

Breaking AGN sample paradigms with FIRST/NVSS, WISE, and 3XMM



ARCHES

National Astronomy Meeting,
Llandudno, July 2015



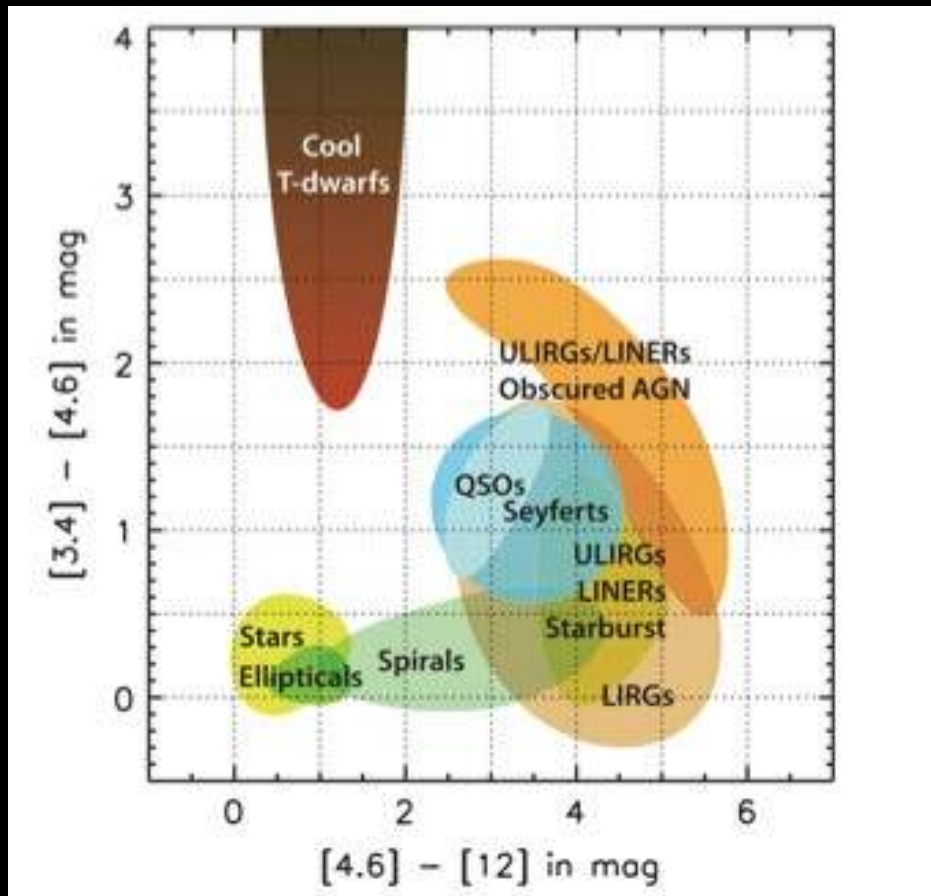
Beatriz Mingo

University of Leicester

Collaborators:

Mike Watson, Gordon Stewart, Simon Rosen, Andrew
Blain (Leicester), Martin Hardcastle (Hertfordshire), Silvia
Mateos, Francisco Carrera (IFCA)

