

Revealing the structure of AGN in Circinus

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with

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illustration: M. Kornmesser (ESO)



ACTIVE GALACTIC NUCLEI

Narrow-line region

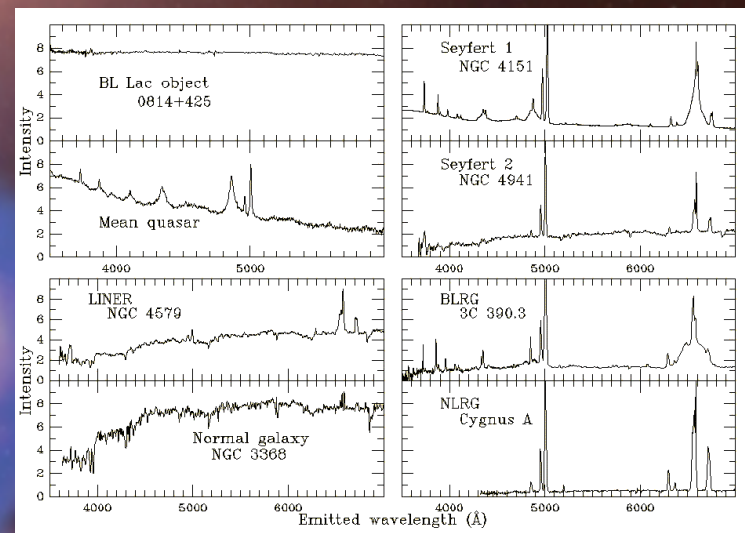
Jet

Accretion Disk +
broad-line region

Dusty Torus

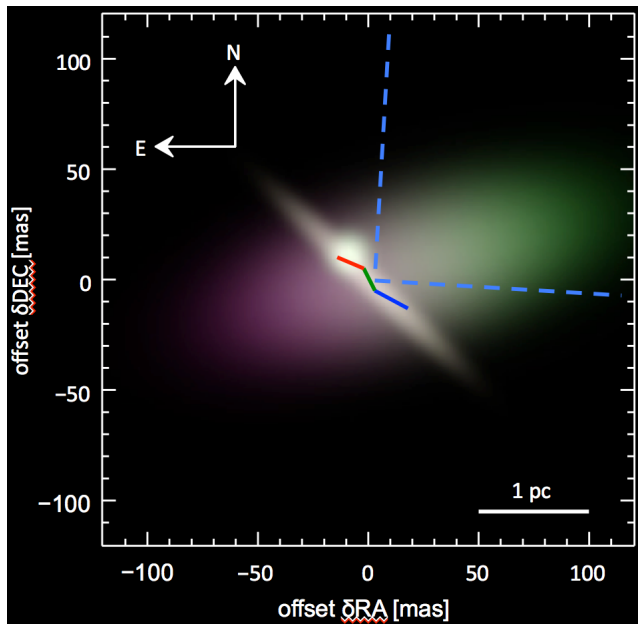
Type 2 AGN

Type 1 AGN

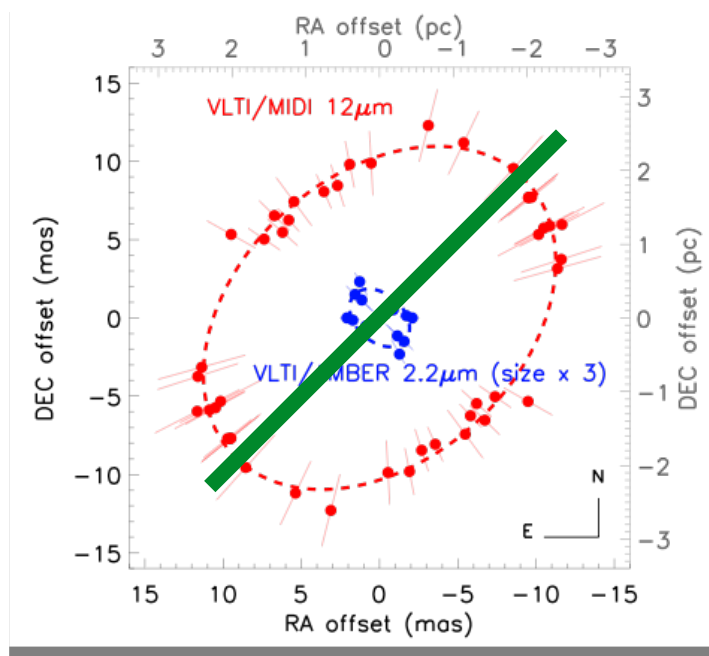
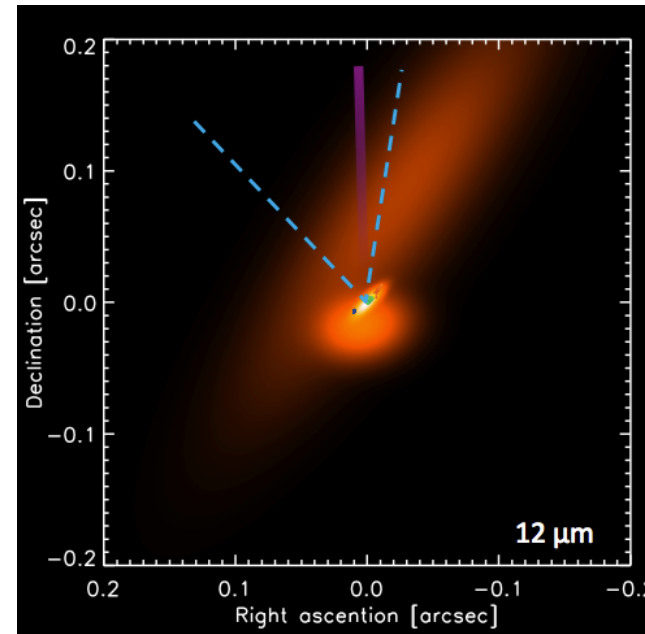


MIR: polar elongation on small scales

Circinus;
Tristram et al. 2014

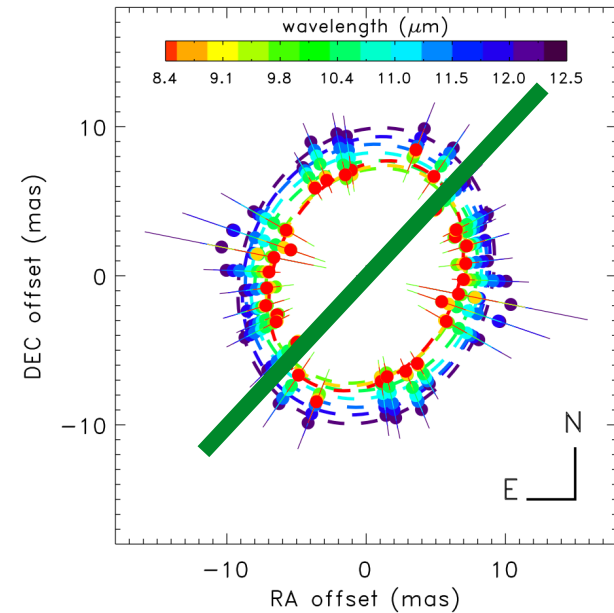


NGC1068;
López Gonzaga et al.2014



NGC3783; Hönlig et al. 2013

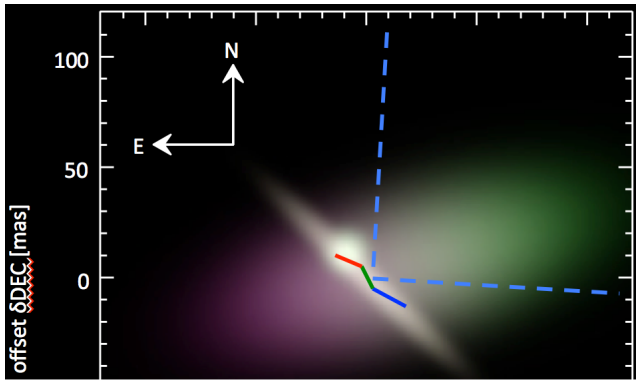
Gaussian size at 58m baseline



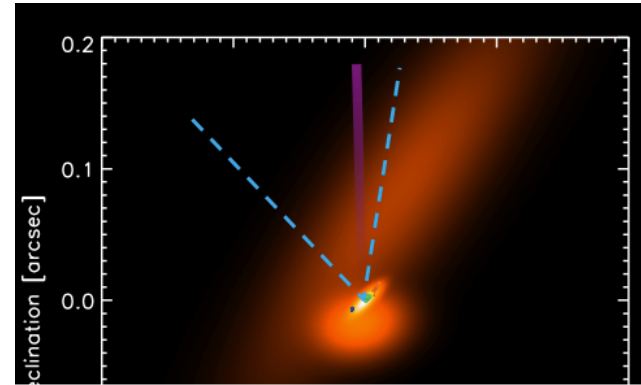
NGC424; Hönlig et al. 2012

MIR: polar elongation on small scales

Circinus;
Tristram et al. 2014

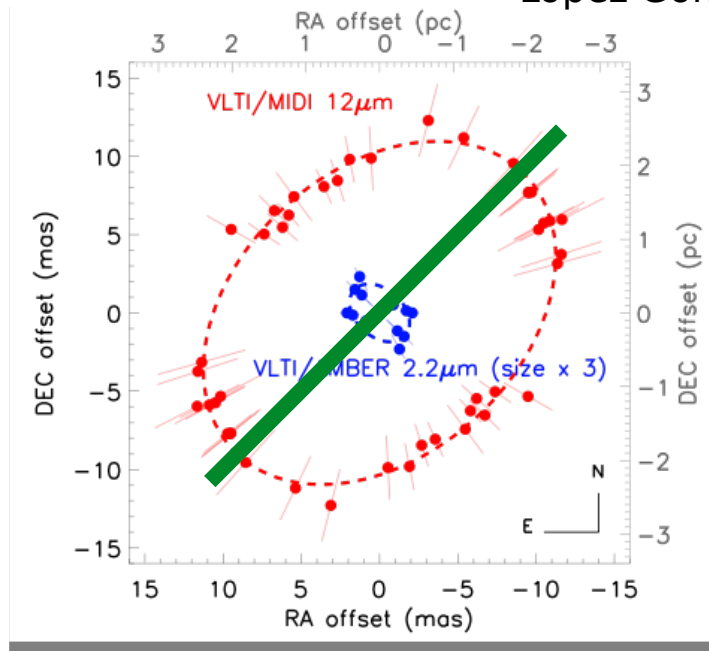


NGC1068;
López Gonzaga et al.2014



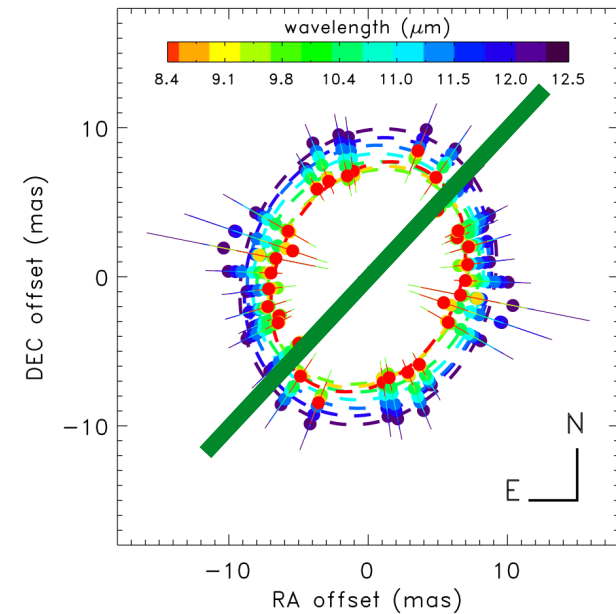
23 sources: 7 with good *uv* coverage;
5 of those 7 with polar elongation

