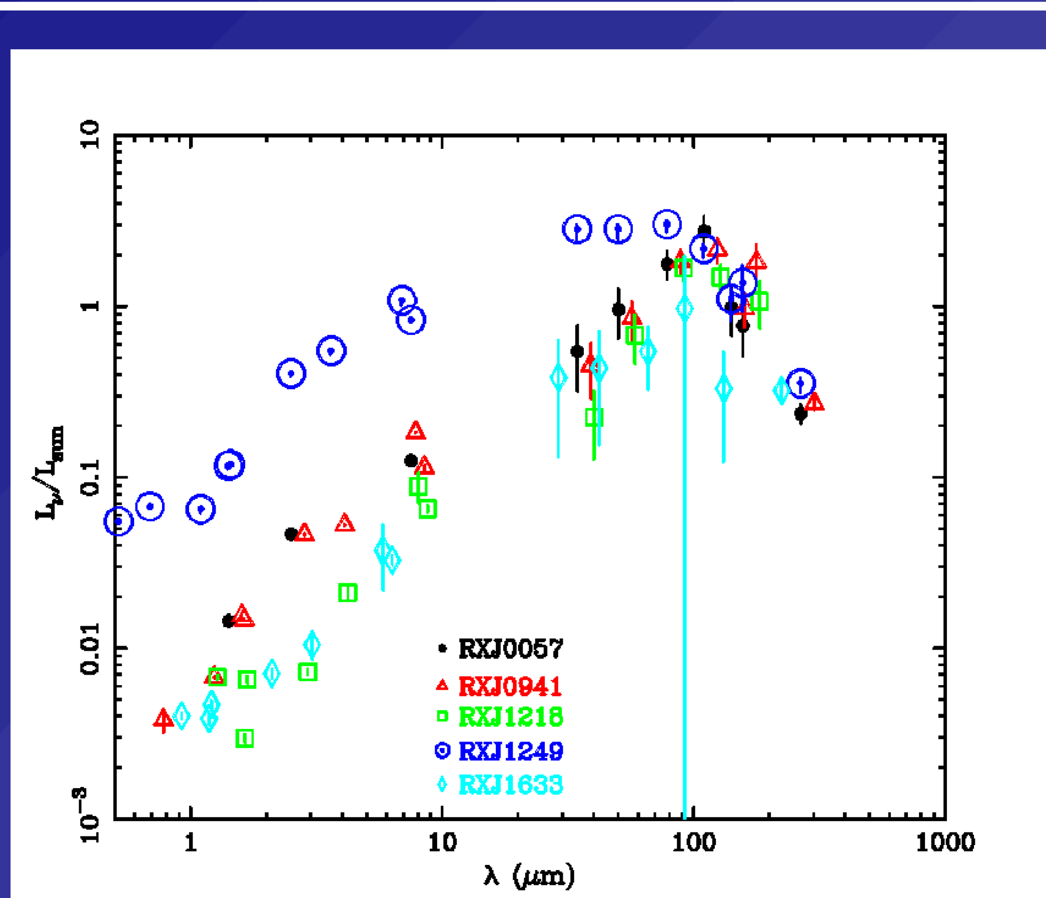
Multi-wavelength properties of submillimeter galaxies

A. Khan Ali[1], F.Carrera[1], J.A. Stevens[2], M.J. Page[3]
[1]Instituto de Física de Cantabria (CSIC-UC), 39005 Santander, Spain
[2]Centre for Astrophysics Research, University of Heartfordshire, College Lane, Hatfield, Herts AL10 9AB
[3]Mullard Space Science Laboratory, University College London, Holmbury St. Mary, Dorking, Surrey RH5 6NT

We have assembled a sample of 5 X-ray and submm-luminous QSOs which are therefore both growing their central black holes through accretion and forming stars copiously. Hence, they are good laboratories to investigate the co-evolution of star formation and AGN. Our XMM-Newton observations reveal strong outflowing ionized winds from the QSOs which could terminate star formation. SCUBA maps have shown that they are also surrounded by submm source overdensities, placing them in the centres of high density peaks of the z~2 Universe. In one case we have already proved that the submm sources are indeed massive (but with undernourished black holes, if any) star-forming galaxies associated to the QSO.

