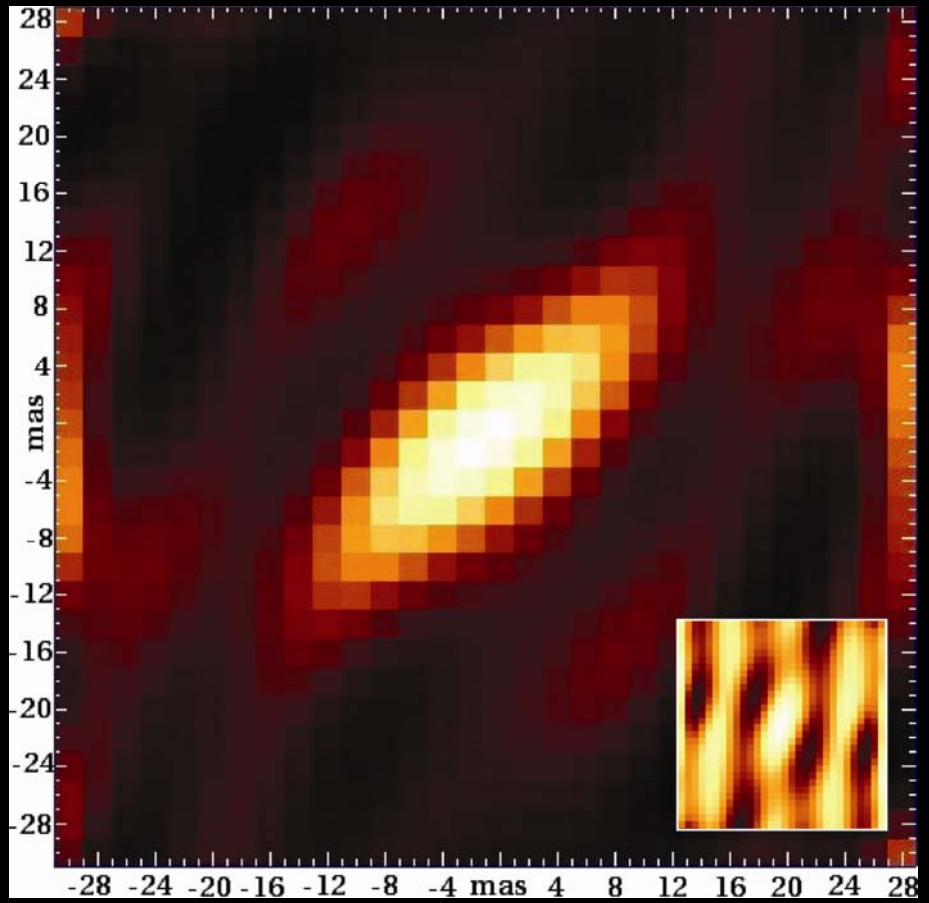
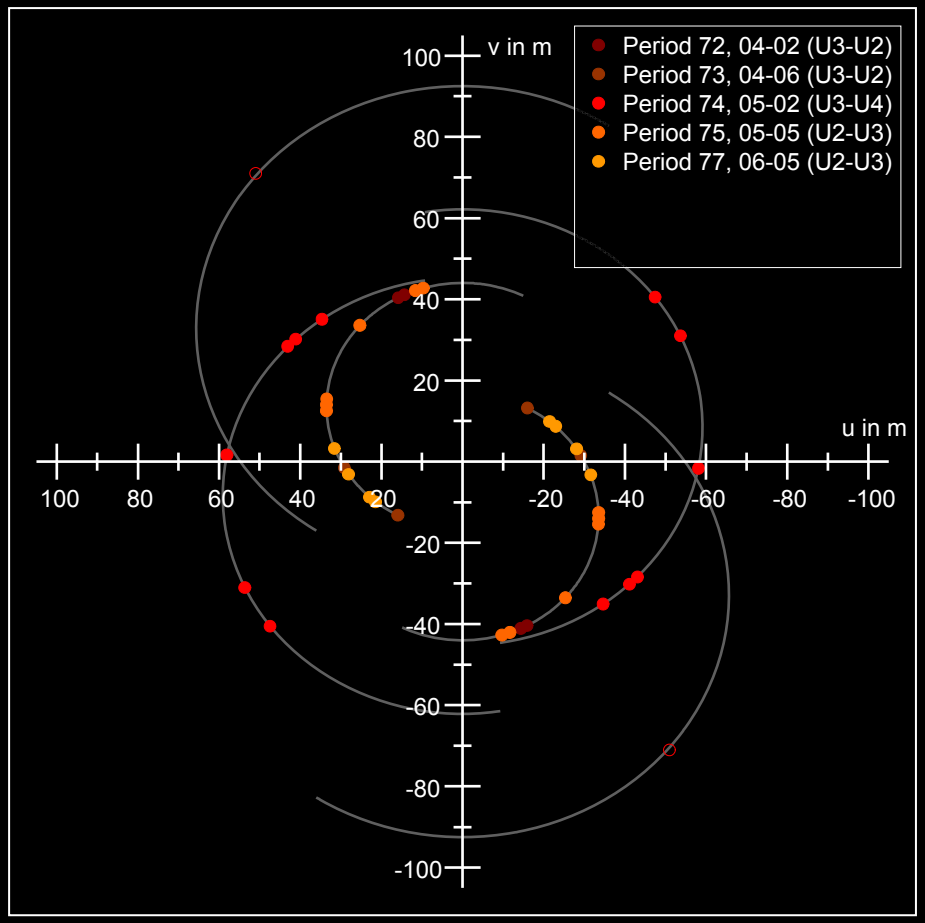
