Genuine spectral energy distributions of AGN

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PARSEC program

High spatial resolution study of the Nearest Active Galactic Nuclei

Compilation of the highest spatial resolution data available

- Angular scales of $\theta < 0.1$”
- UV + OP + IR + radio

What is new are the achieved angular scales in the 1 to 20µm from 8 – 10 class telescopes

- 1 - 5 µm → $\theta < 0.1$”
- 10 - 20 µm → $\theta < 0.5$”
- Interferometry at 10 µm → $\theta < 0.05$“

What we have:

- HST at 0.3 - 0.9 µm → $\theta < 0.1$”

What we partially have:

- VLA/ VLBA → $\theta < 0.1$”

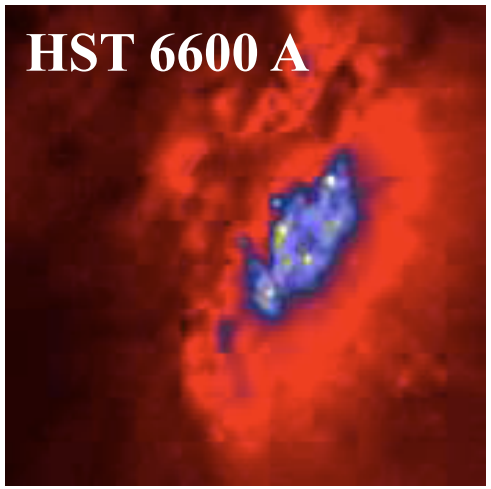
Some of the nearest …

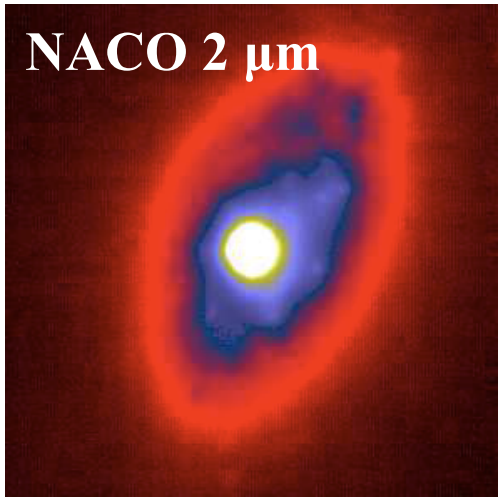
		1”/pc	FWHM core	
			2 μm	20 μm
S2/RG	CenA	16	< 1 pc	< 8 pc
S2	Circinus	19	~ 2 pc	< 9 pc
S2	N1068	70	< 4 pc	< 35 pc
S1/Li	N1097	70	< 10 pc	< 35 pc
S2	N1386	94	< 8 pc	< 32 pc
S2	N7582	150	< 12 pc	< 100 pc
S1.9	N5506	180	< 10 pc	< 90 pc
S1	N3783	280	< 22 pc	< 140 pc
S1	N7469	470	< 38 pc	< 230 pc

Prieto et al. 2004, 05; Haering-Neumayer et al. 2007; Reunanen et al. 2009.

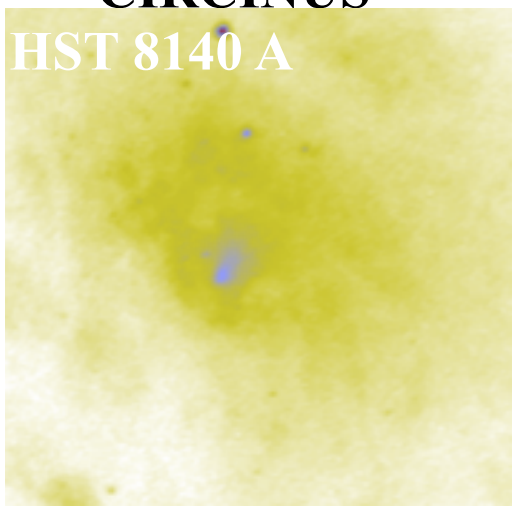
Obscured AGN shows up only from ~ 2 μm onward