The Idea

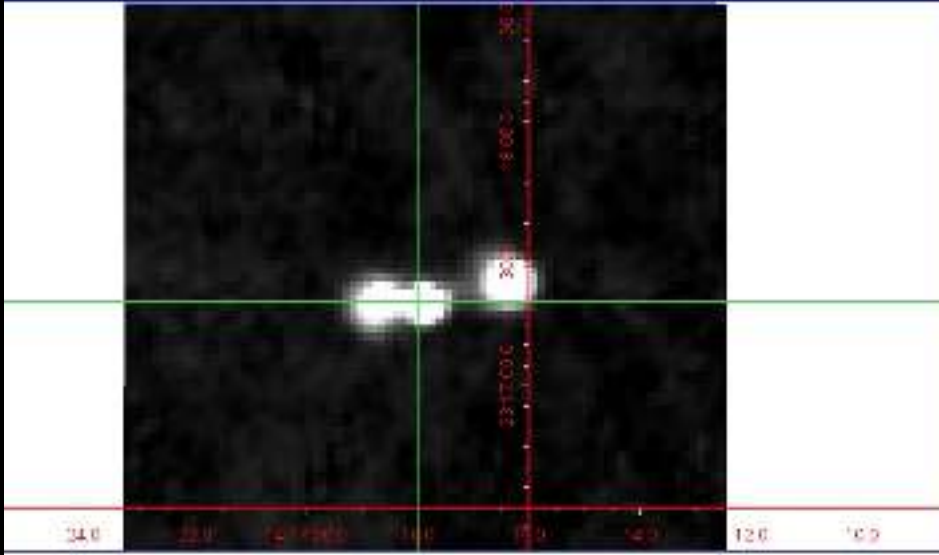


Lake+ 2012

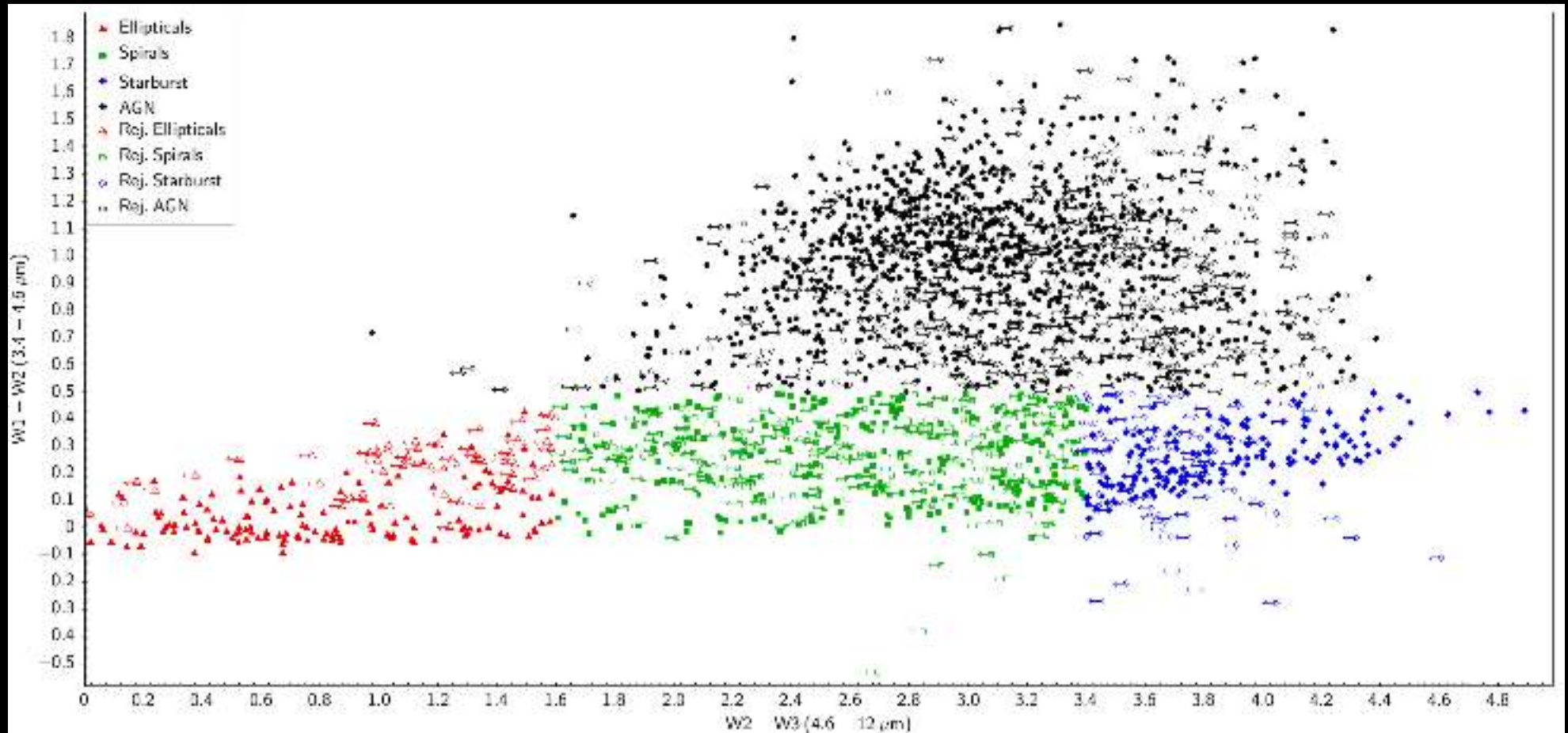
- 3XMM + WISE + NVSS/FIRST
 - What does the WISE c/c plot look like?
- Data quality criteria:
 - $S/N > 5$ in $w1$, $w2$, $S/N > 3$ in $w3$
 - No X-ray extended
 - “good” radio
- X-matching chi-sq code (Pineau+ 2011)