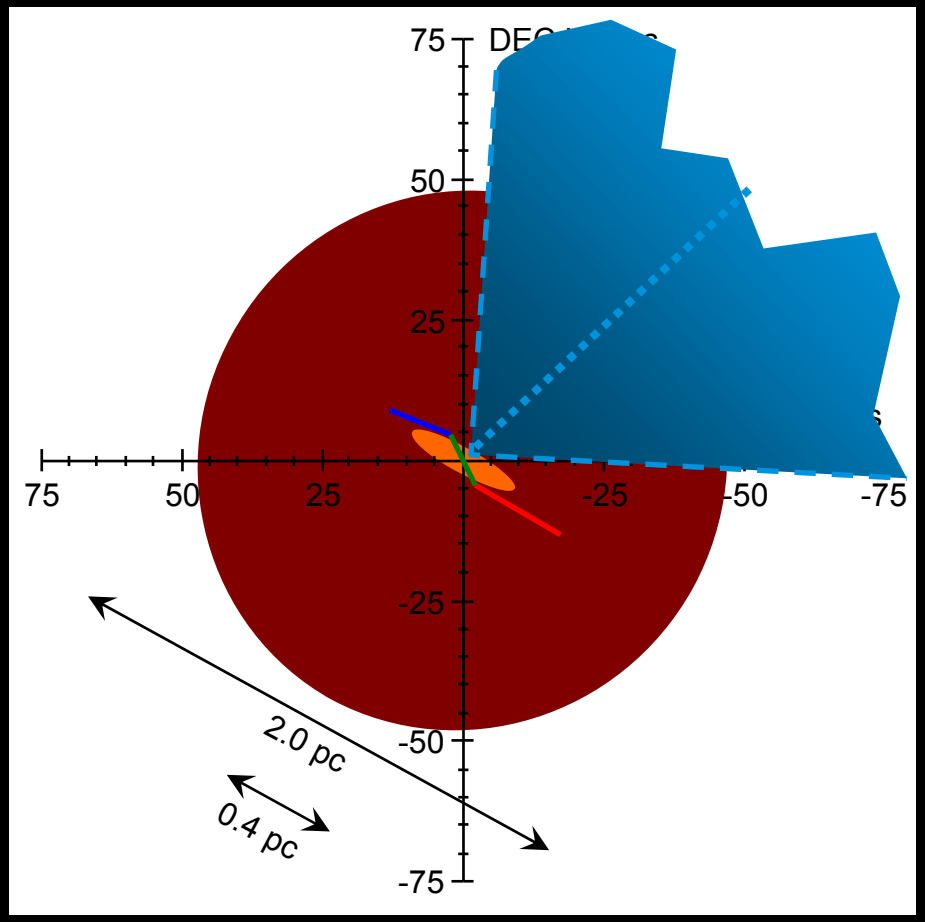