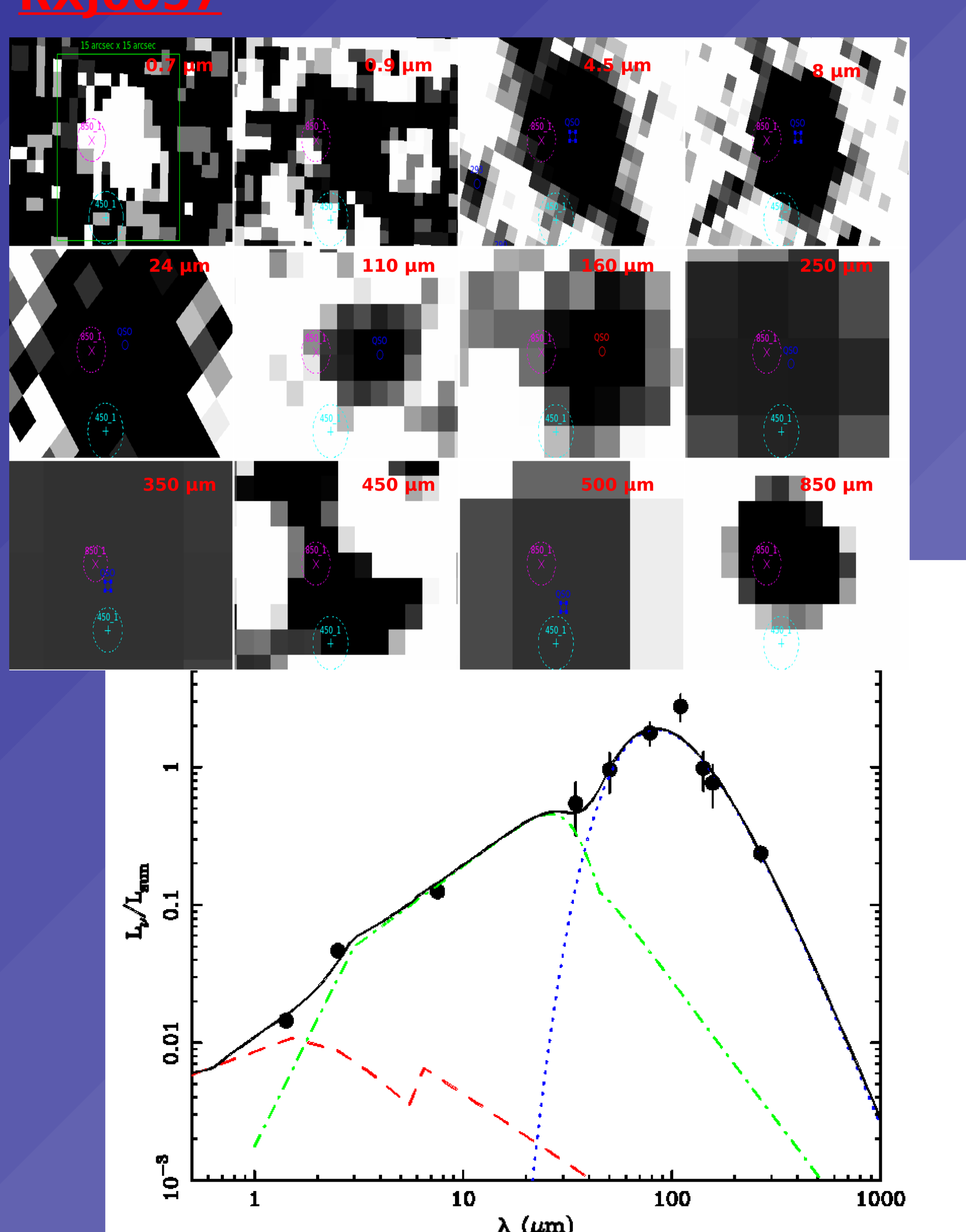
We present here the analysis of new PACS and SPIRE Herschel data (together with our existing and archival optical-NIR-MIR observations) on the central QSOs. Both AGN (direct and reprocessed) and Star Formation (SF) emission are needed to model their Spectral Energy Distributions (SEDs). The fits are reasonable in all cases except perhaps for RXJ1633. We confirm the presence of strong FIR emission due to SF in these objects, at the ULIRG/HLIRG level, with SFR~1000-2000 M_{sun}/y. Our sources have different relative direct/reprocessed and AGN/SF contributions. We therefore confirm that these objects are both forming stars copiously and growing by strong accretion, but with diverse properties.