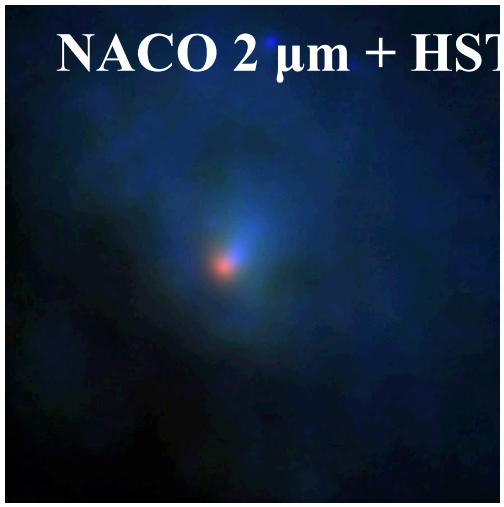
NGC 7582



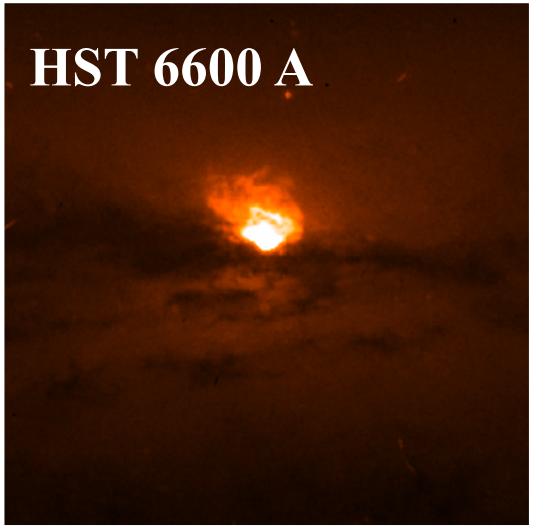


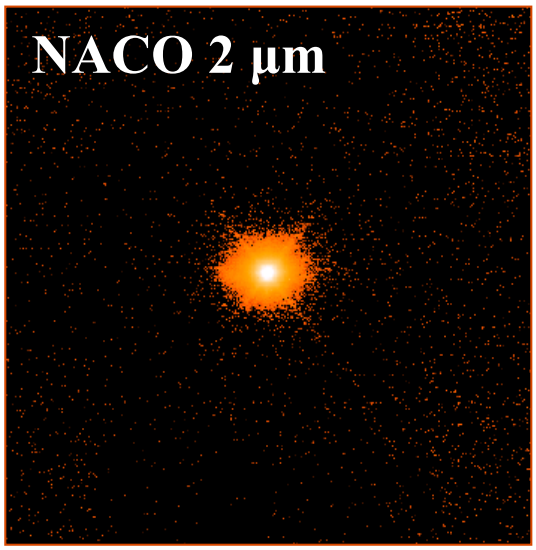
CIRCINUS



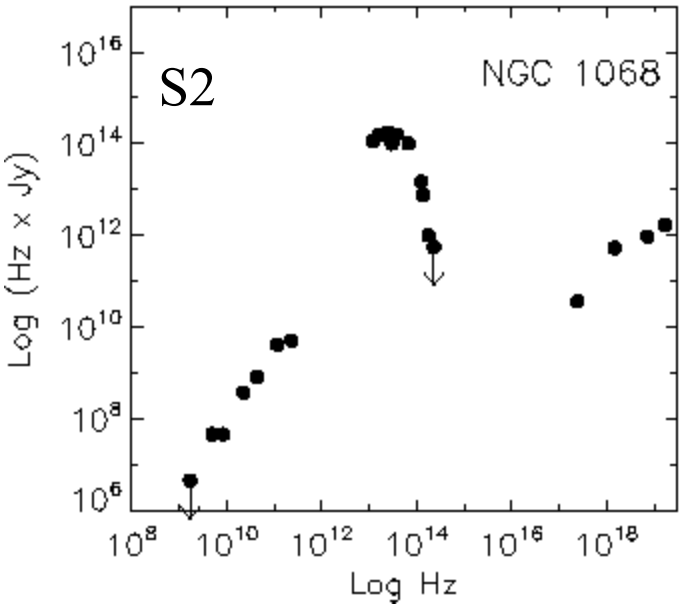