- 1) Collapse FIRST sources within 30" (Magliocchetti + 1998)
- 2) USE FIRST flux unless NVSS larger by 5 sigma
- 3) Exclude extended X-ray sources
- 4) Xmatch

It's complicated...



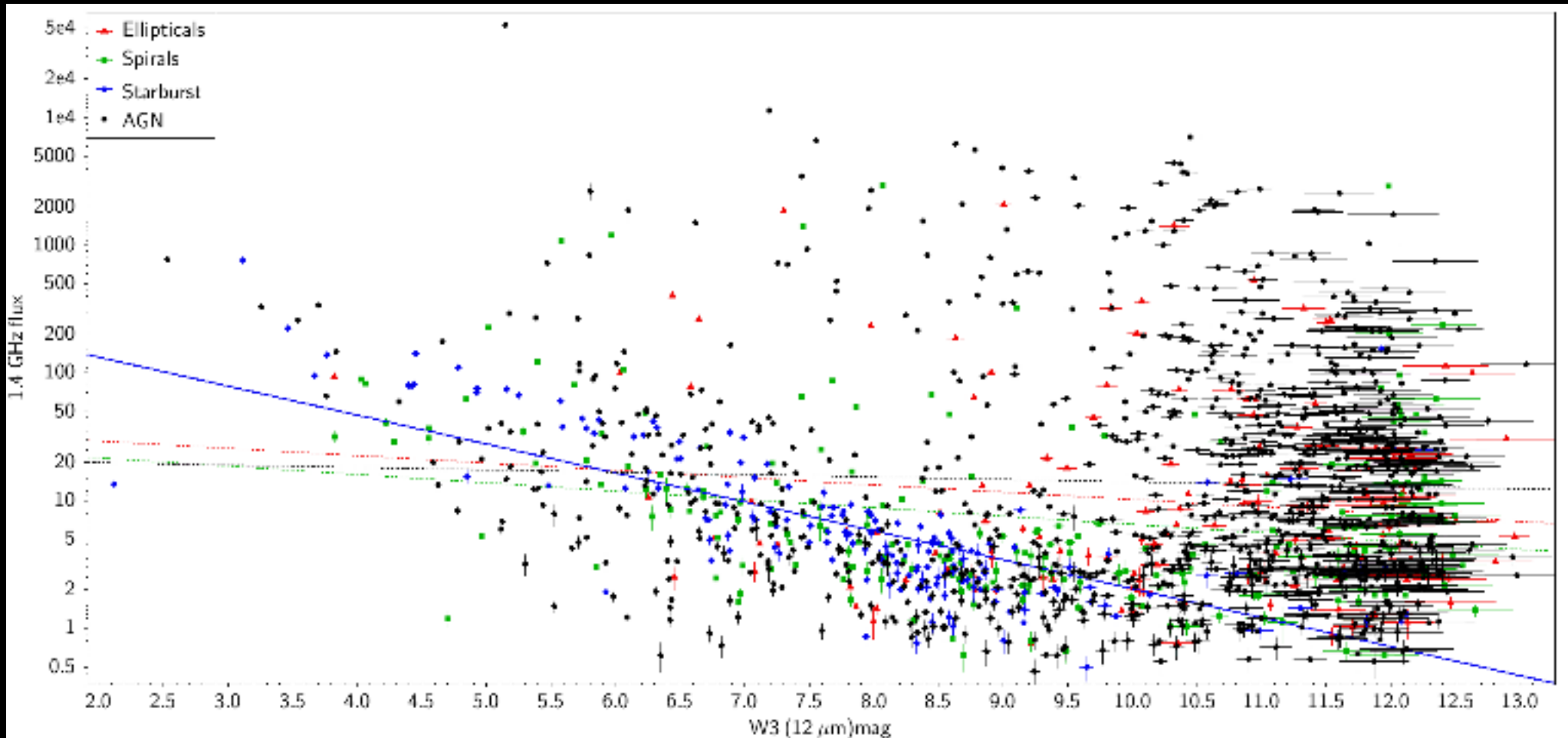
All that work to get just ~1500 sources



1008 AGN (577 z)
145 Ellipticals (94 z)
222 Spirals (149 z)
174 Starburst (114 z)

W3 S/N>3 eliminates 45% of the sample
SDSS z eliminates another 45% (still good result!)