López Gonzaga et al. 2016



NGC3783; Hönicg et al. 2013

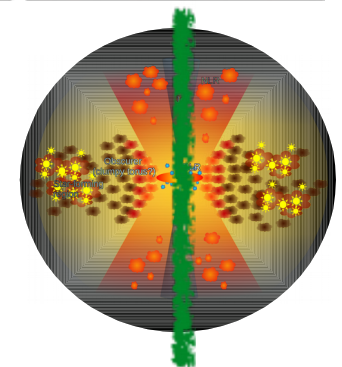
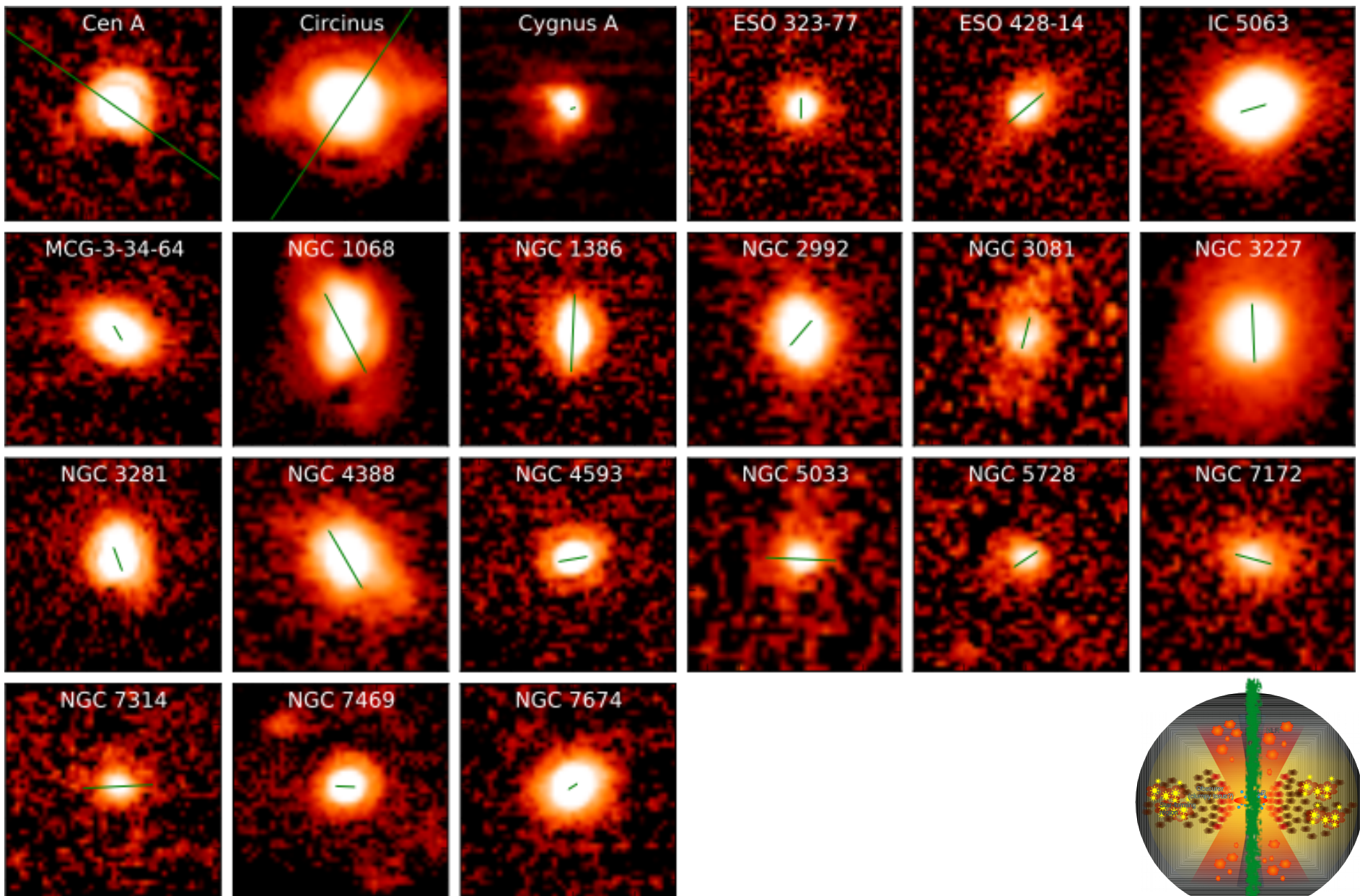
Gaussian size at 58m baseline



NGC424; Hönicg et al. 2012

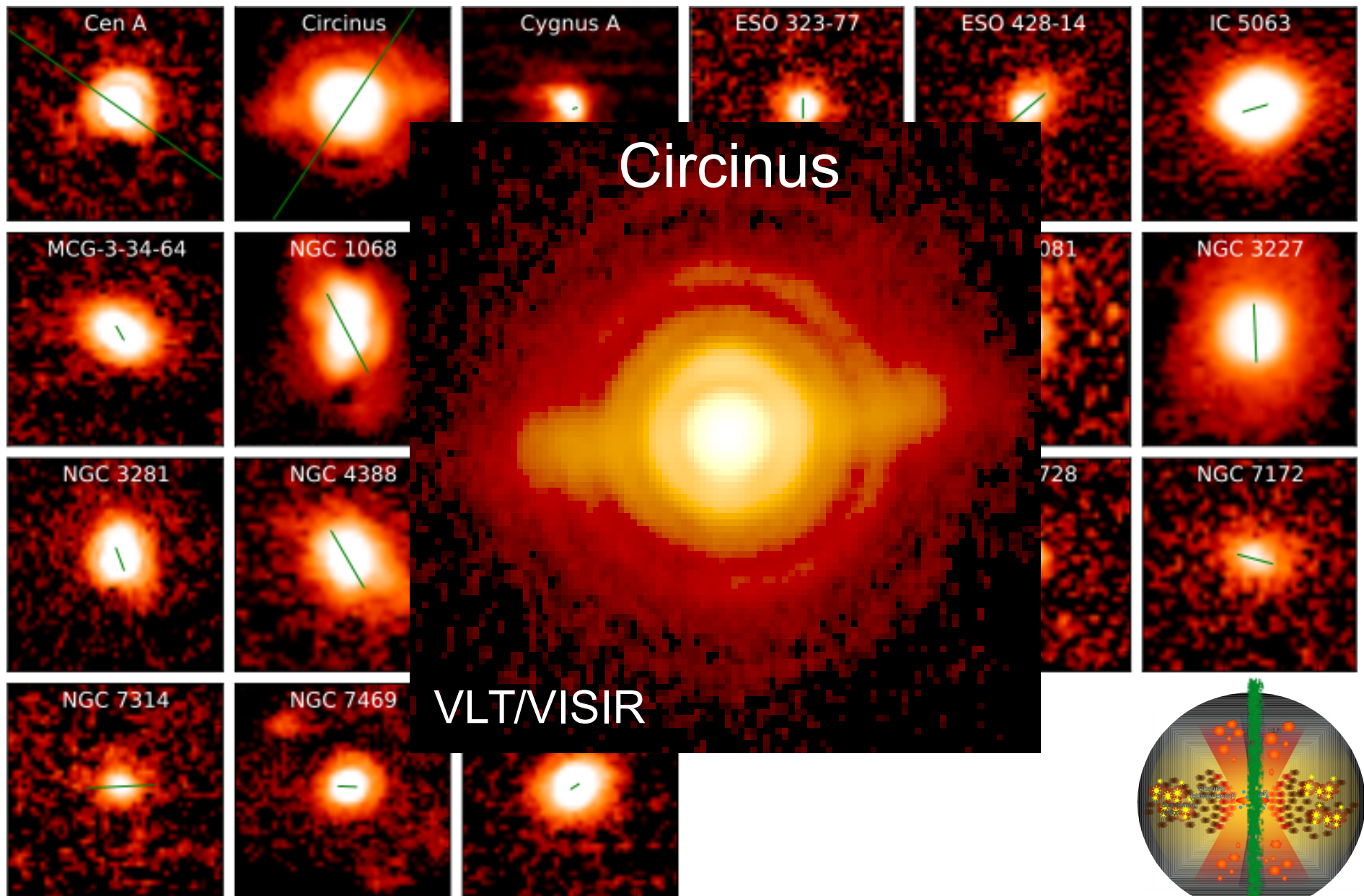
MIR: polar elongation on large scales

Asmus, Honig, Gandhi (2016)

