Disks and cones: resolving the dusty torus with mid-infrared interferometry

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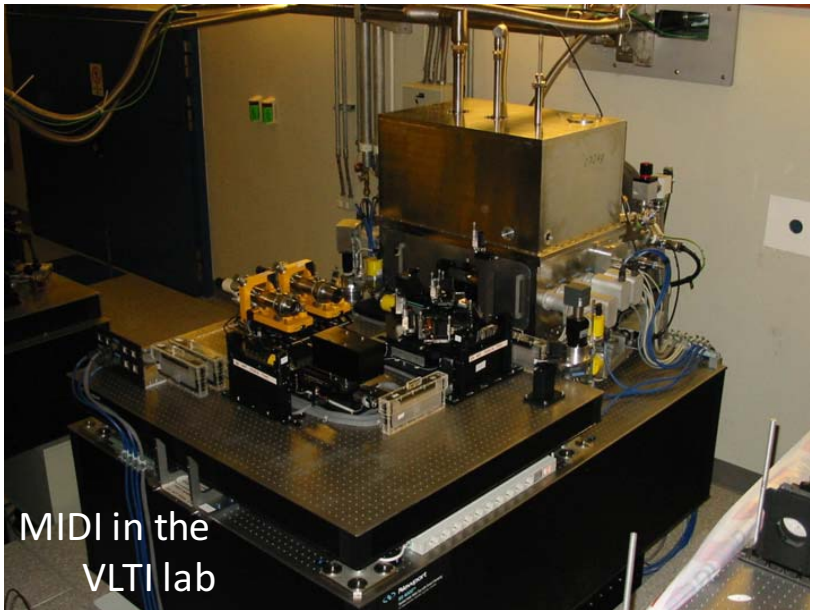
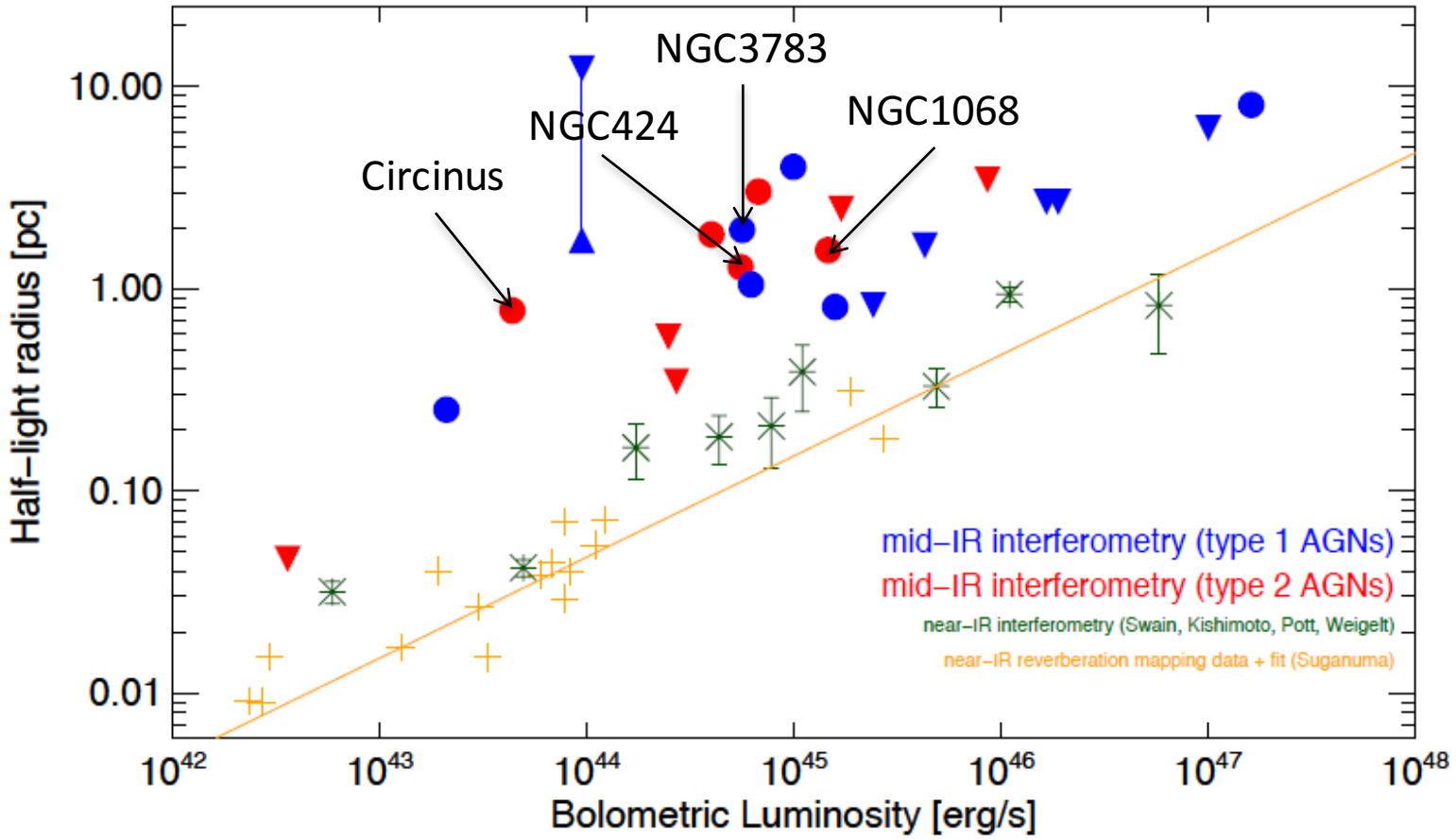
MIDI – VLTI's mid-infrared interferometer