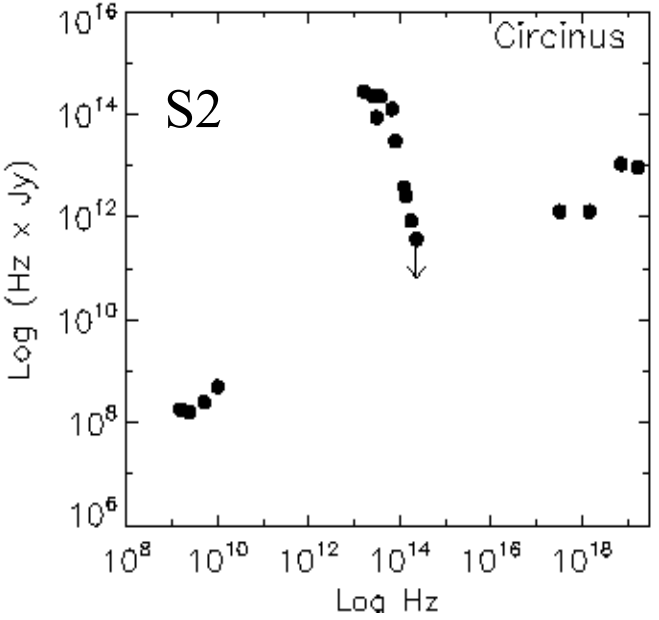
NGC 5506

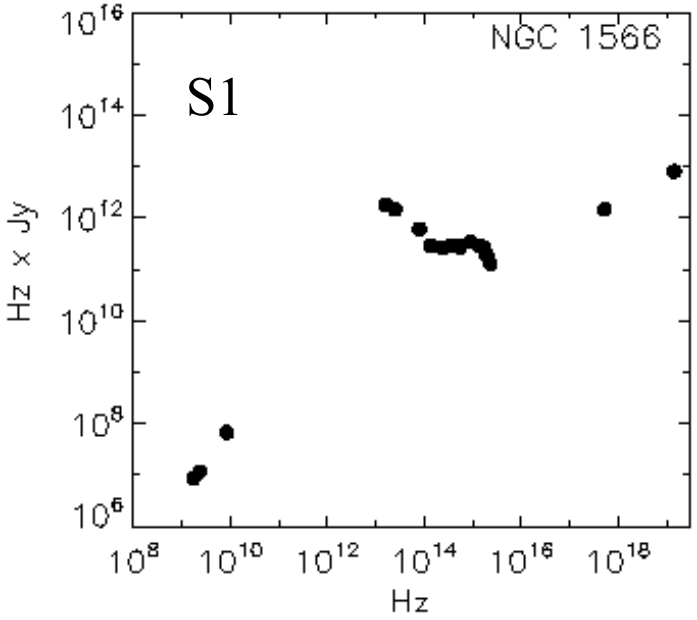


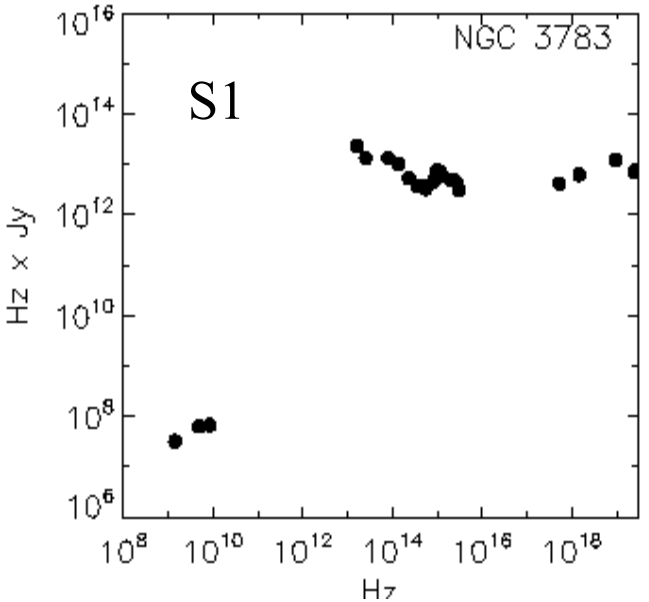


Examples of high spatial resolution SEDs

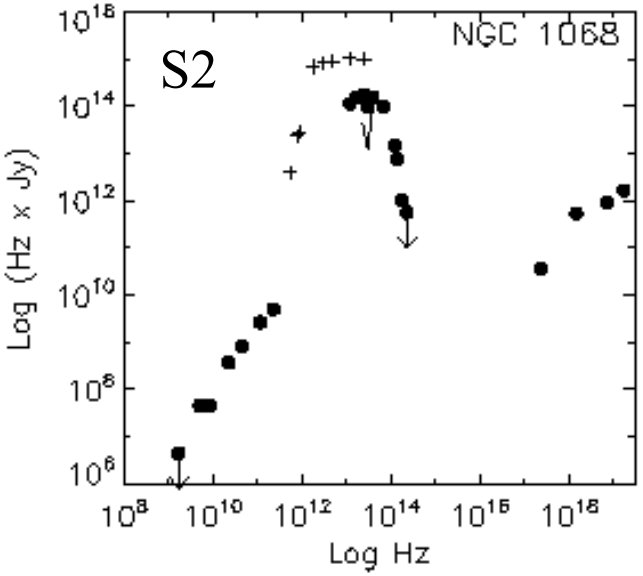