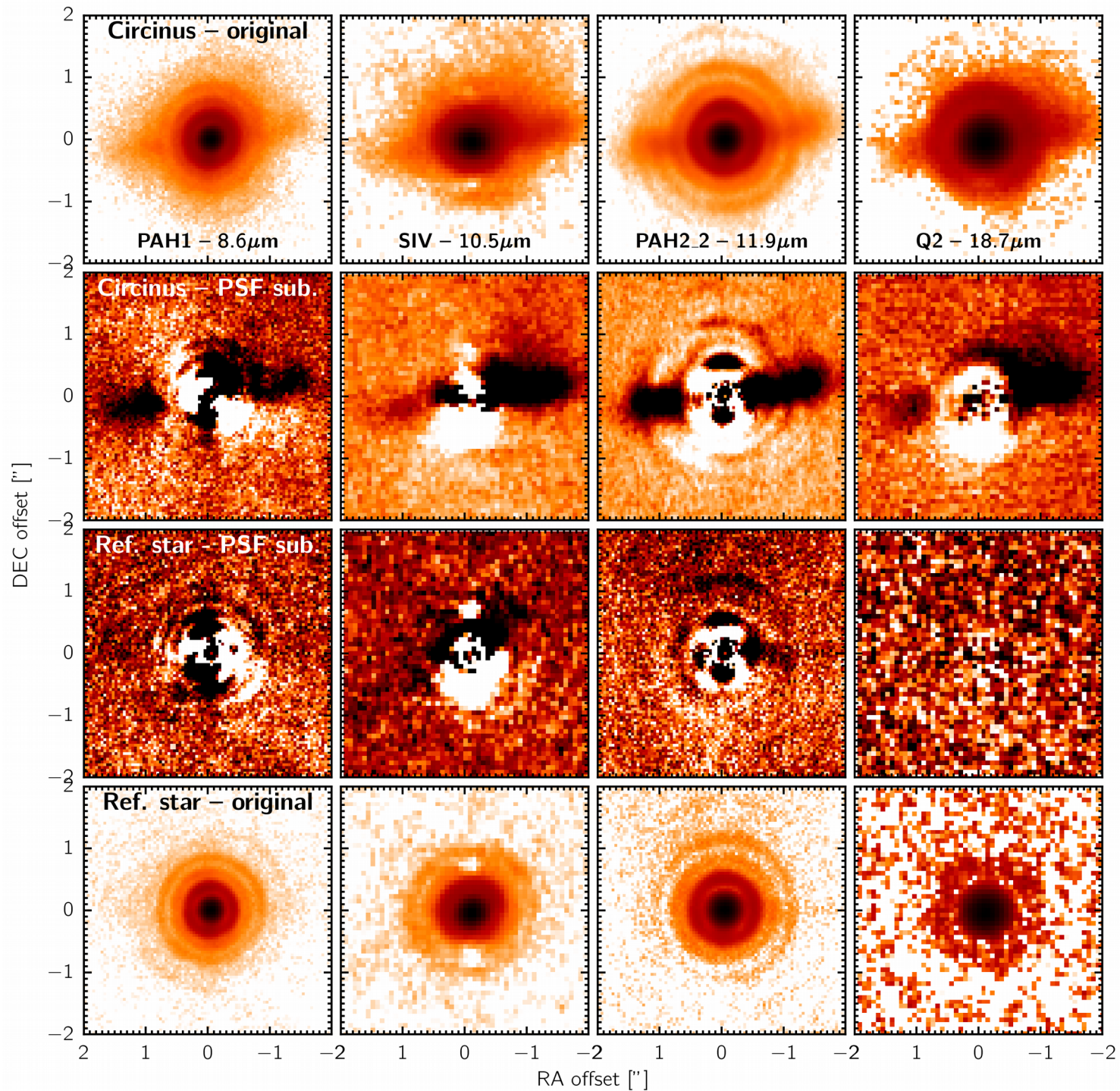


MIR: polar elongation on large scales

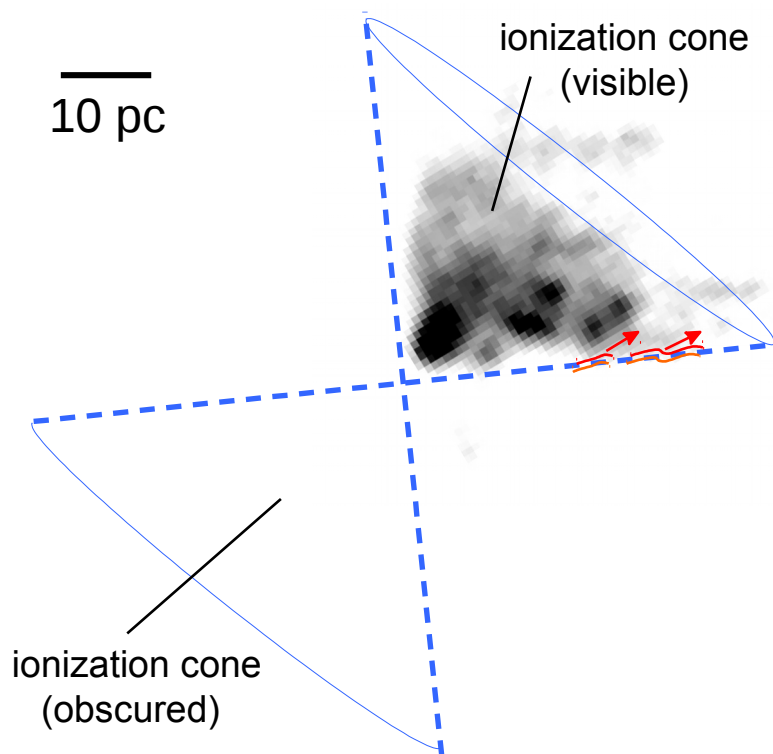
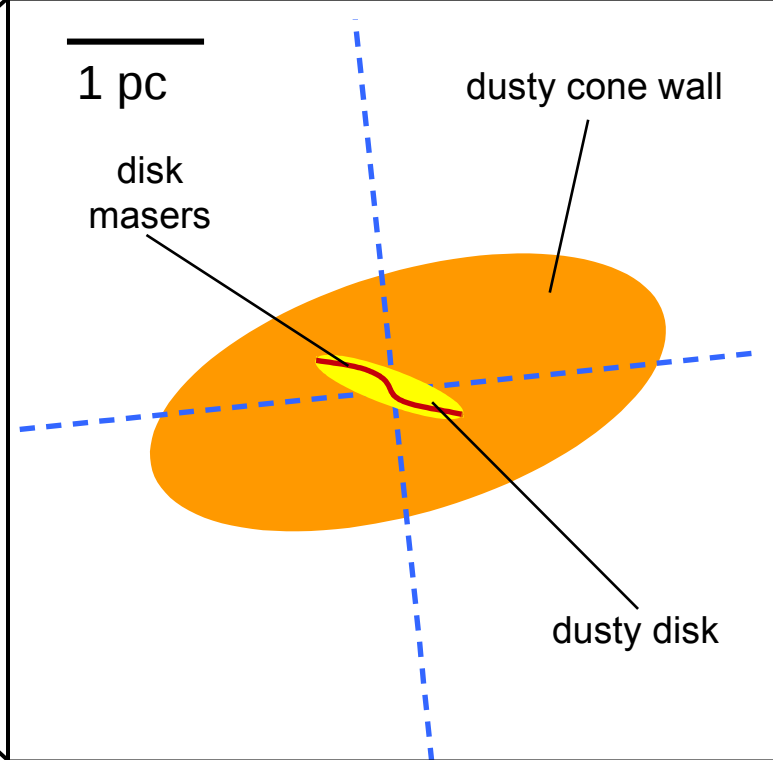
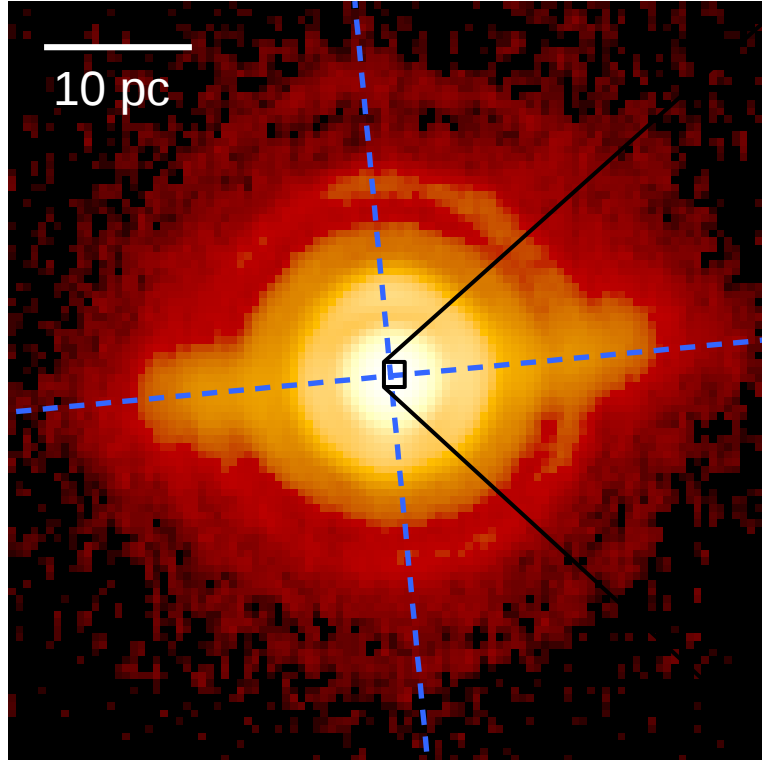
Asmus, Honig, Gandhi (2016)

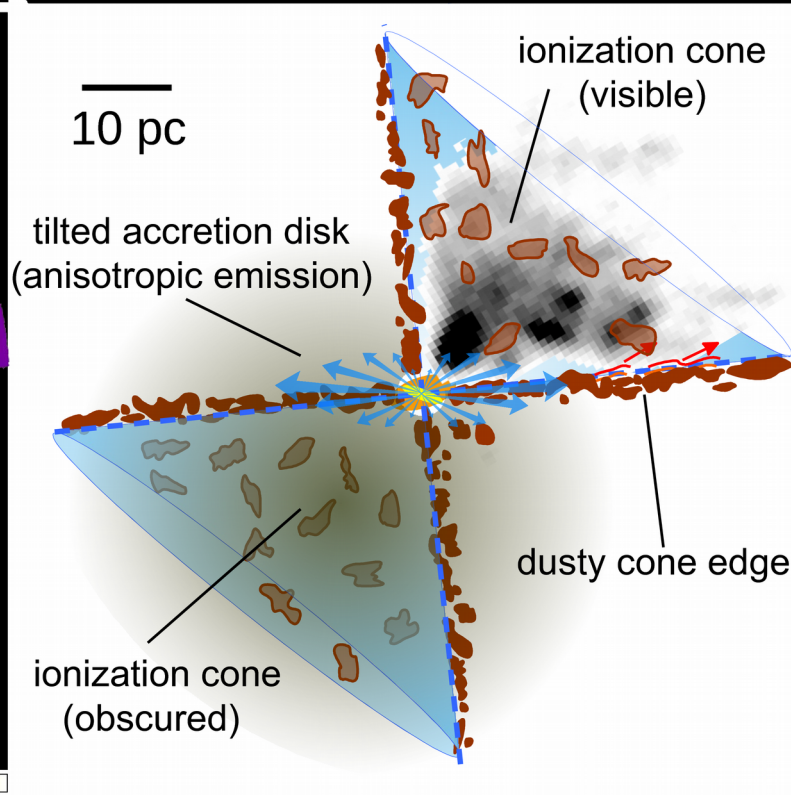
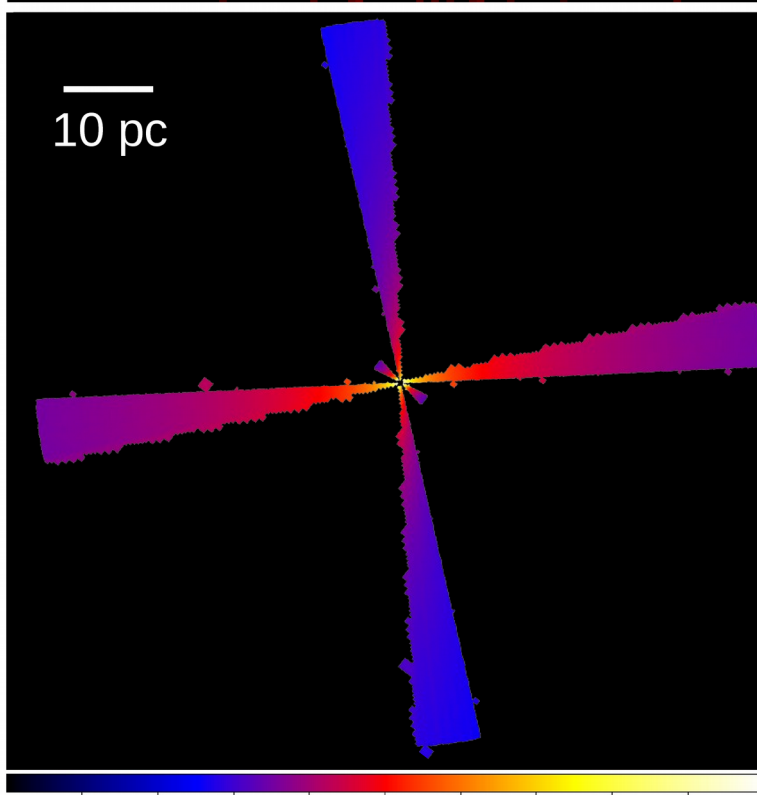
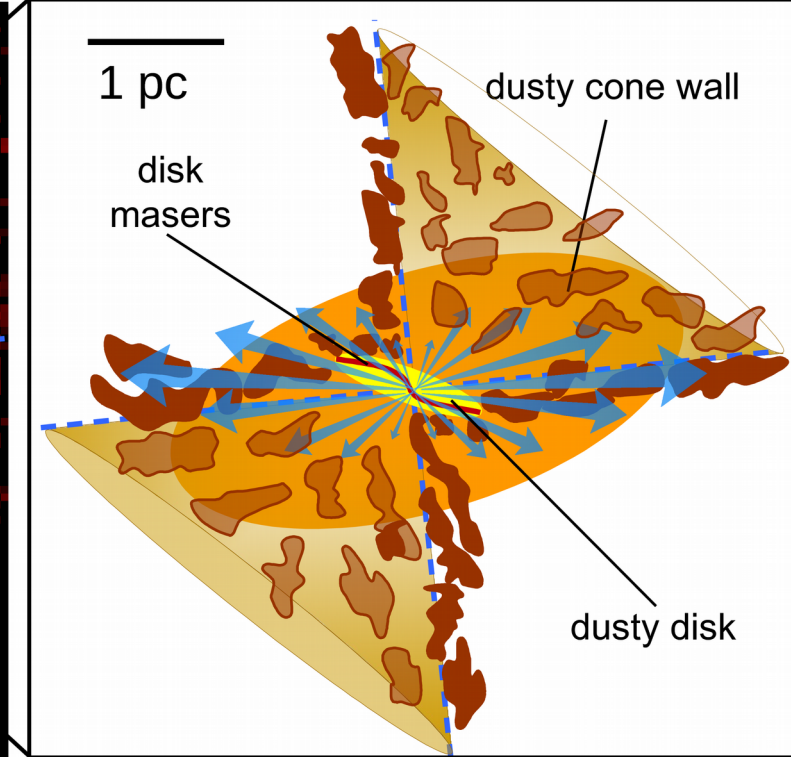
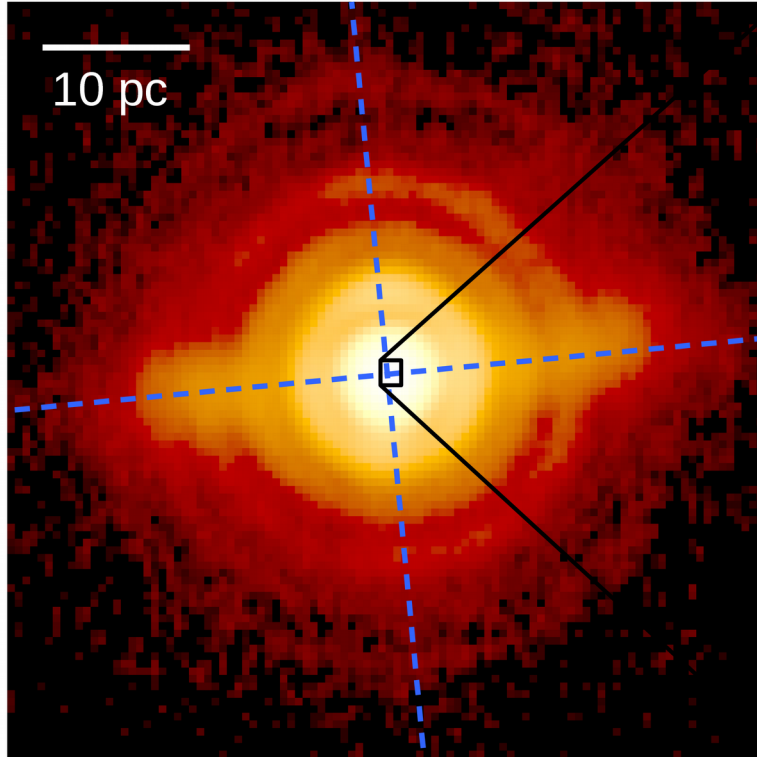