- MID-infrared Interferometric instrument
- Two beam Michelson type interferometer
- N-band (8 to 13 μm) dispersed fringes:
  - NaCl prism ($R = \lambda / \delta\lambda \sim 30$)


MIDI in the VLTI lab

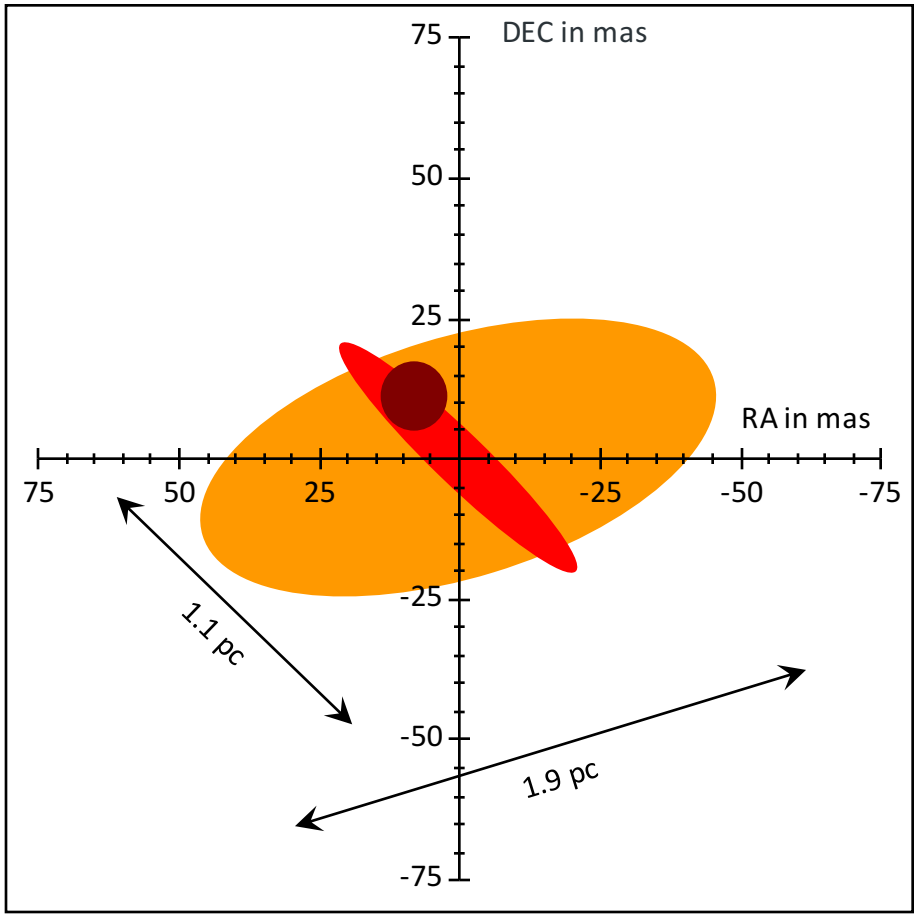