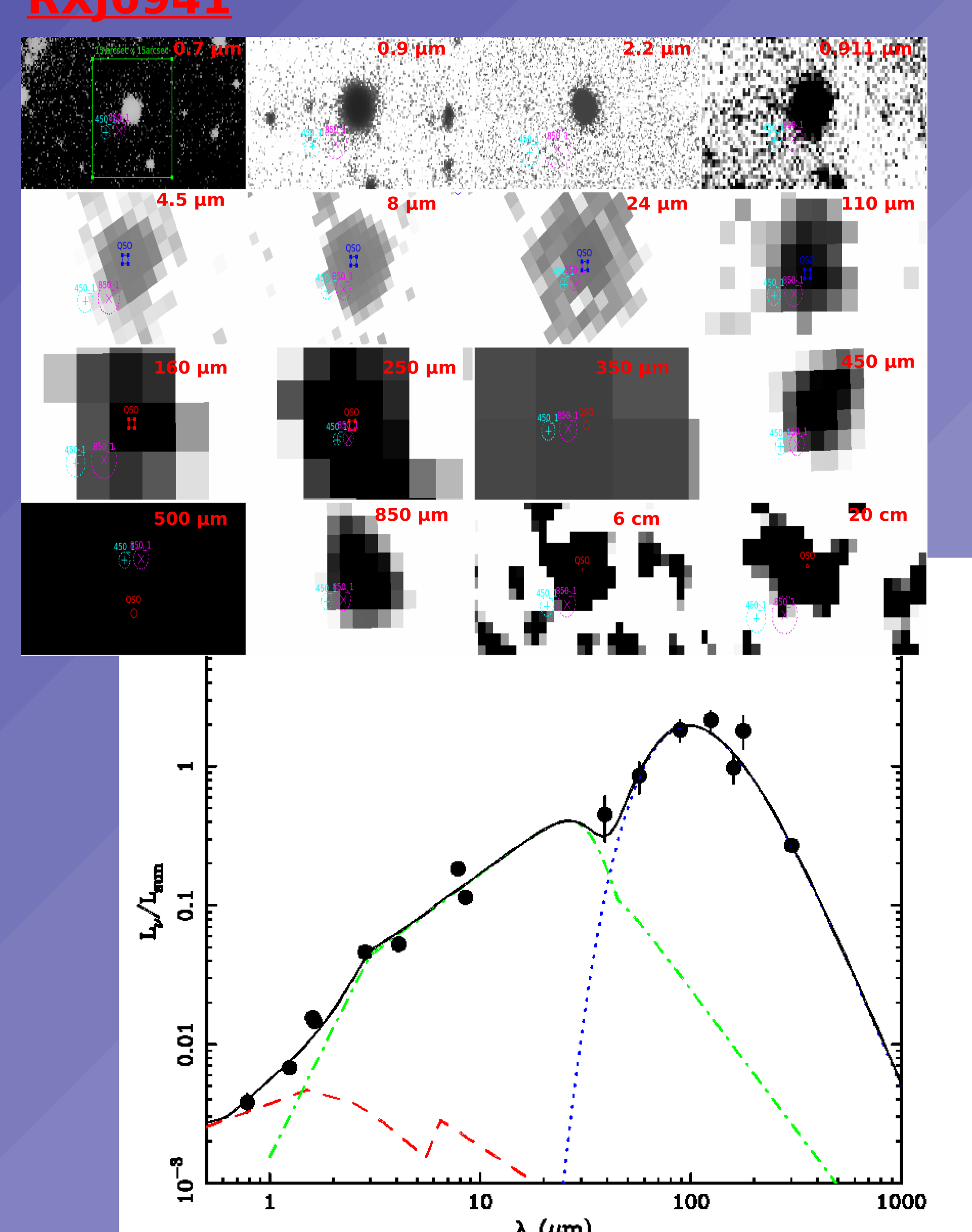
We have modeled the SEDs with three components: a direct AGN accretion disk (after a template from [4], dashed red line), a torus component (after a smoothed dust torus template from [4], dot-dashed green line) and a Star Formation component (a greybody, dotted blue line). The fitted components are then integrated to obtain the luminosities in the Table. The fitted greybody temperature for RXJ0057,RXJ0941 and RXJ1218 are closer to those of SMG (T~35K [1]), while that of RXJ1249 (our most luminous source with the strongest AGN fraction) is closer to that of unabsorbed QSO (T~47K [3]).