MIR morphology of Circinus: extended polar bar

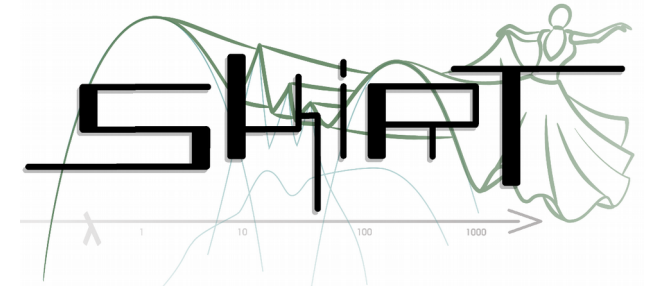
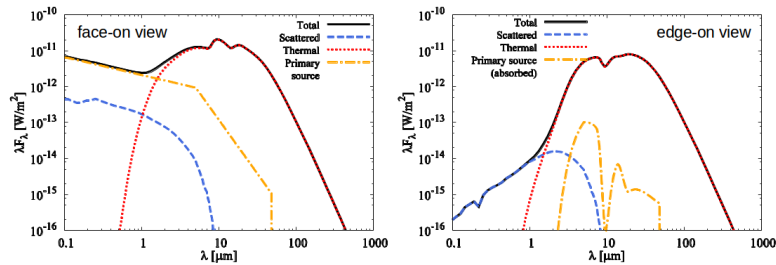


VLT/VISIR



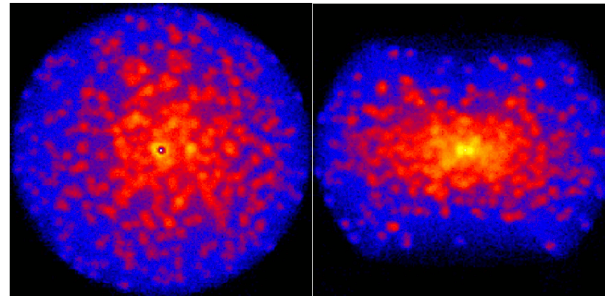


Monte Carlo radiative transfer

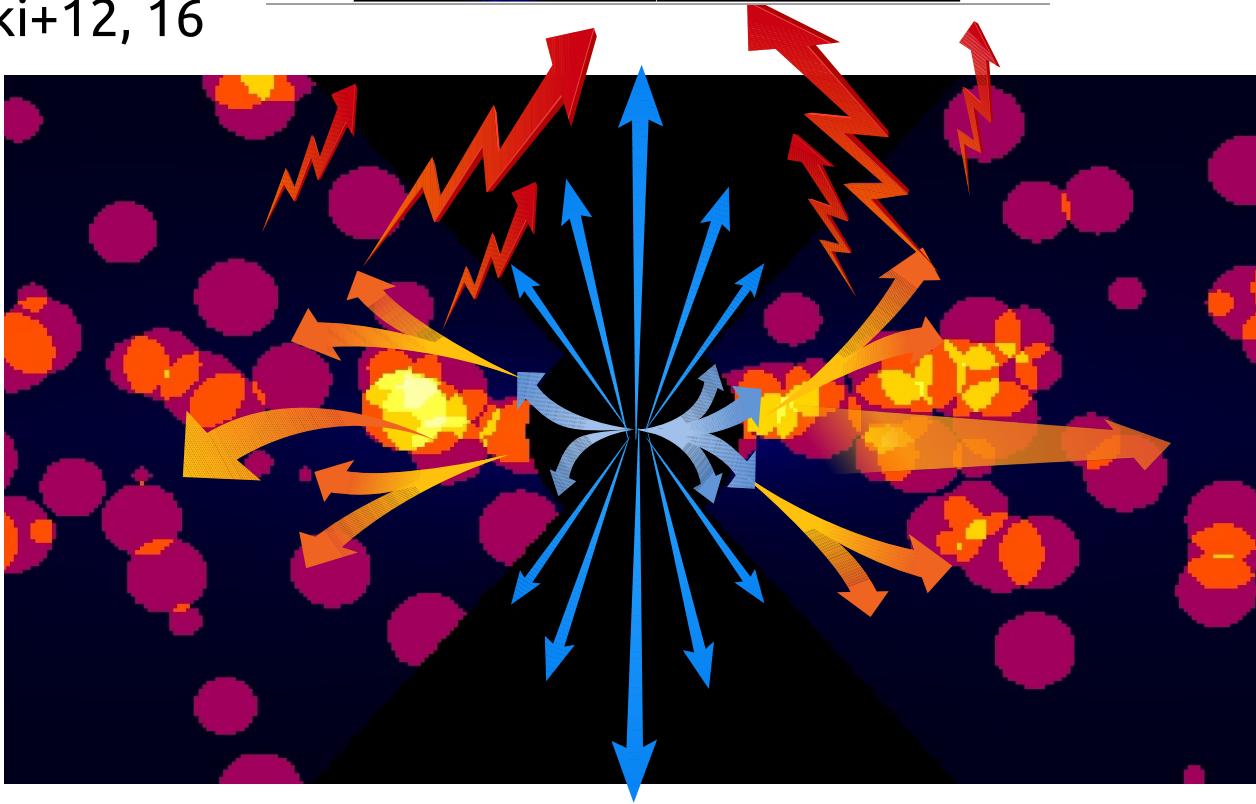


<http://www.skirt.ugent.be>

Baes+11;
Baes & Camps 15;
Camps & Baes 15

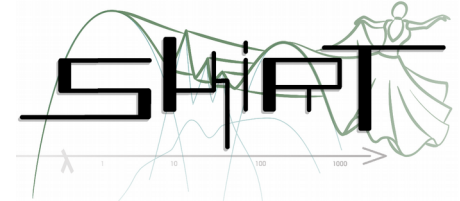


Stalevski+12, 16

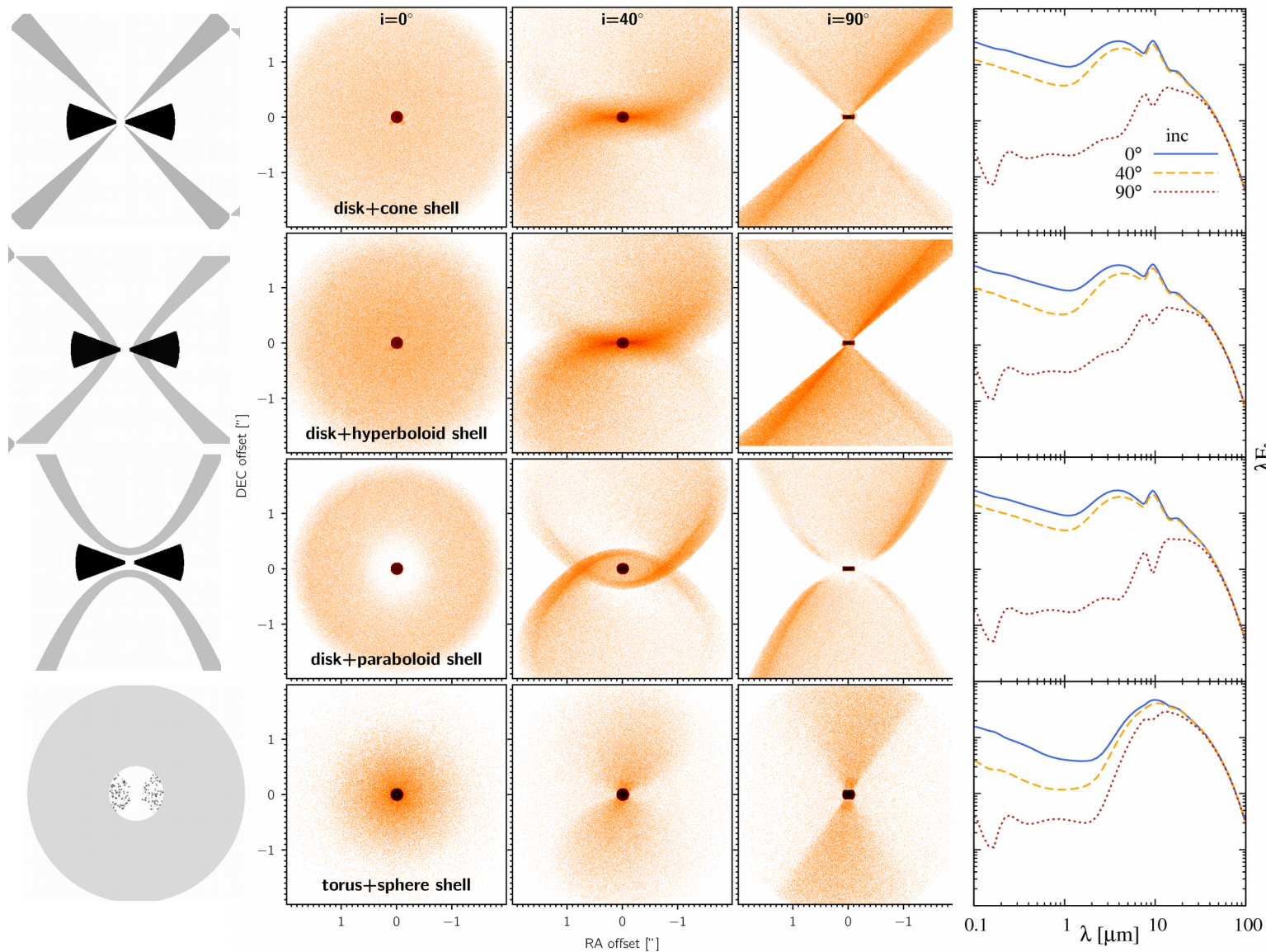


Which geometry can reproduce morphology?