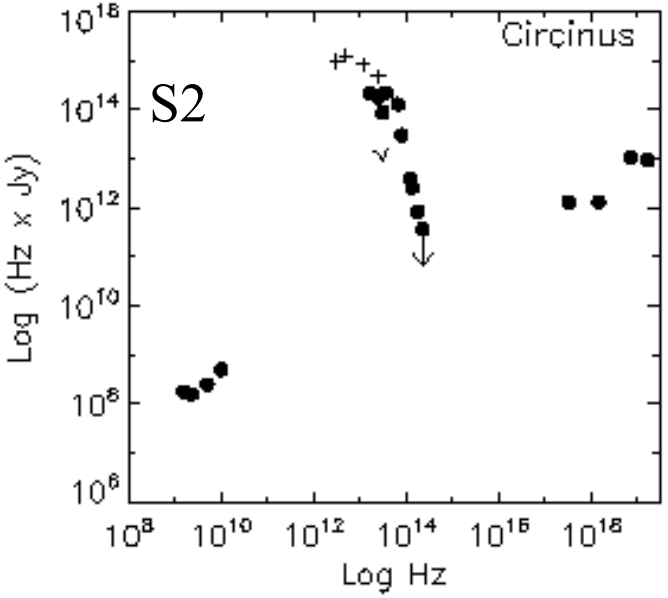


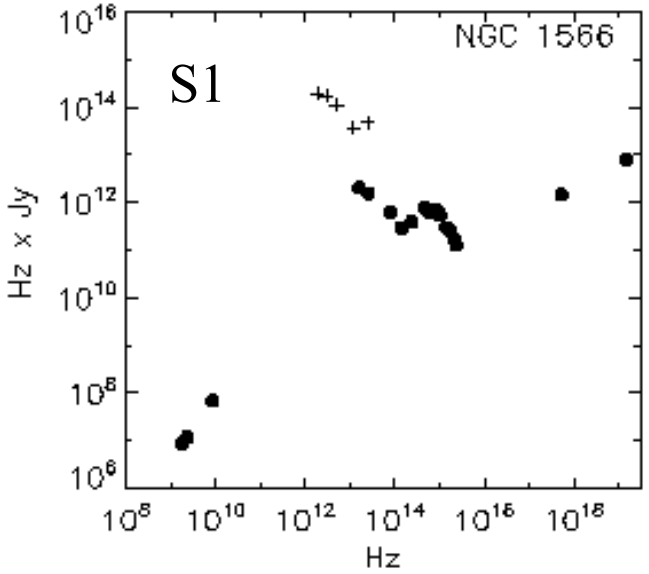


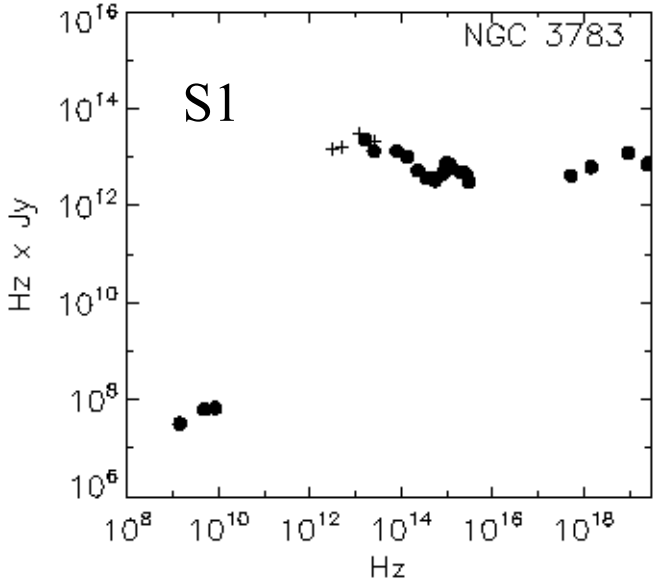


“+ “ IRAS, ISO, SPITZER, and/or millimetre data