courtesy of G. Hüdepohl

Surveys: the AGN Large Programme



↳ dust emission parsec-sized and with a large scatter

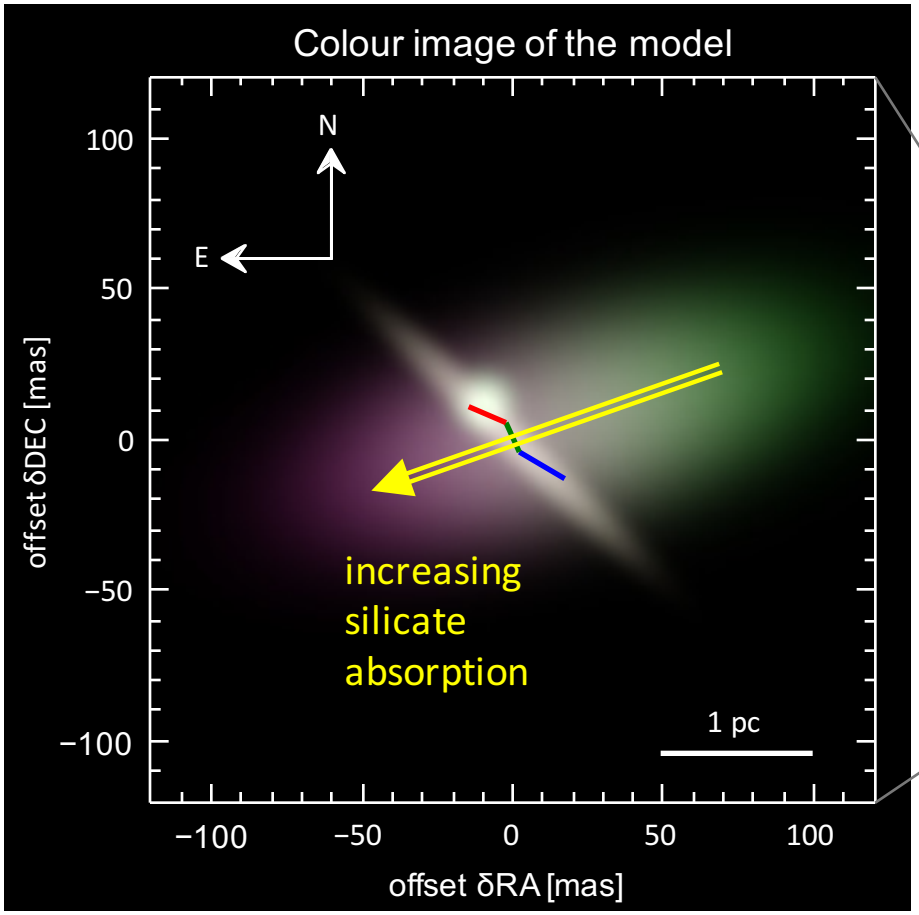
Circinus: modelling (3BB Gaussians)



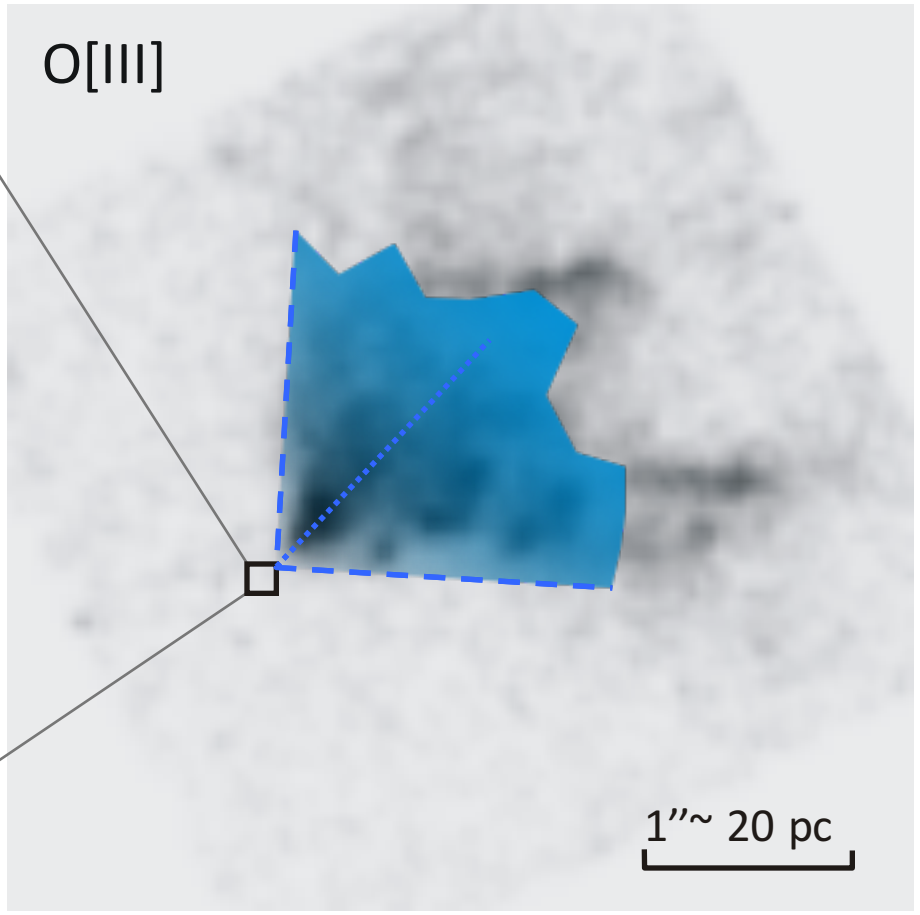
Three Blackbody Gaussians:

Size:	Δ_1 = 12 ± 2 mas
Silicate depth:	τ_1 = 1.2 ± 0.2
Temperature:	T_1 = 317 ± 22 K
Covering factor:	f_1 = 0.5 ± 0.3
Size:	Δ_2 = 57 ± 15 mas
Axis ratio:	r_2 = 0.16 ± 0.04
Position angle	α_2 = 46 ± 3°
Silicate depth:	τ_2 = 1.9 ± 0.4
Temperature:	T_2 = 290 ± 22 K
Covering factor:	f_2 = 0.6 ± 0.3
Size:	Δ_3 = 93 ± 12 mas
Axis ratio:	r_3 = 0.45 ± 0.07
Position angle:	α_3 = 107 ± 8°
Silicate depth:	τ_3 = 2.4 ± 0.6
Temperature:	T_3 = 304 ± 30 K
Covering factor:	f_3 = 0.3 ± 0.2

Detailed studies: The Circinus galaxy

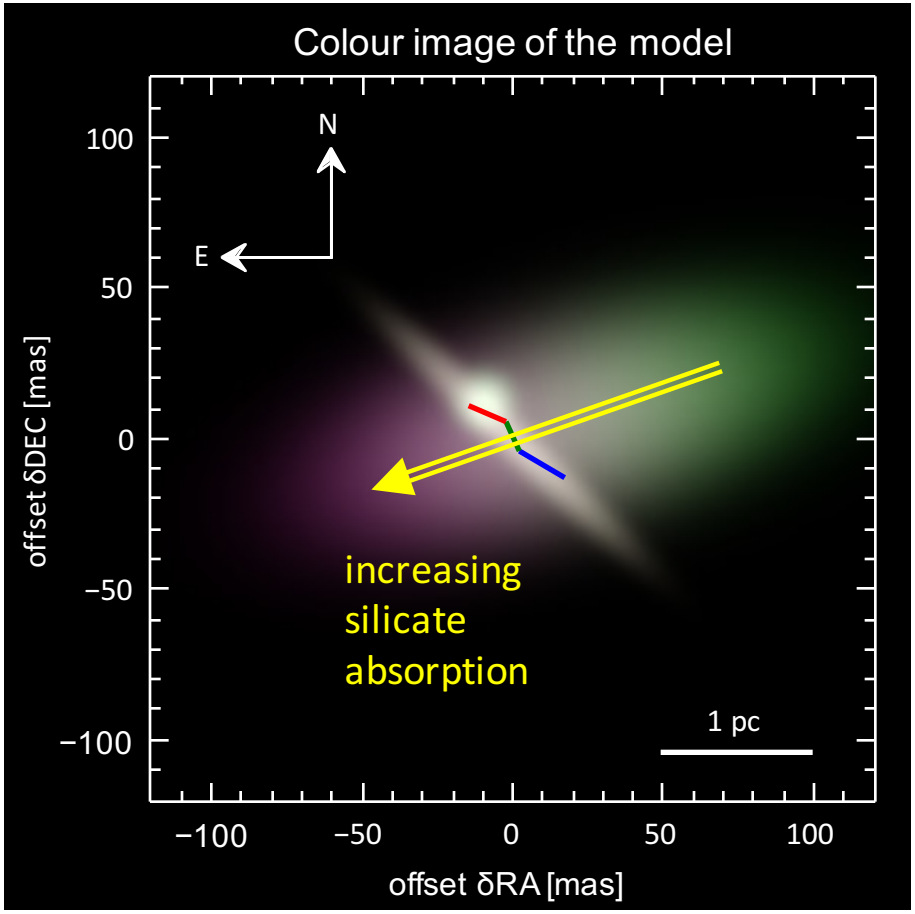


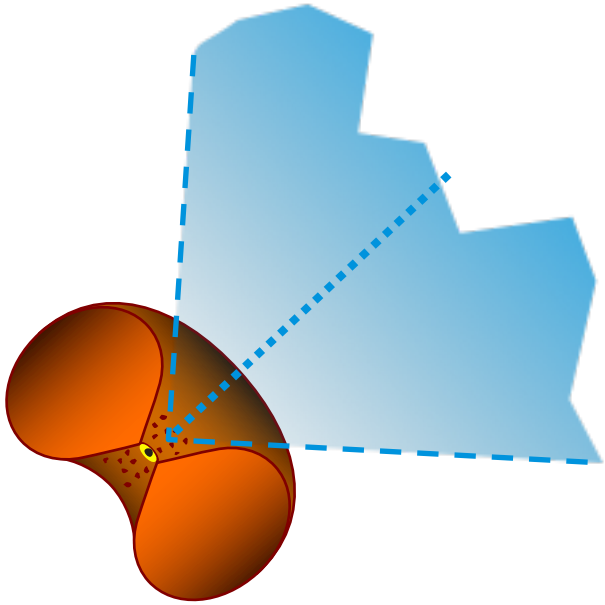
Tristram et al. 2014



Wilson et al. 2000

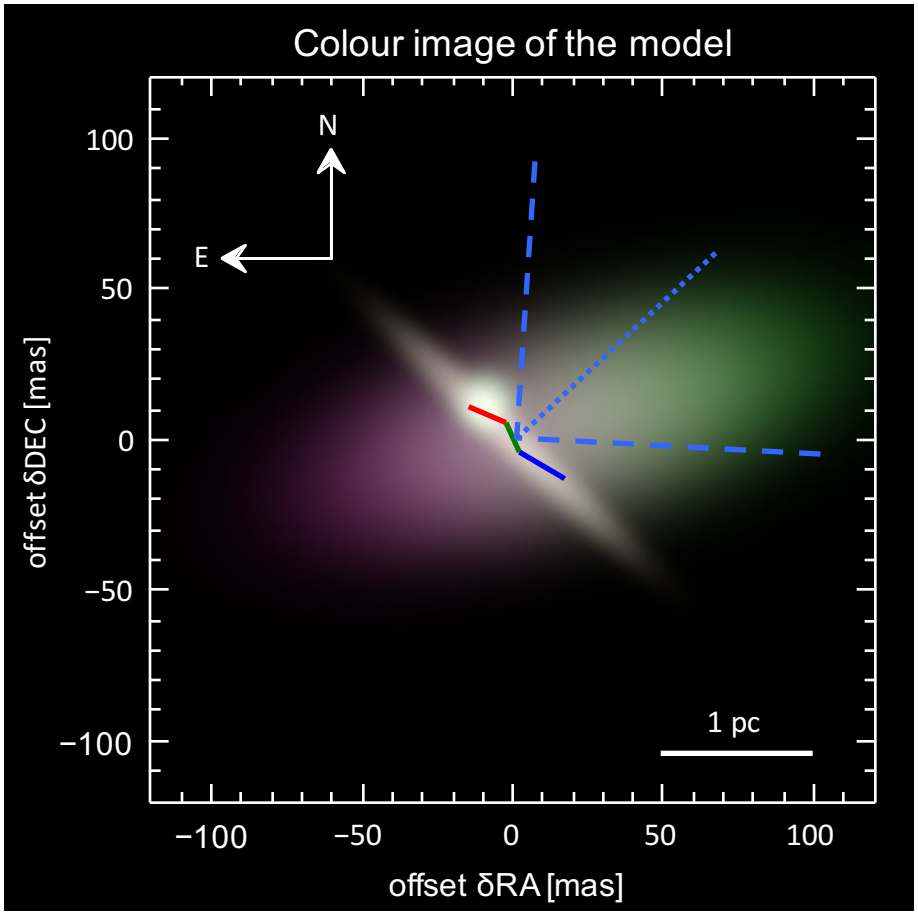
3. Individual sources: the Circinus galaxy