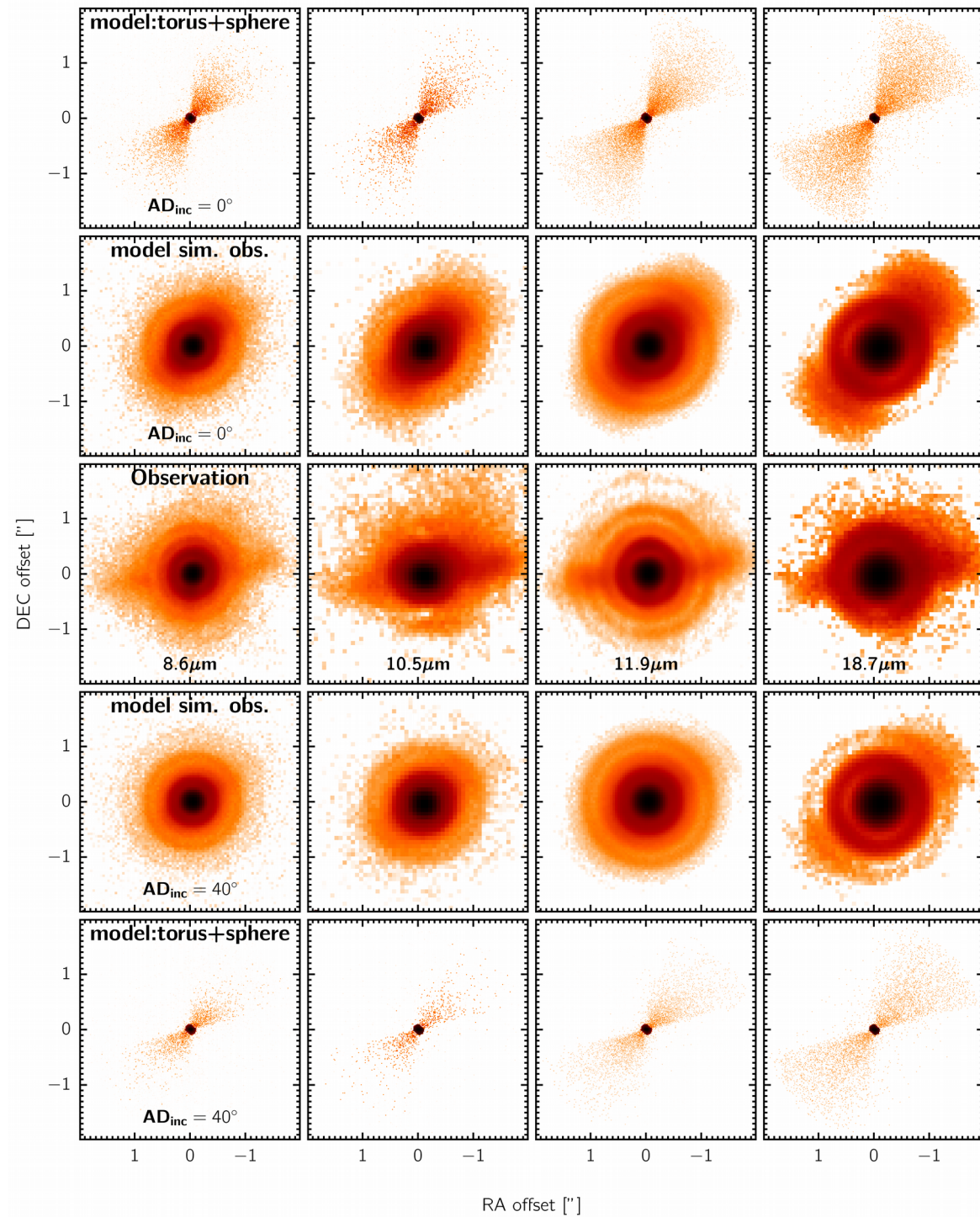
Monte Carlo radiative transfer
with



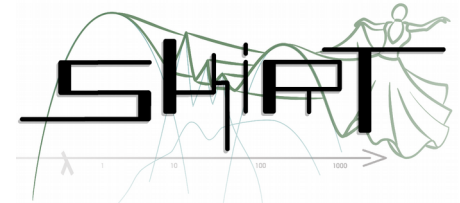
<http://www.skirt.ugent.be>



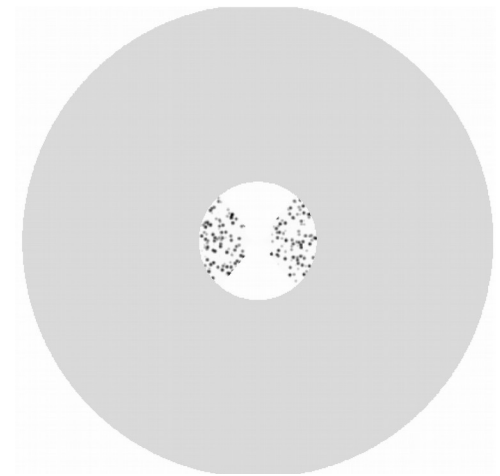
torus+sphere shell: does not work



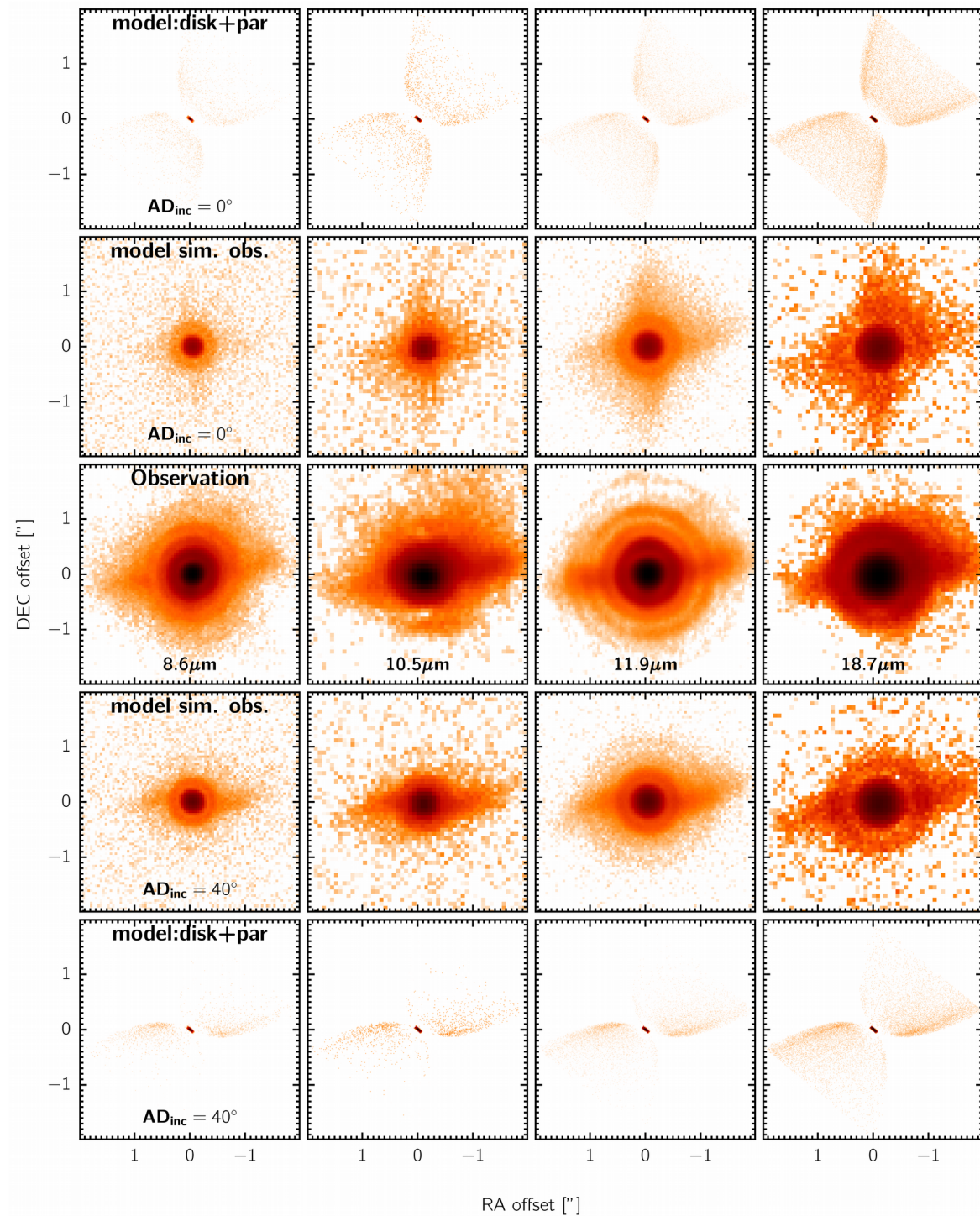
Monte Carlo radiative transfer
with



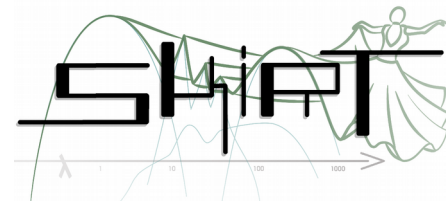
<http://www.skirt.ugent.be>



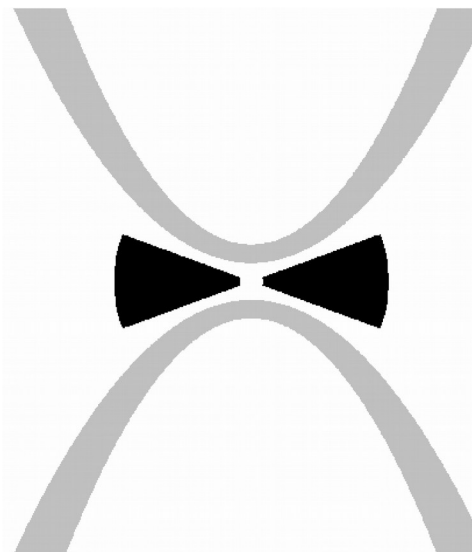
disk+paraboloid: does not work



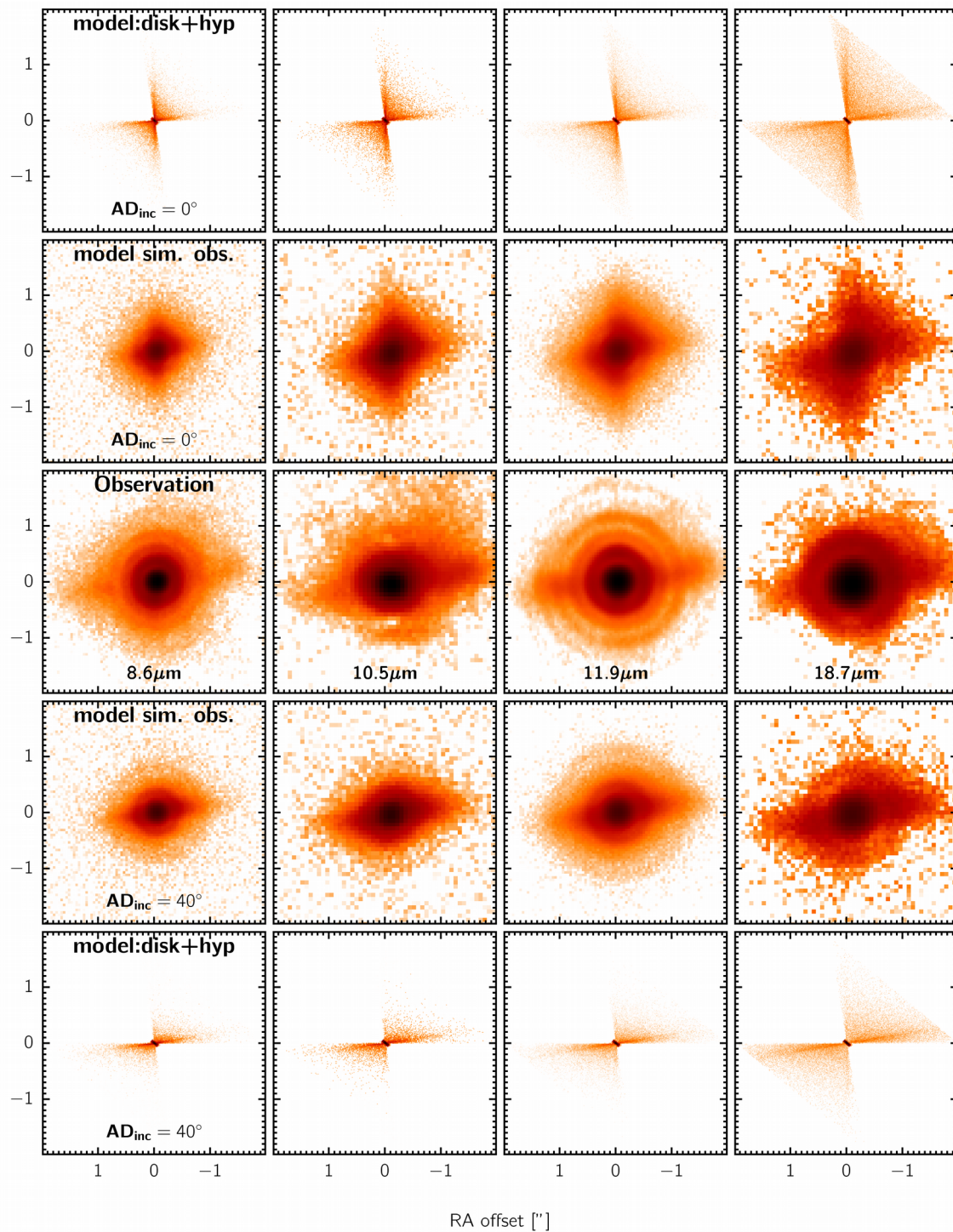
Monte Carlo radiative transfer
with



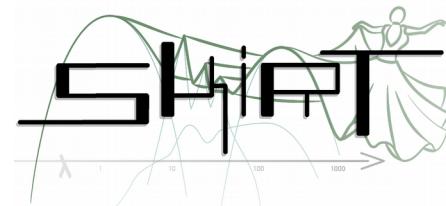
<http://www.skirt.ugent.be>



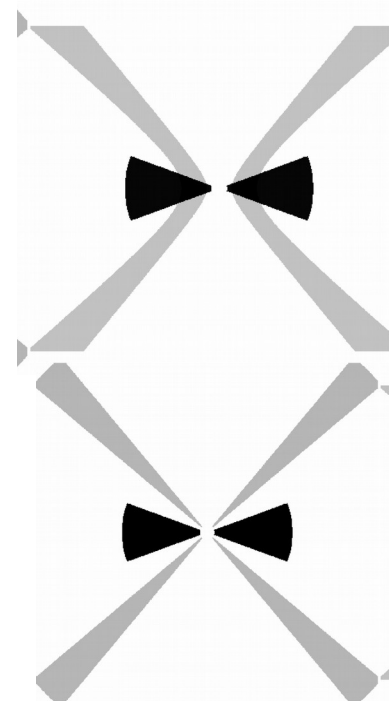
disk+hyperboloid/cone: might work !