SOURCE	z	T / K	β	$L_{IR,SF}/L_{sun}$ x10^{12} (8-1000μm)	$L_{FIR,SF}/L_{sun}$ x10^{12} (40-500μm)	L_{disk}/L_{sun} x10^{12} (0.5-250μm)	L_{torus}/L_{sun} x 10^{12} (1-300μm)	SFR / $M_{sun}y^{-1}$	L_{x210}/L_{sun} x 10^{12}
RXJ0057	2.19	35	1.91	(7.86 ± 0.68)	(7.40 ± 0.65)	(4.52 ± 0.20)	(16.2 ± 0.4)	1275± 112	0.29
RXJ0941	1.82	30	1.87	(7.03 ± 0.43)	(6.89 ± 0.42)	(1.96 ± 0.03)	(14.3 ± 0.1)	1186 ± 73	0.097
RXJ1218	1.74	37	0.75	(6.41 ± 0.66)	(6.20 ± 0.64)	(0.65± 0.002)	(2.56 ± 0.09)	1068 ± 111	0.23
RXJ1249	2.21	51	1.14	(11.51 ± 0.75)	(12.43 ± 0.62)	(40.65 ± 0.15)	(96.8 ± 0.4)	2140 ± 107	0.37
RXJ1633	2.80	47	1.6	(6.73 ± 0.80)	(5.57 ± 0.66)	(1.74 ± 0.62)	(3.78 ± 0.22)	959 ± 114	0.58