Raban et al. 2009

The Circinus galaxy





Tristram et al. 2007

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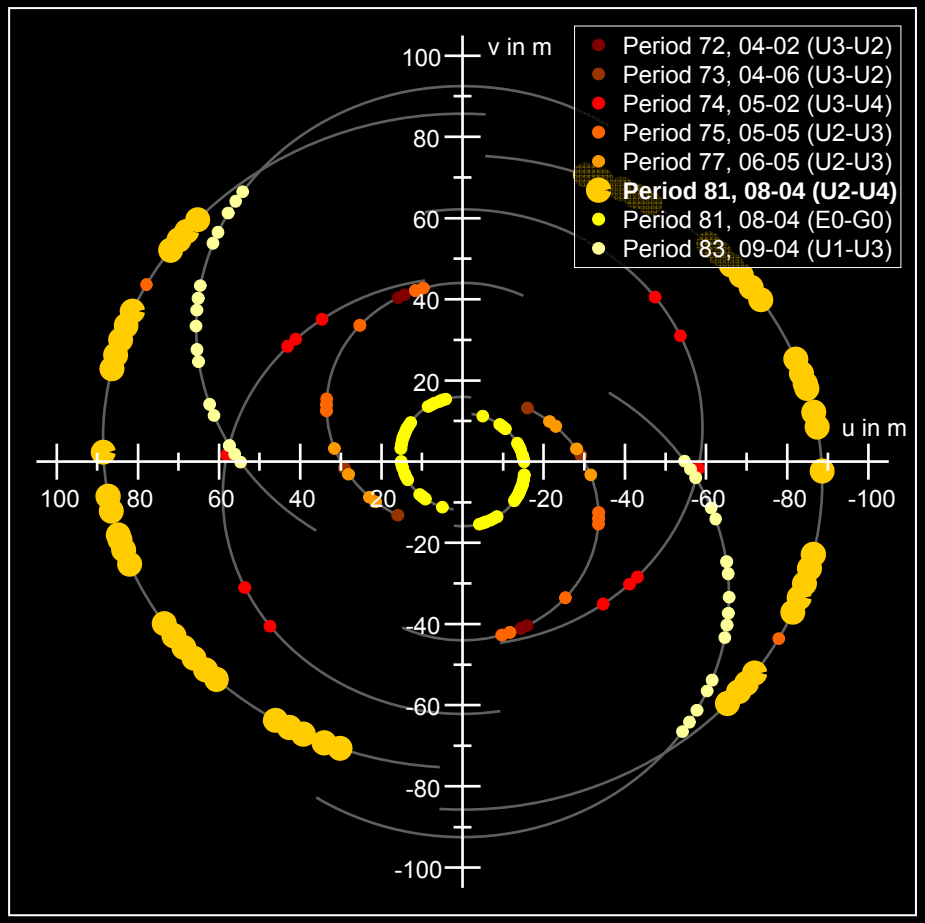

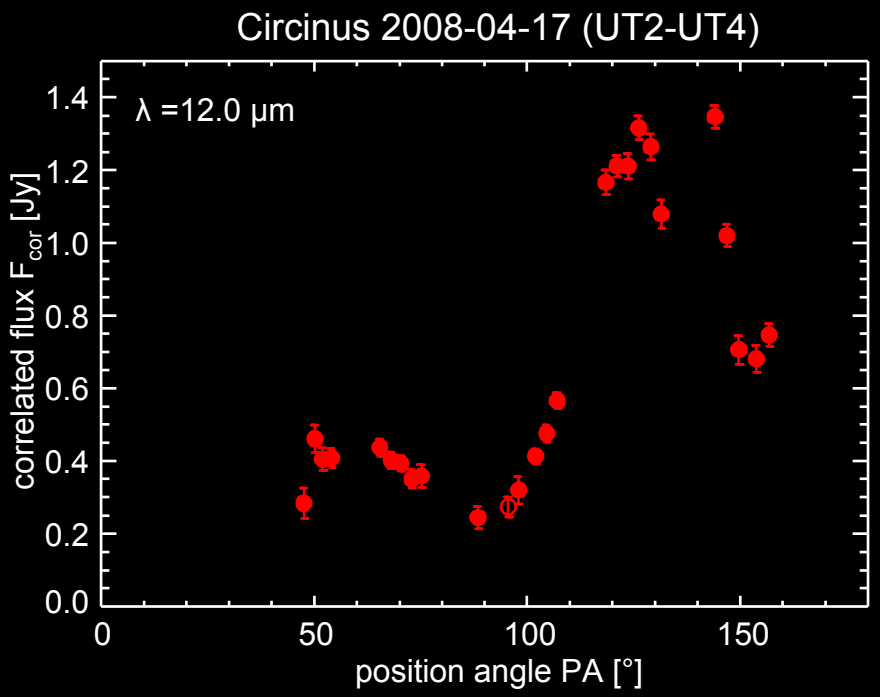

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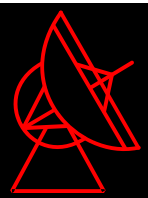