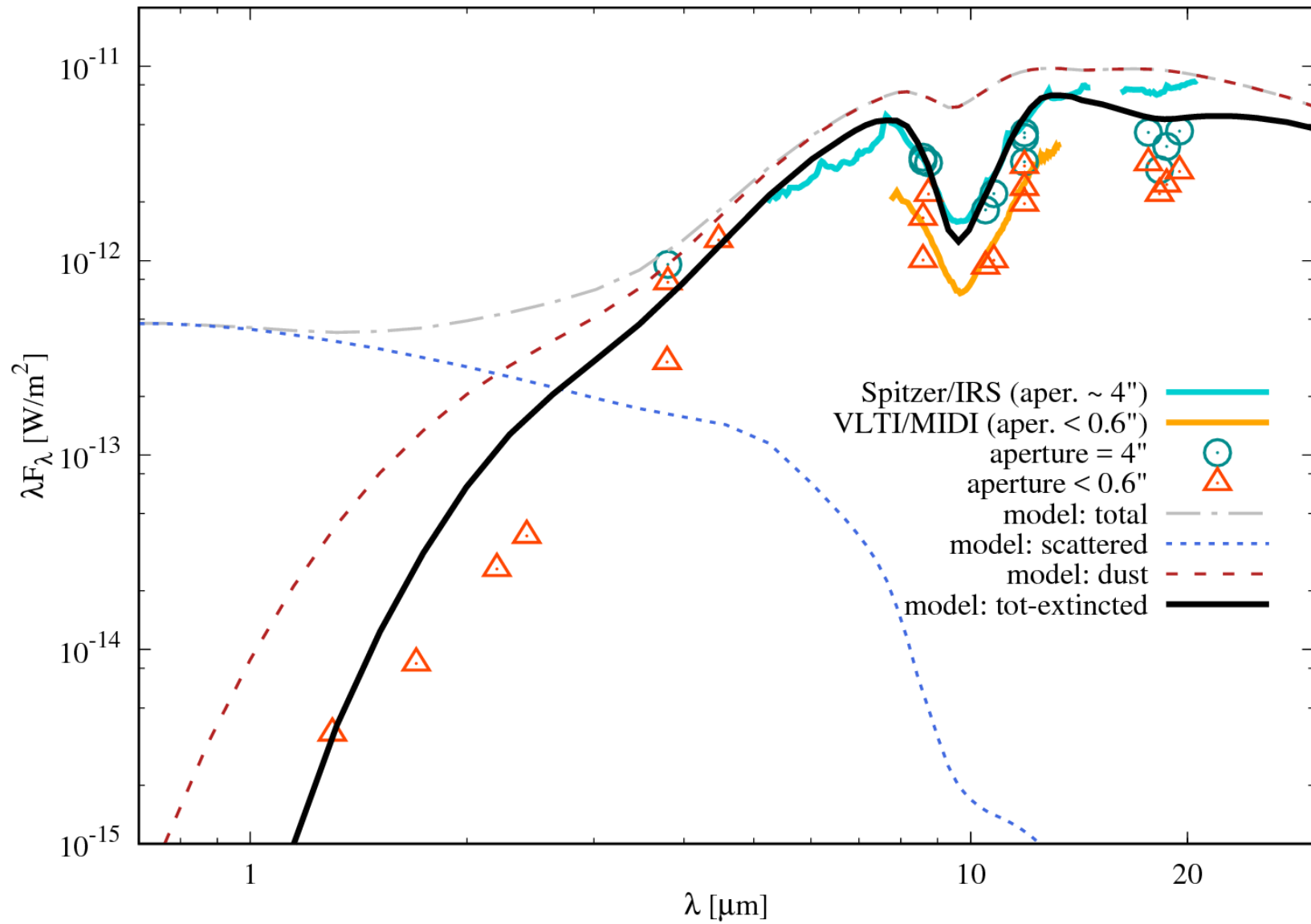
Monte Carlo radiative transfer
with



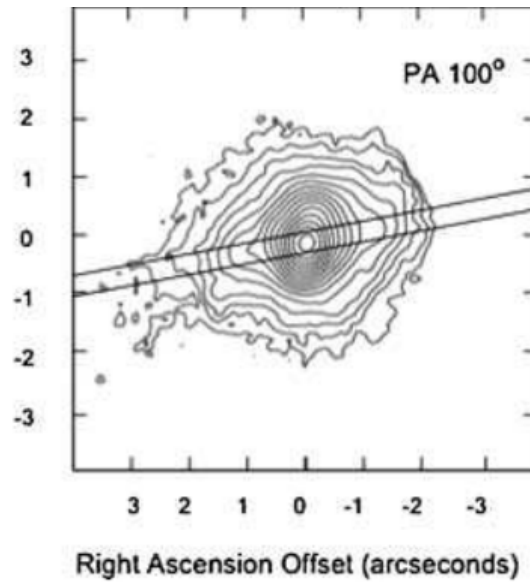
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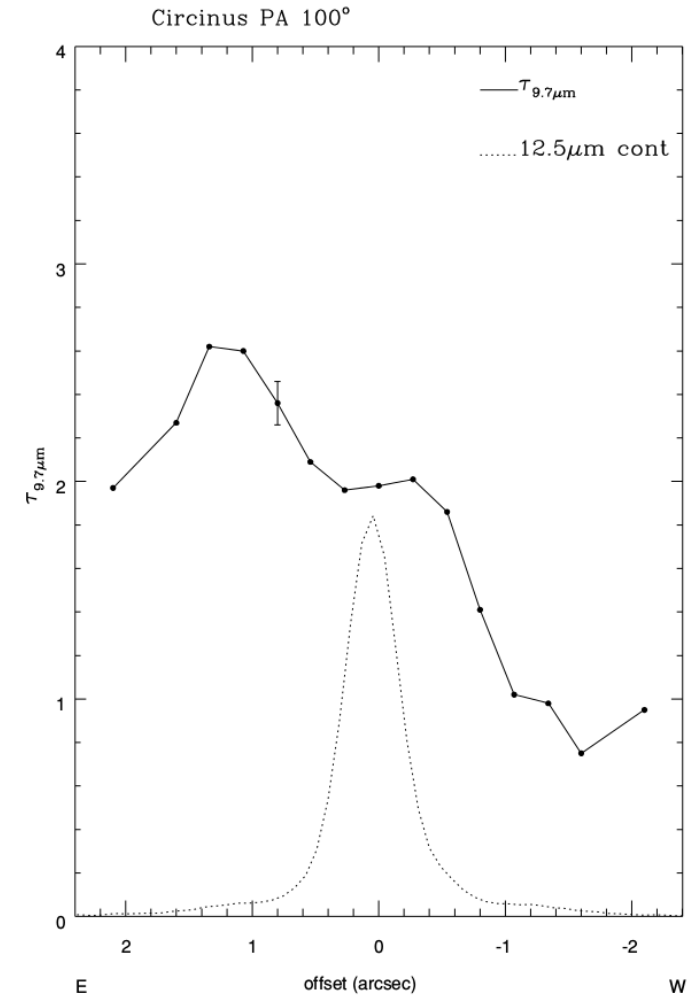
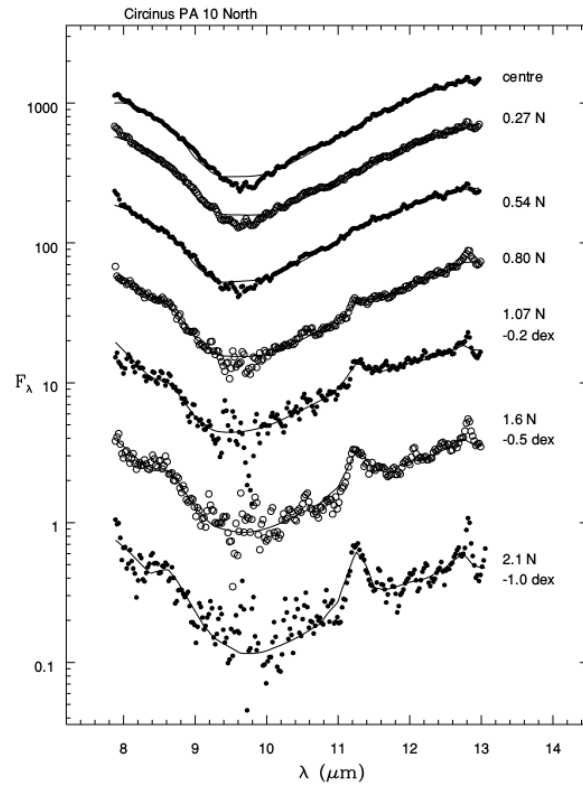
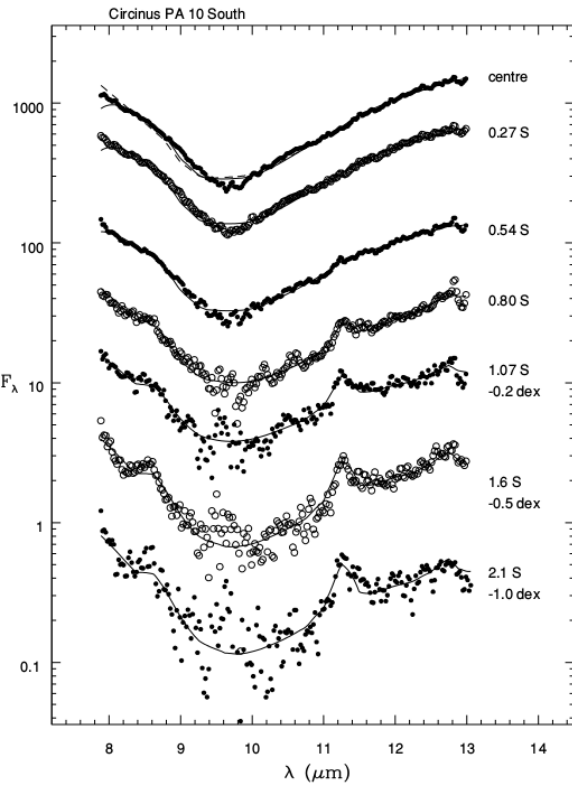
Good match with SED !