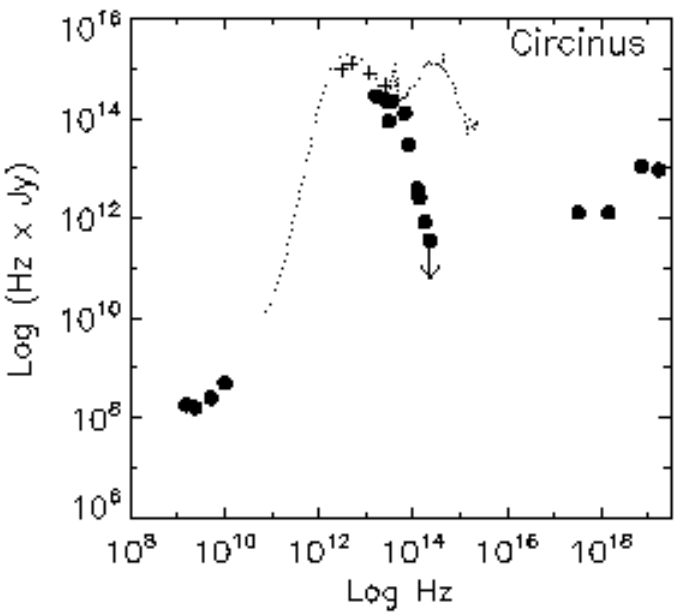


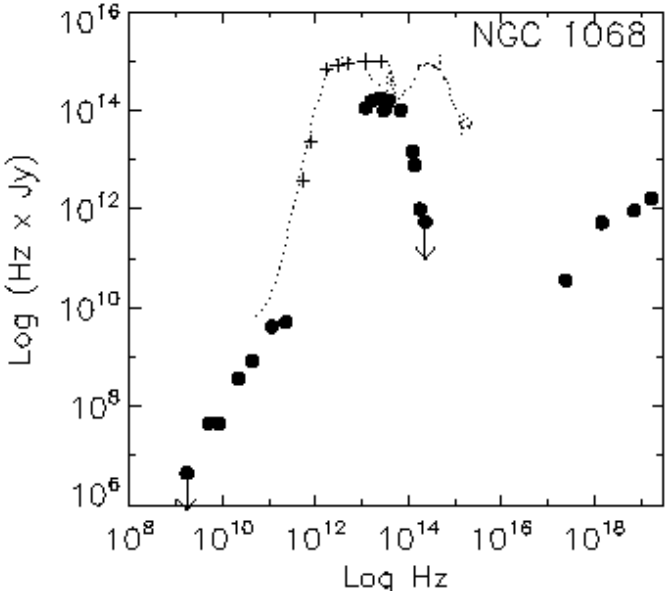






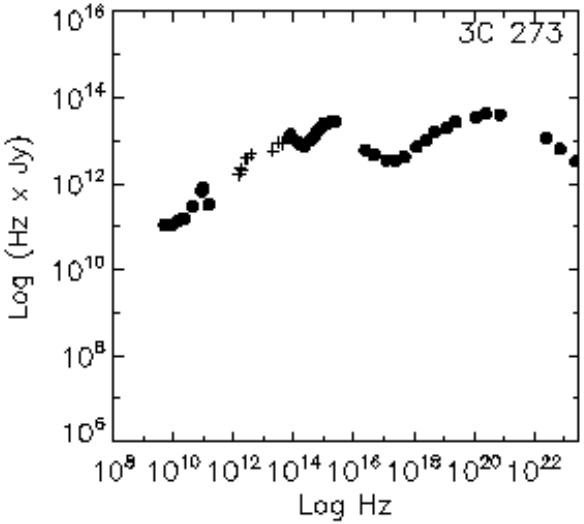
Comparison with an average Seyfert 2 SED taken from Polletta et al. 2007