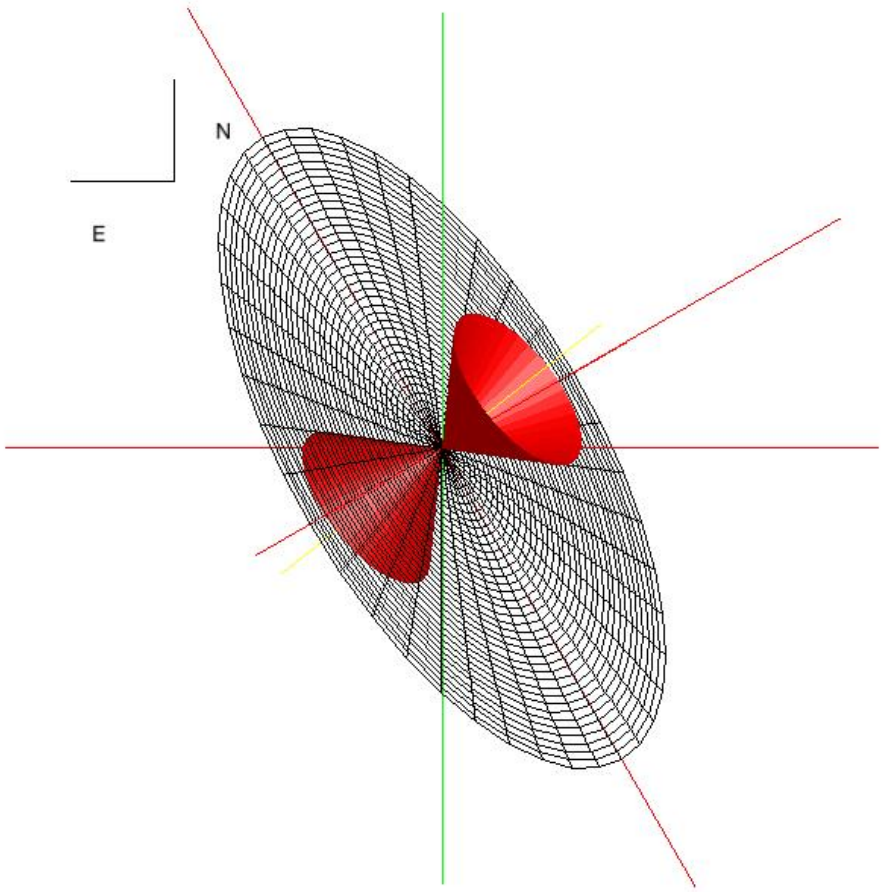


Tristram et al. 2014

3. Individual sources: the Circinus galaxy

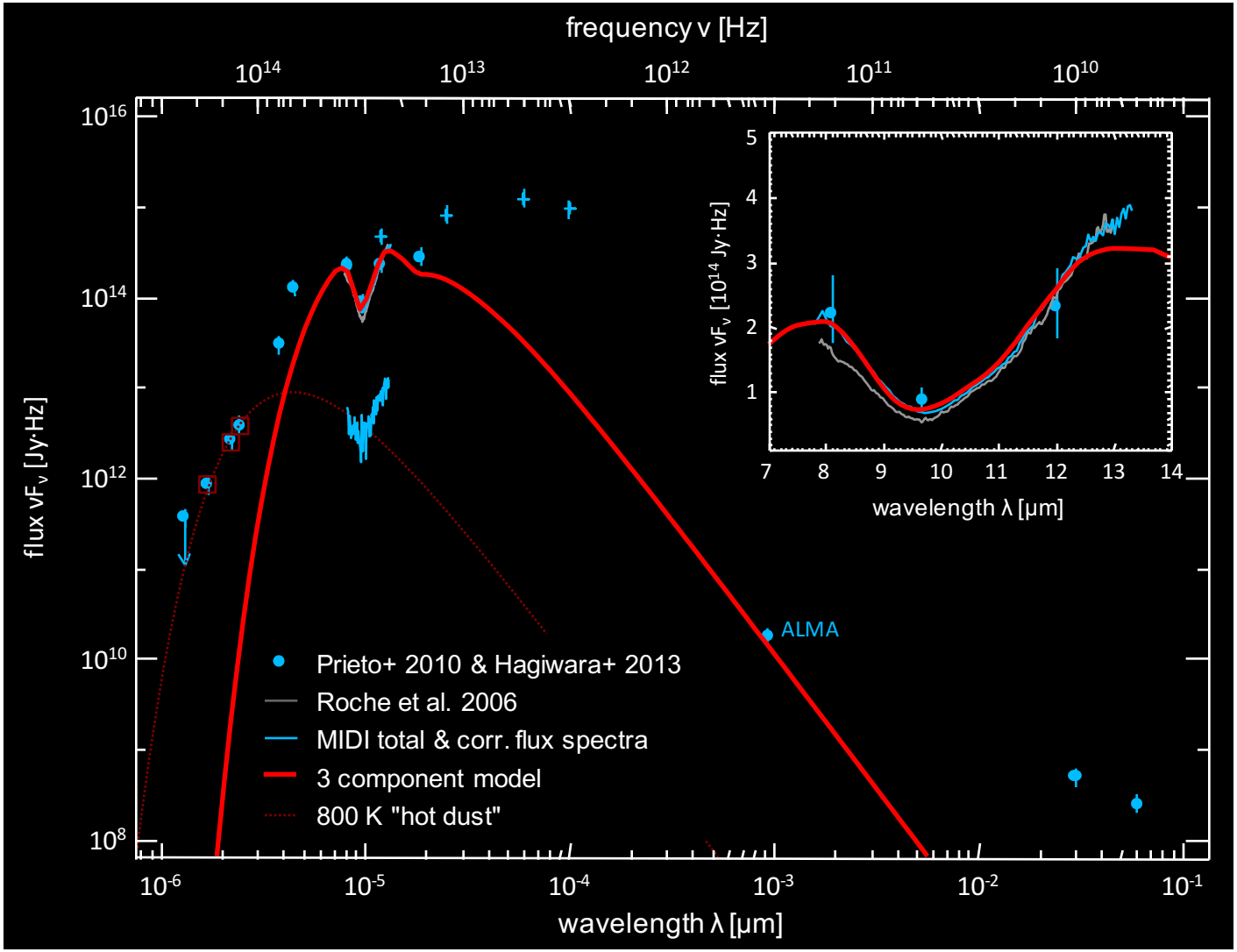


Tristram et al. 2014

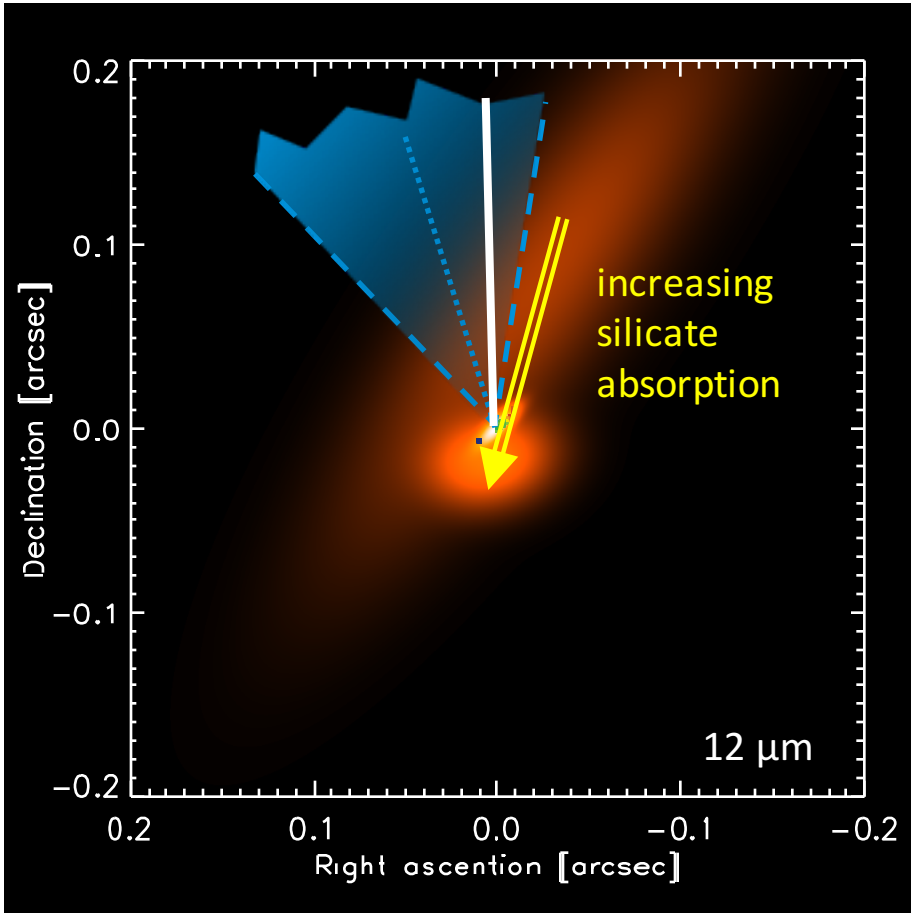


Fischer et al. 2013

Circinus: spectral energy distribution



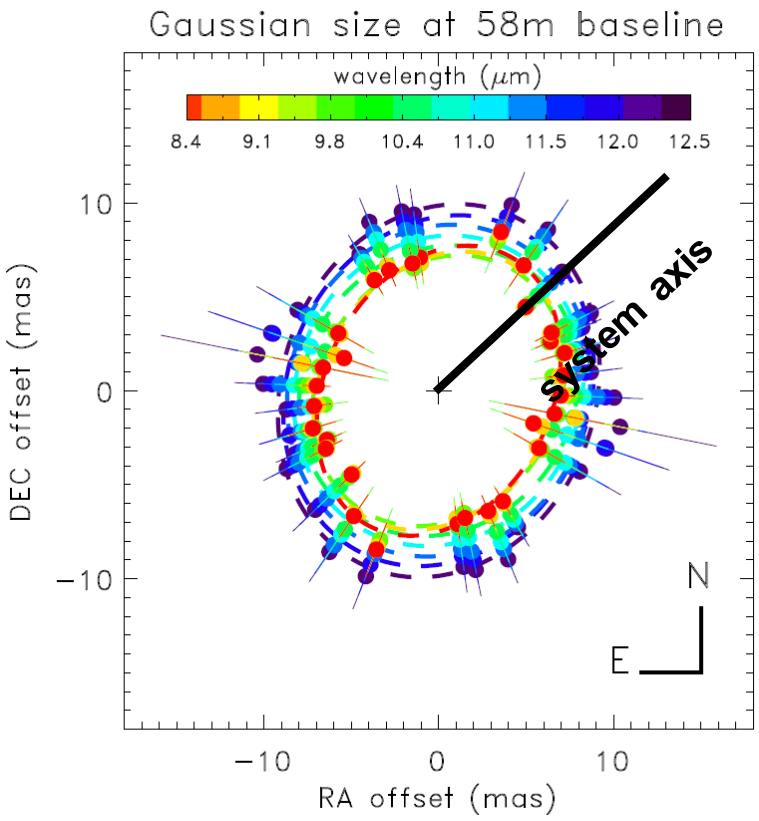
Detailed studies: NGC1068