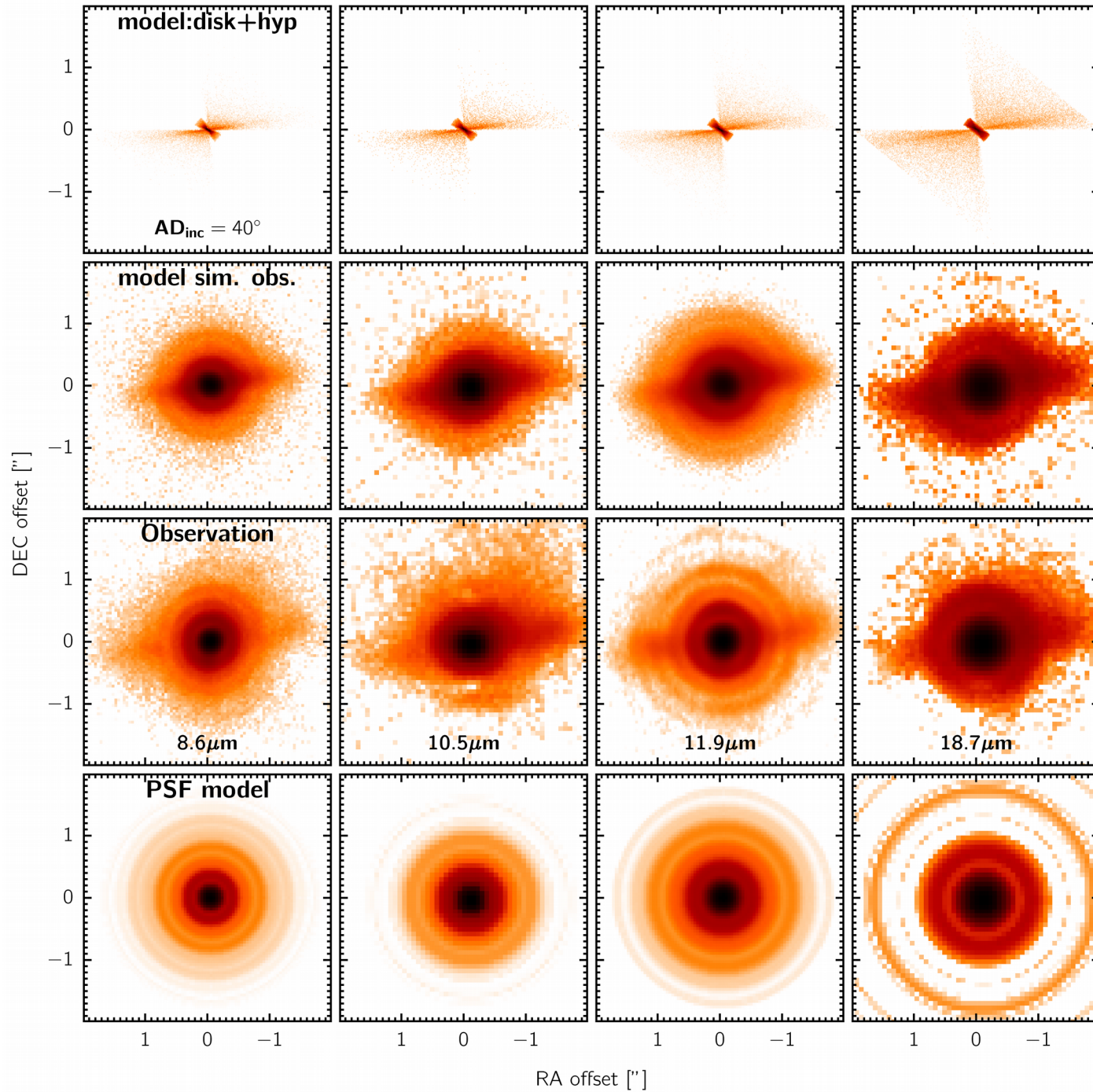
[Significant foreground absorption by host galaxy]



Roche et al. 2006

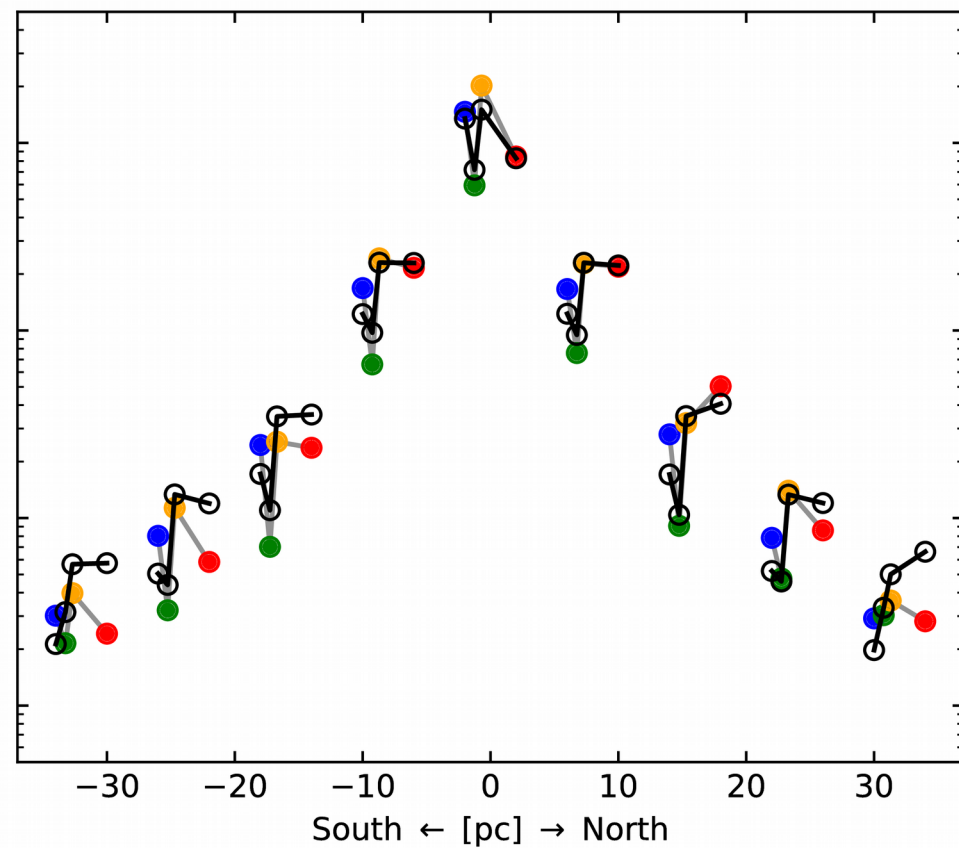
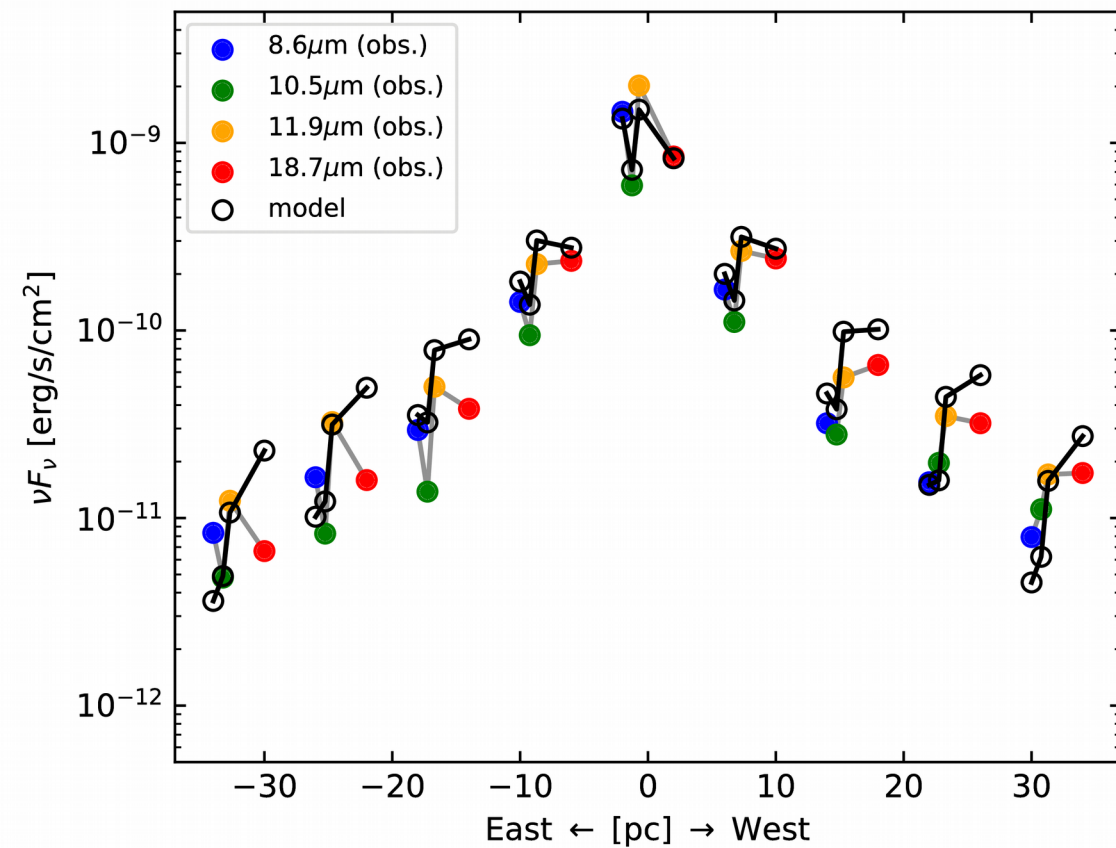
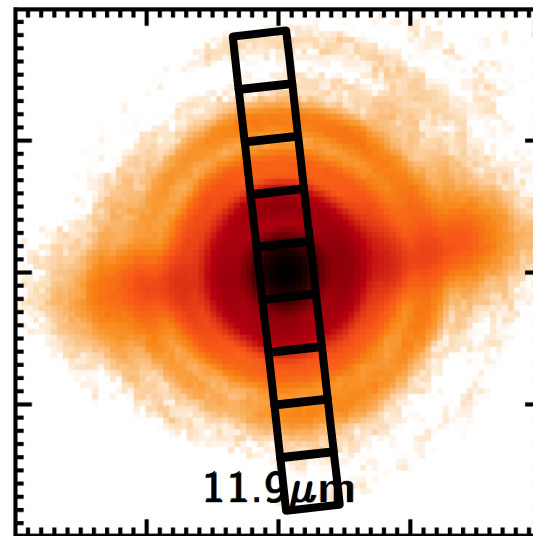
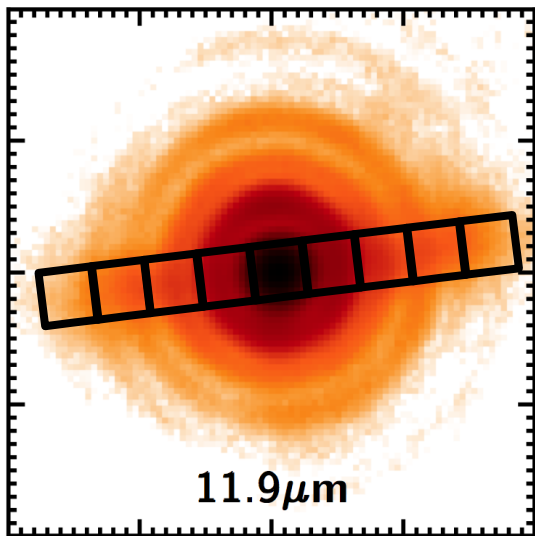


Good match with MIR morphology !



Good match of “mini-SEDs” !