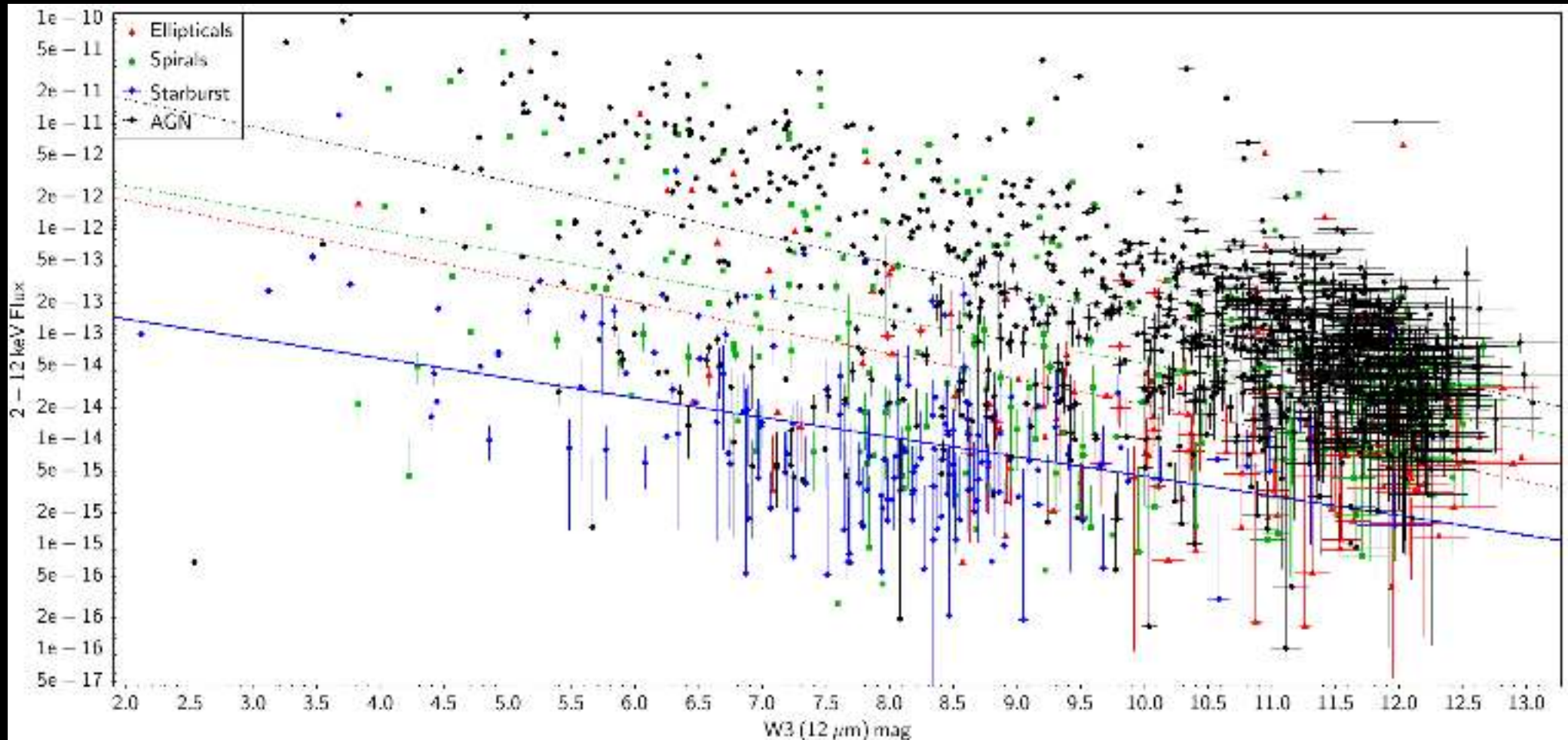
Flux/mag triage



Strong SF correlation, also tells us about “radio-shy” AGN

Wide range of radio fluxes for given mid-IR magnitude → jet regulation? Need L to verify