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→ Derive size estimates from the visibilities

Size – luminosity relation

- Assume Gaussian brightness distribution:

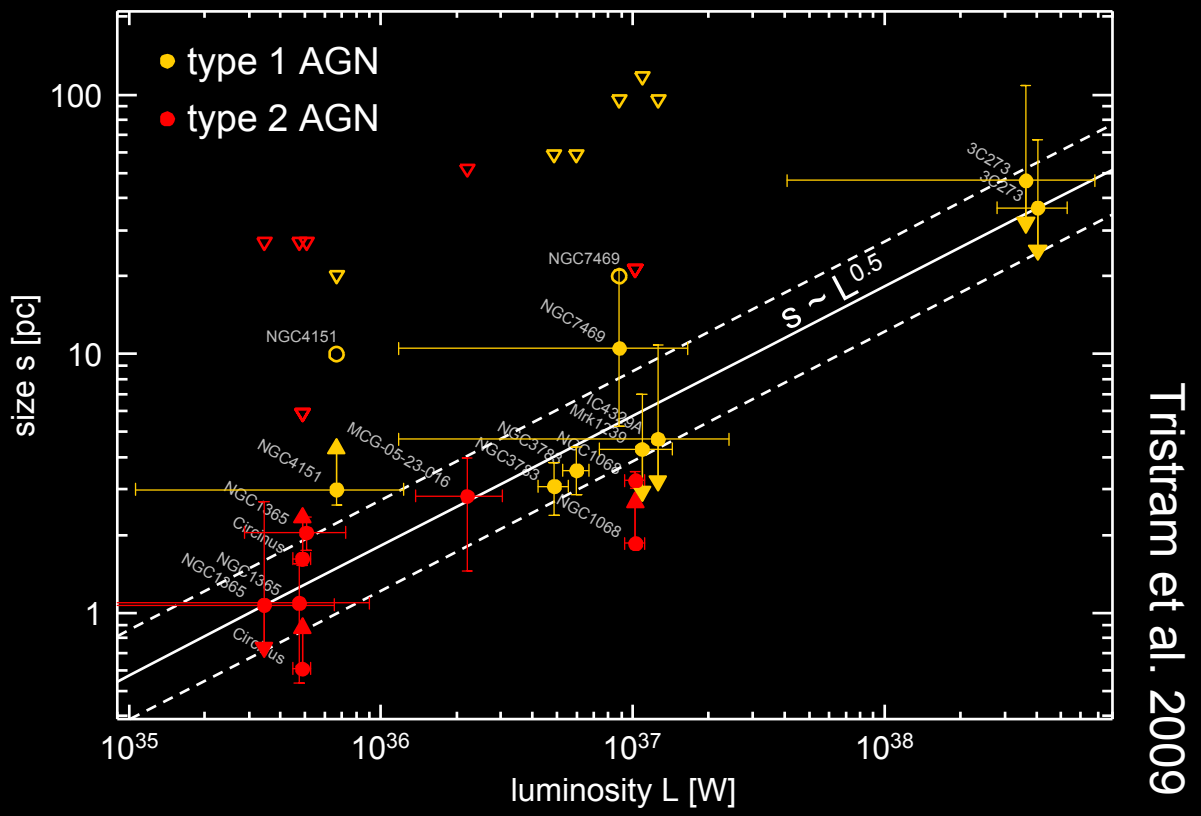
$$FWHM(\lambda) = \frac{\lambda}{BL} \cdot \frac{2}{\pi} \sqrt{-\ln 2 \cdot \ln V(\lambda)}$$

- Good estimate for size of emitter for

$$0.2 \lesssim V(\lambda) \lesssim 0.8$$

- Otherwise only upper or low limit on size

Size – luminosity relation



- Simple expectation: $s = p \cdot (L)^{0.5}$
- Data consistent for $p = (1.8 \pm 0.3) \cdot 10^{-18}$ pc $W^{-0.5}$