Stalevski, Asmus & Tristram, submitted

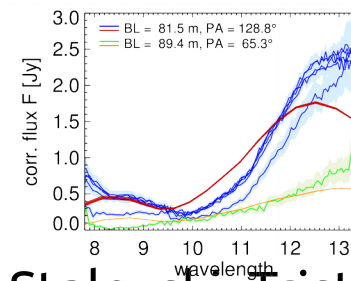
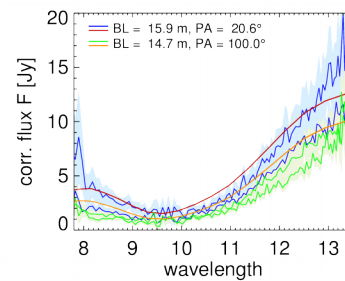
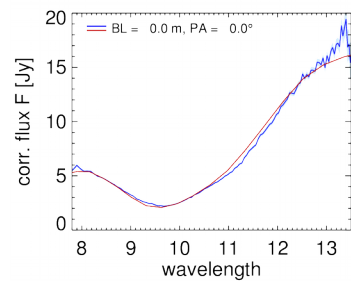
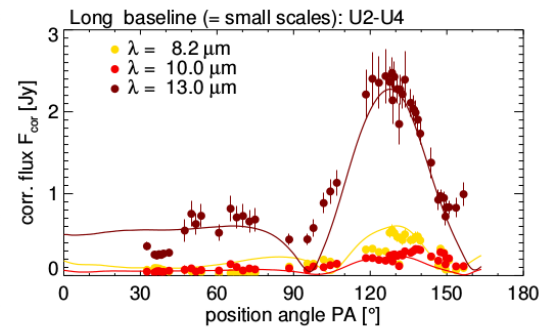
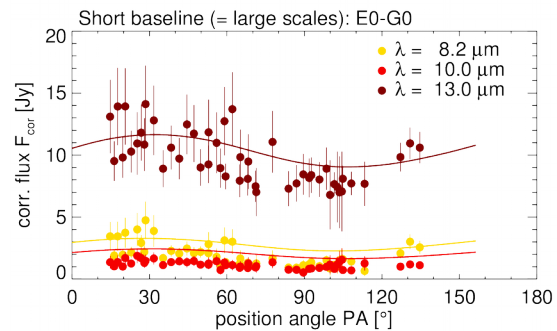
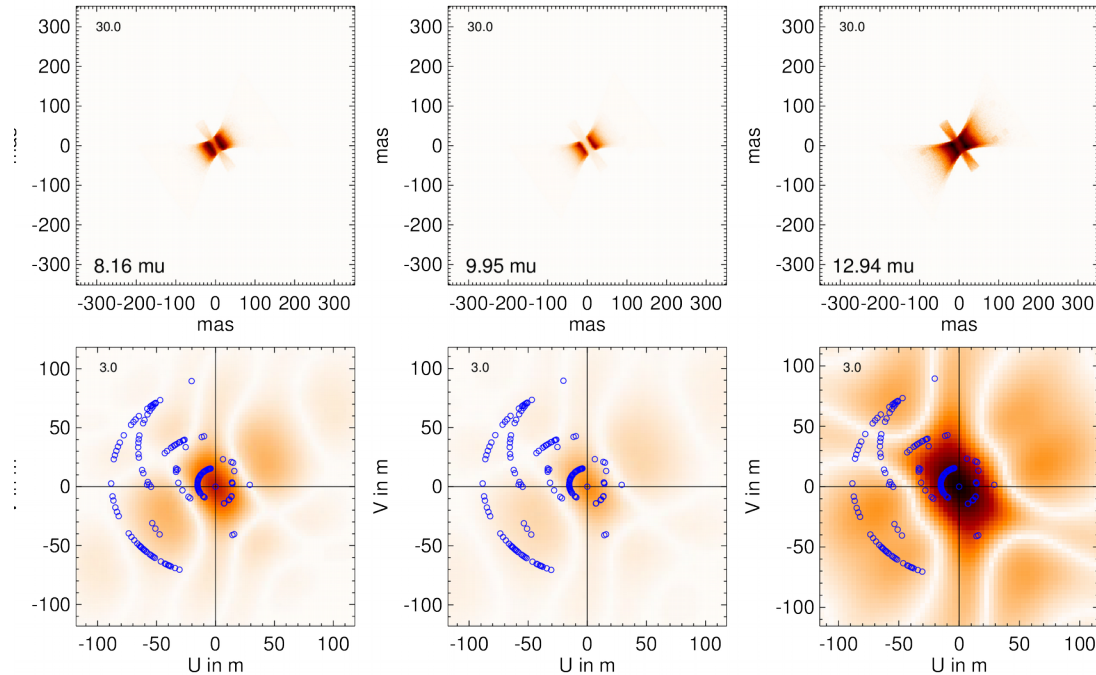


Good match with VLTI/MIDI interferometry !

Circinus Cone Model

Model read from tor_t9-5.0sg_Rout1.5_Rin0.13_p0_oa10_hypSh_tv-30.0g_D4_a0.2-0.4_tit25_L0.25_oa30_i90_

PA = -55.0°, FLX = 0.60, SIZ = 1.00, TAU = 1.7



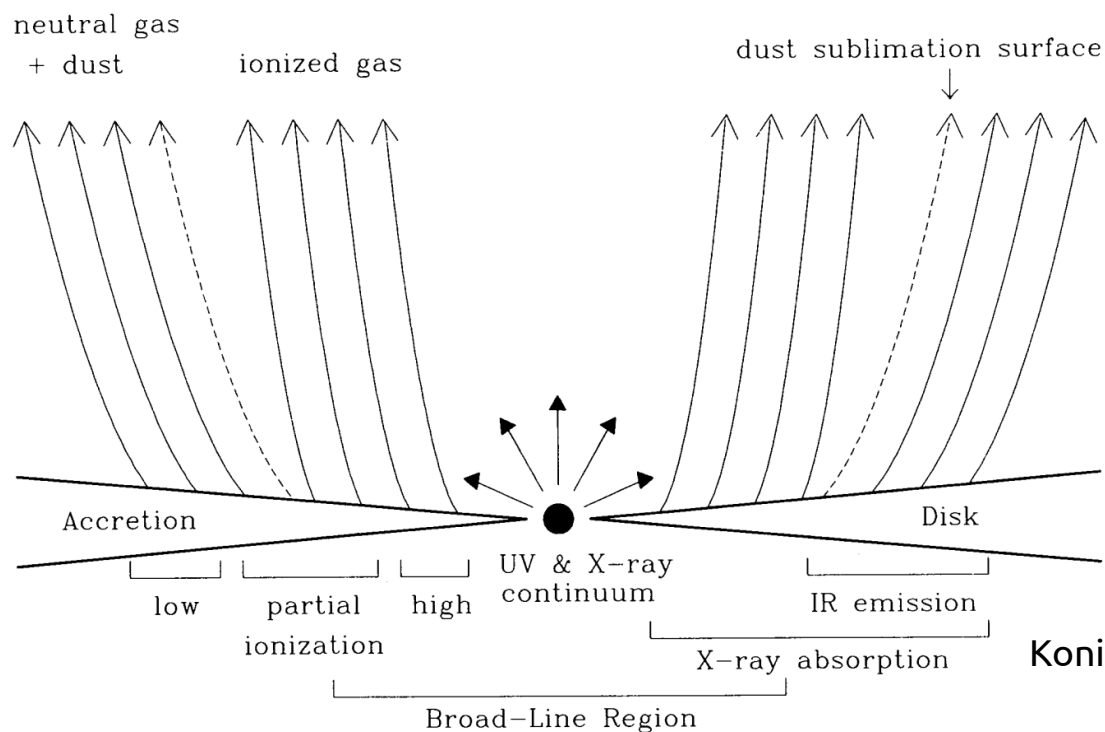
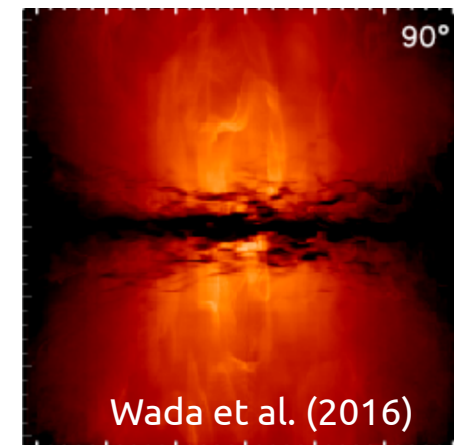
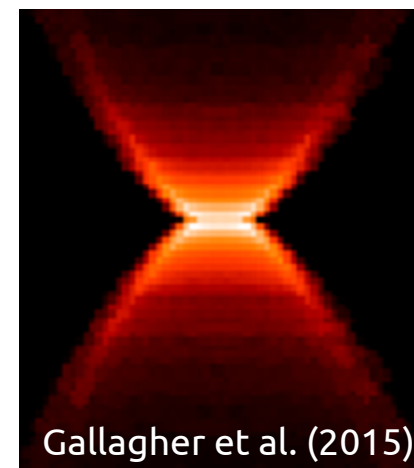
Radiation pressure driven dusty wind

Radiation pressure drives away the gas and dust from the accretion disk to the polar regions, leaving behind what may constitute the obscuring "dusty torus"

[Konigl & Kartje (1994); Keating et al. (2012); Roth et al. (2012); Gallagher et al. (2015)]

[Dorodnitsyn et al. 2011, 2012; Dorodnitsyn & Kallman 2012; Dorodnitsyn et al. 2016]

[Wada (2012), Wada et al. (2016), Chan & Krolik (2016, 2017)]



Konigl & Kartje (1994)

Keeping an eye out for AGN polar dust with upgraded VLT/VISIR

Are powerful polar dusty winds ubiquitous in AGN?

(PI: Daniel Asmus)

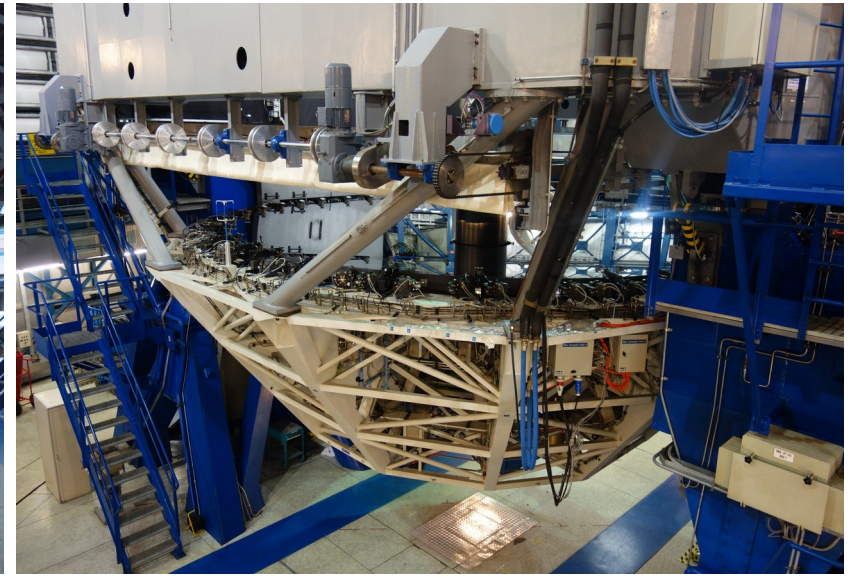
(deep imaging of 9 nearby type 2 AGN)

Revolutionising our view of AGN: from the classical torus to the new dusty wind paradigm

(PI: Sebastian Hönig) (spectroscopy and multi-band imaging of 18 AGN)

Does a hollow dusty cone instead of a dusty torus explain the mid-IR emission of the Circinus AGN?

(PI: Marko Stalevski) (coronagraphy + sparse aperture masking of Circinus)

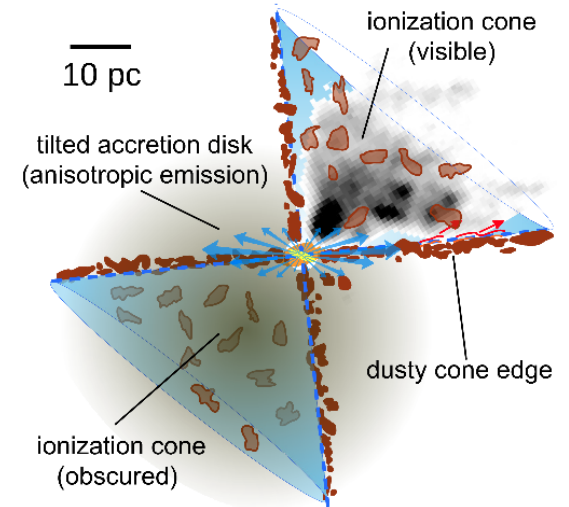


Conclusions

Stalevski, Asmus & Tristram, submitted

* AGN in Circinus dusty disk + dusty polar wind explains:

- MIR morphology
- SED
- Resolved photometry



* A prototype for polar-elongated AGN

* Caution when using torus models to interpret the data