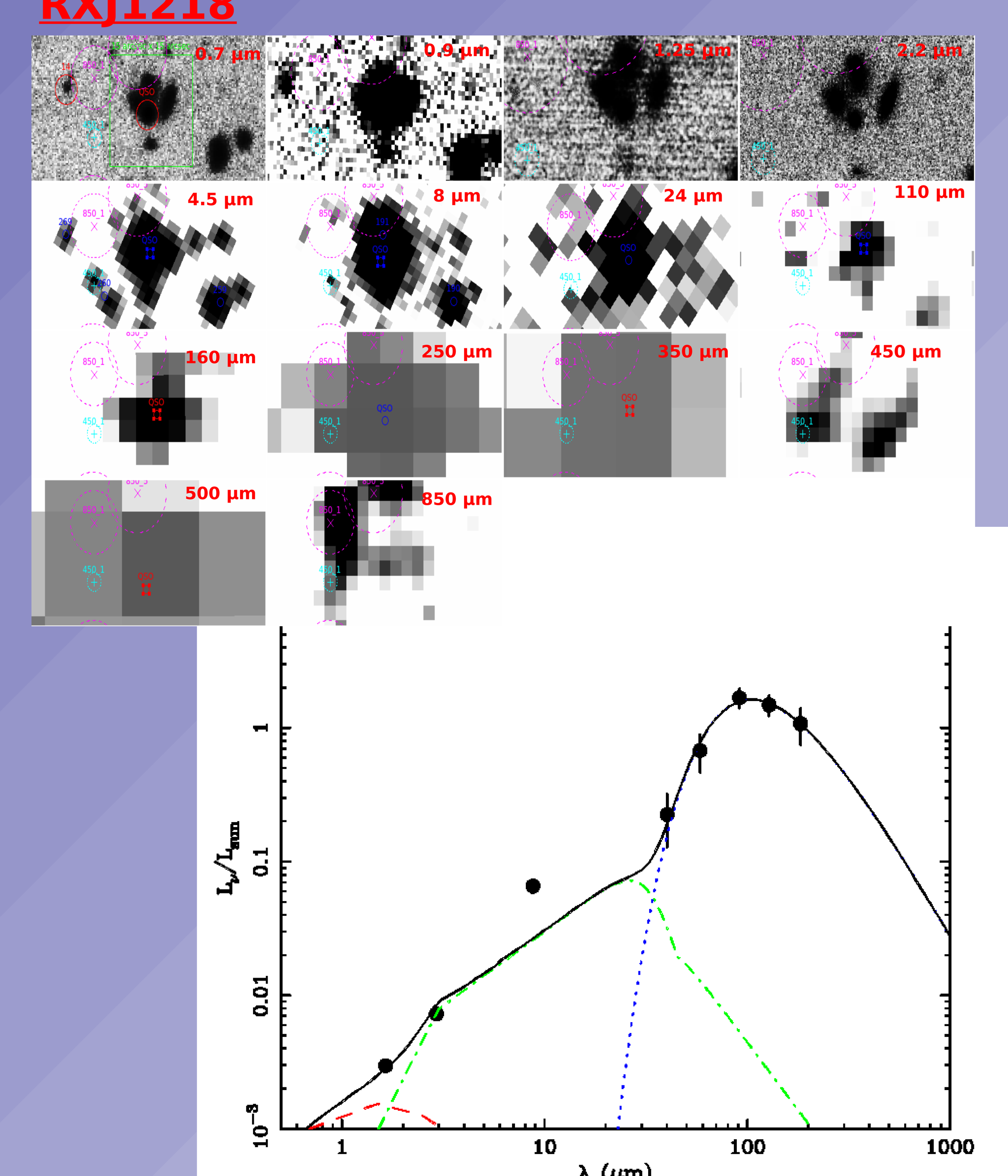
RXJ0057



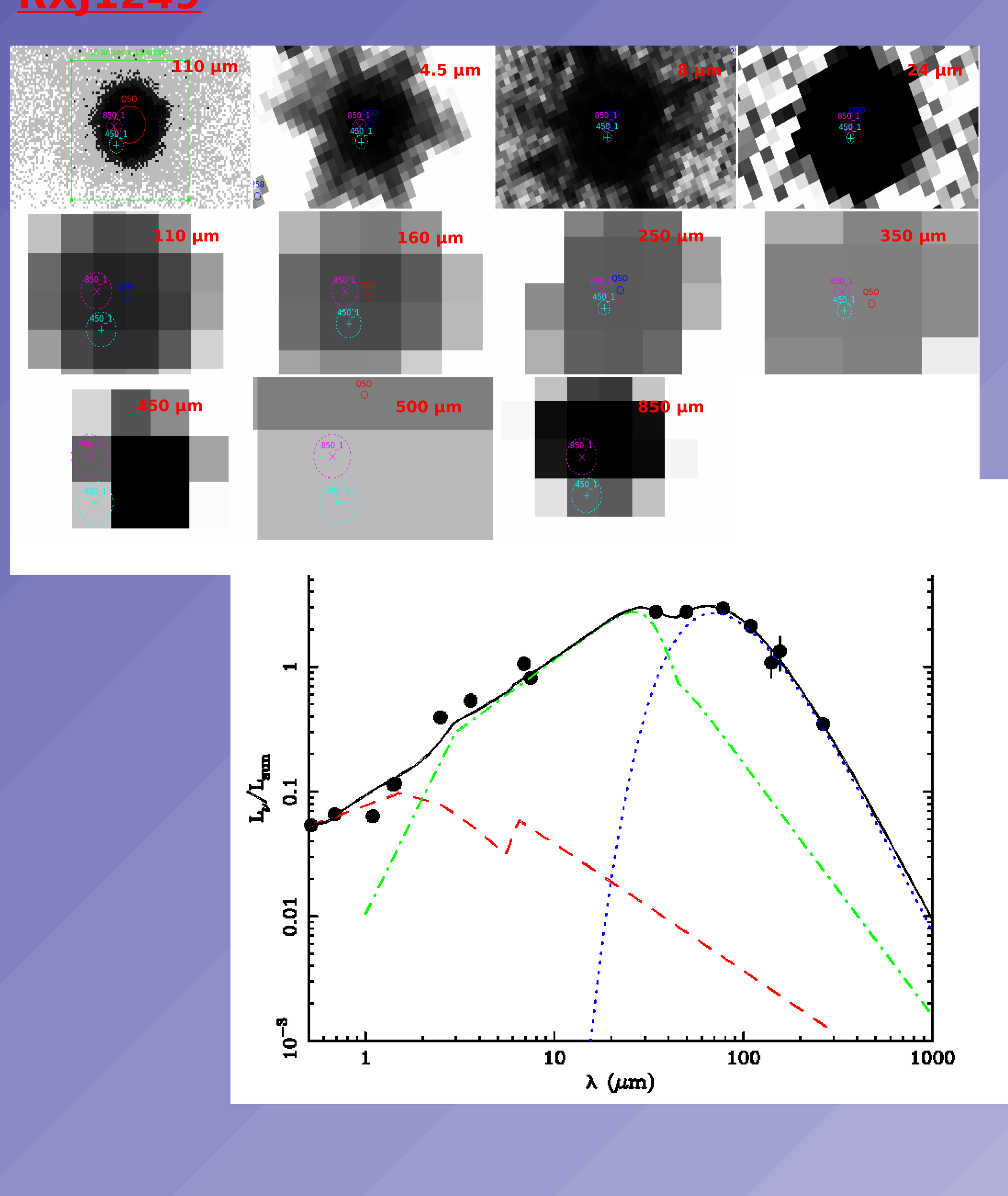
RXJ0941



RXJ1218



RXJ1249



References