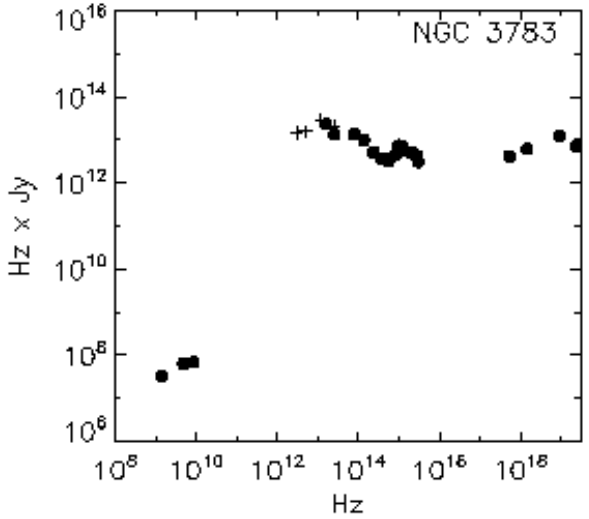


Dominating AGN: their IR luminosity is ~100% of the total IR emission of the galaxy

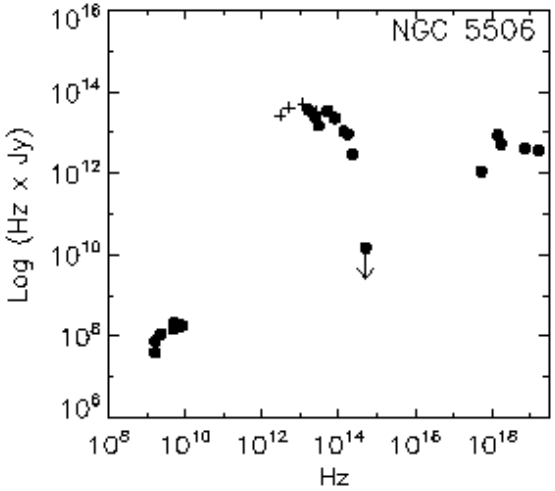
QSO



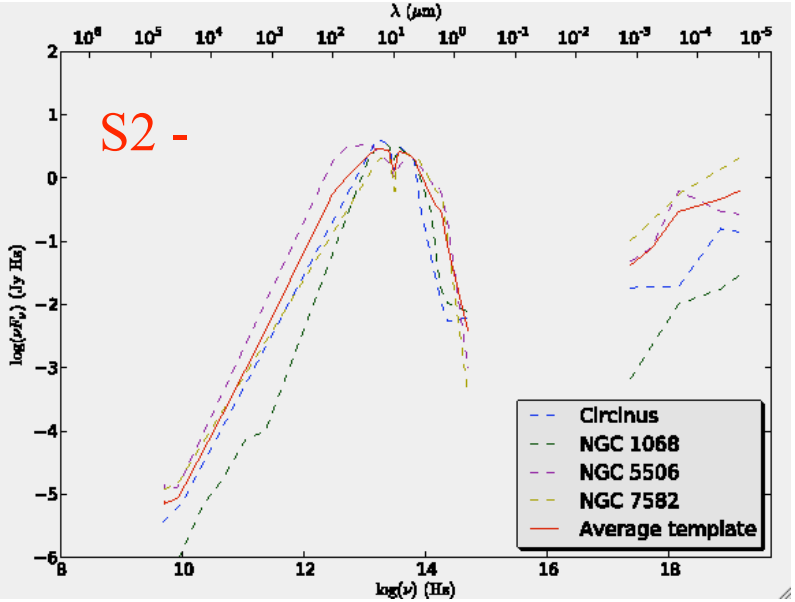
S1

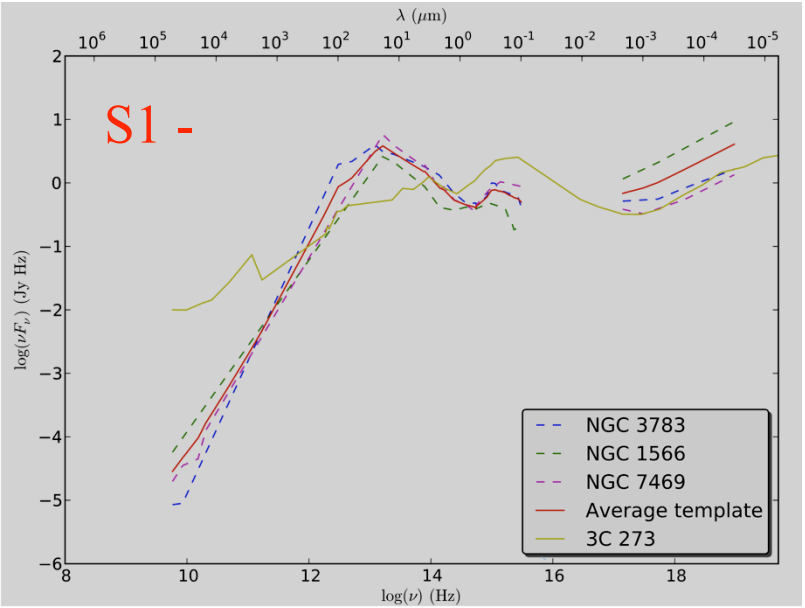


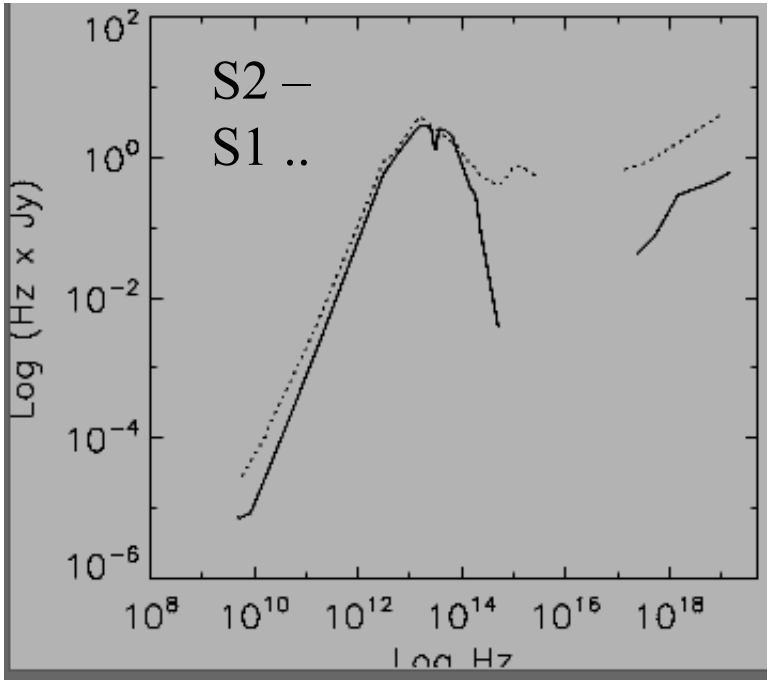
S2



Average SEDs of nearby AGNs







Fernandez-Ontiveros et al. 2009

The true energy output in the IR

		IRcore	IR(large-ap/core)	$X_{hv>20keV}$ / IRcore
S1/Li	N1097	6.5×10^{41}	700	8%
S2/RG	CenA	2×10^{42}	50	200 %
S2	Circinus	6×10^{42}	10	20%
S1	N1566	2×10^{42}	200	200 %
S2	N7582	2.5×10^{43}	20	35 %
S2	N1068	8.5×10^{43}	20	2 %
S1.9	N5506	2×10^{44}	1	5%
S1	N3783	4×10^{44}	1	15%
Qso	3C 273	9×10^{46}	1	300%

On the nearest AGN

- AGN cores in the IR have sizes less than a few tens of pc
- Their SEDs are characterised by a conspicuous bump peaking in the 2-10 μm range. This bump is very step at the shortest wavelengths in type 2, but shallower in type 1.
- Their IR luminosities are above 80% of the total, this being taken as $L_{total} = LIR + LX_{20\text{-}100\ keV}$
- Their IR luminosities can be up to several order of magnitude lower than that of their host galaxy
- Yet, AGN with luminosities above 10^{44} erg/s are as quasars, dominating in full the total IR light of the galaxy