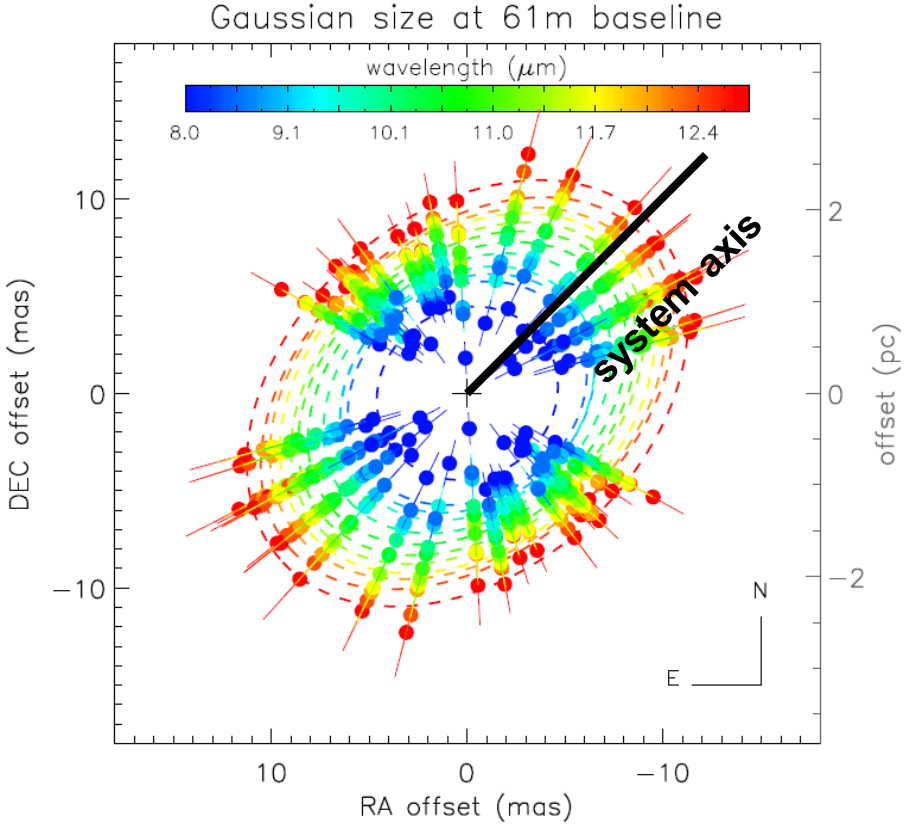
López Gonzaga et al. 2014

- three blackbody gaussians with offsets
- fit to 30 correlated fluxes and phases (ATs and UTs)
- interpretation as inner wall of a dusty cone

Detailed studies: NGC424 & NGC3783



NGC424 (Hönig et al. 2012)



NGC3783 (Hönig et al. 2013)

Detailed studies: Comparison

	Circinus	NGC1068	NGC424	NGC3783
polar extension:	yes	yes	yes	yes
size (extended)	1.6 pc	3.0 pc	2.0 pc	4.2 pc
disk + extended:	yes	yes	?	possibly
disk contribution	20%	15 – 40%	?	10 – 40%
maser disk:	yes	yes	no	no
hot dust:	no	hot disk	?	yes
silicate feature:	gets shallower	gets deeper	no change	no change

Hope to see you here soon!