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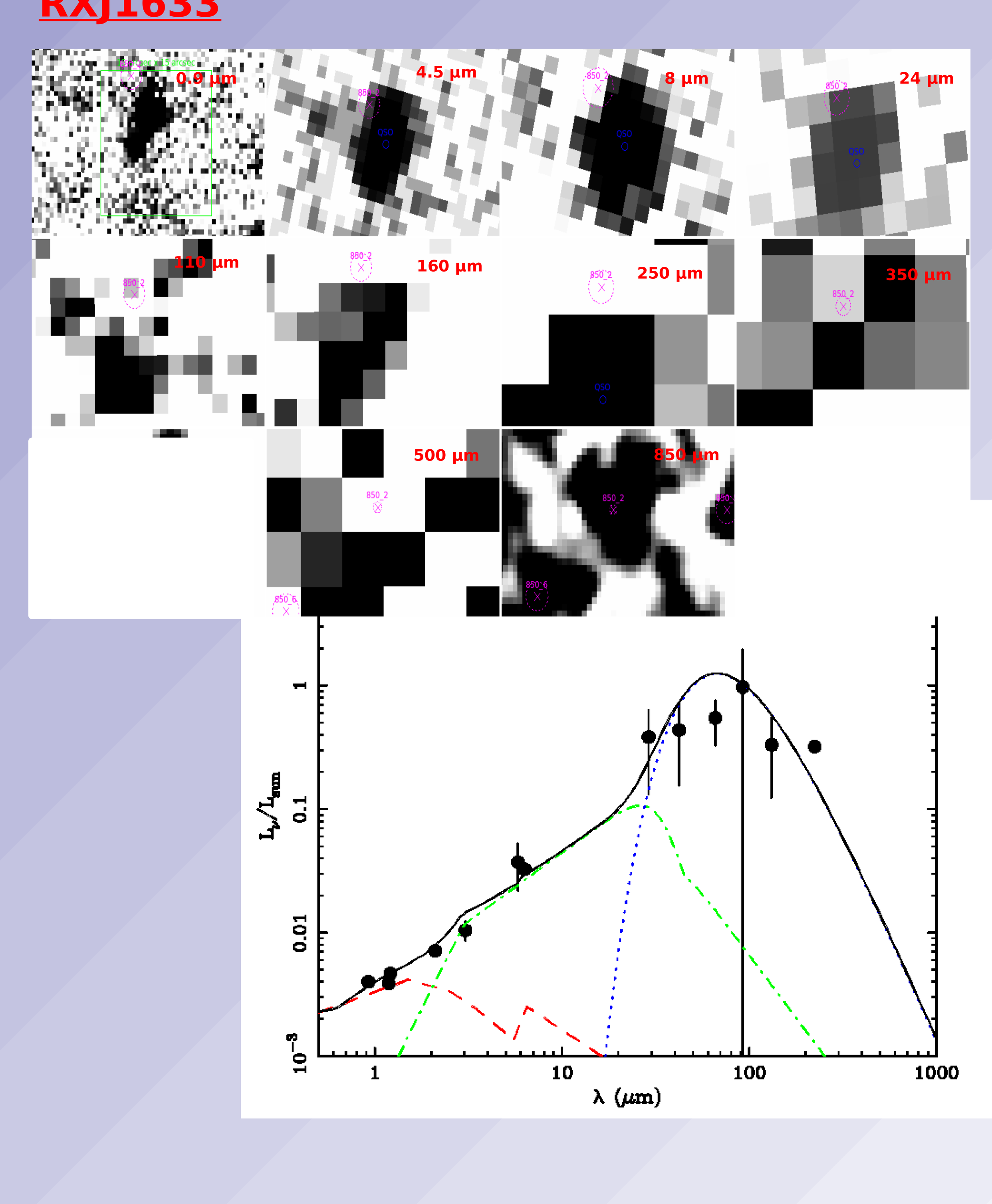
RXJ1633



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