Flux/mag triage

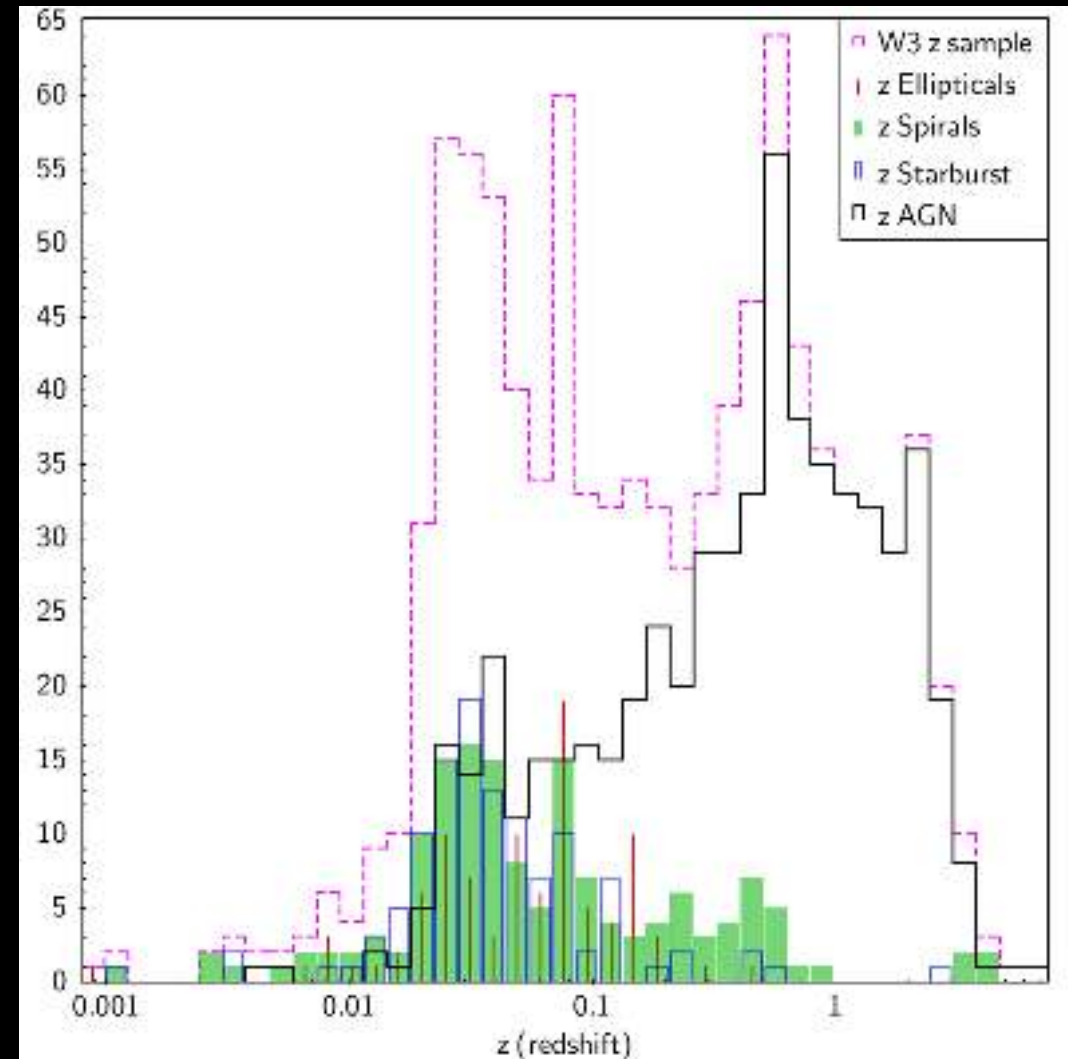
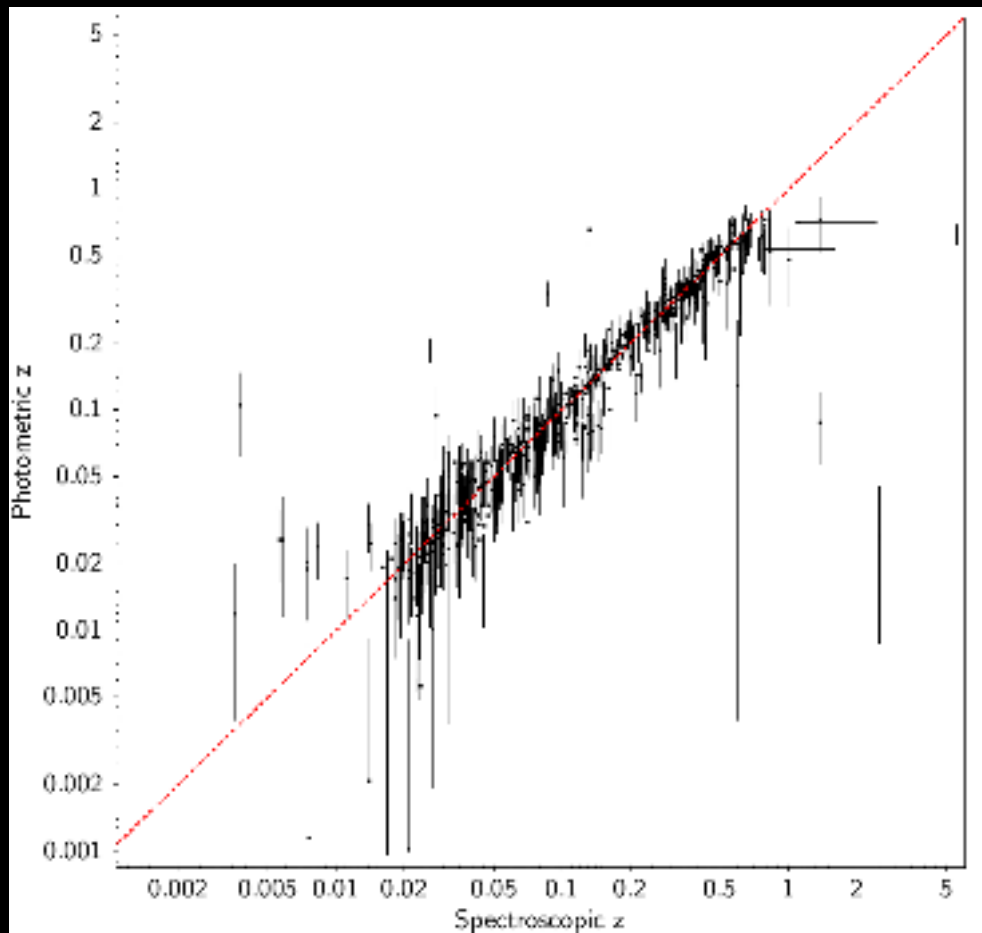


SF correlation, messier than IR/radio, but still reliable

AGN correlation: many “radio-shy” AGN from the previous plot are X-ray bright

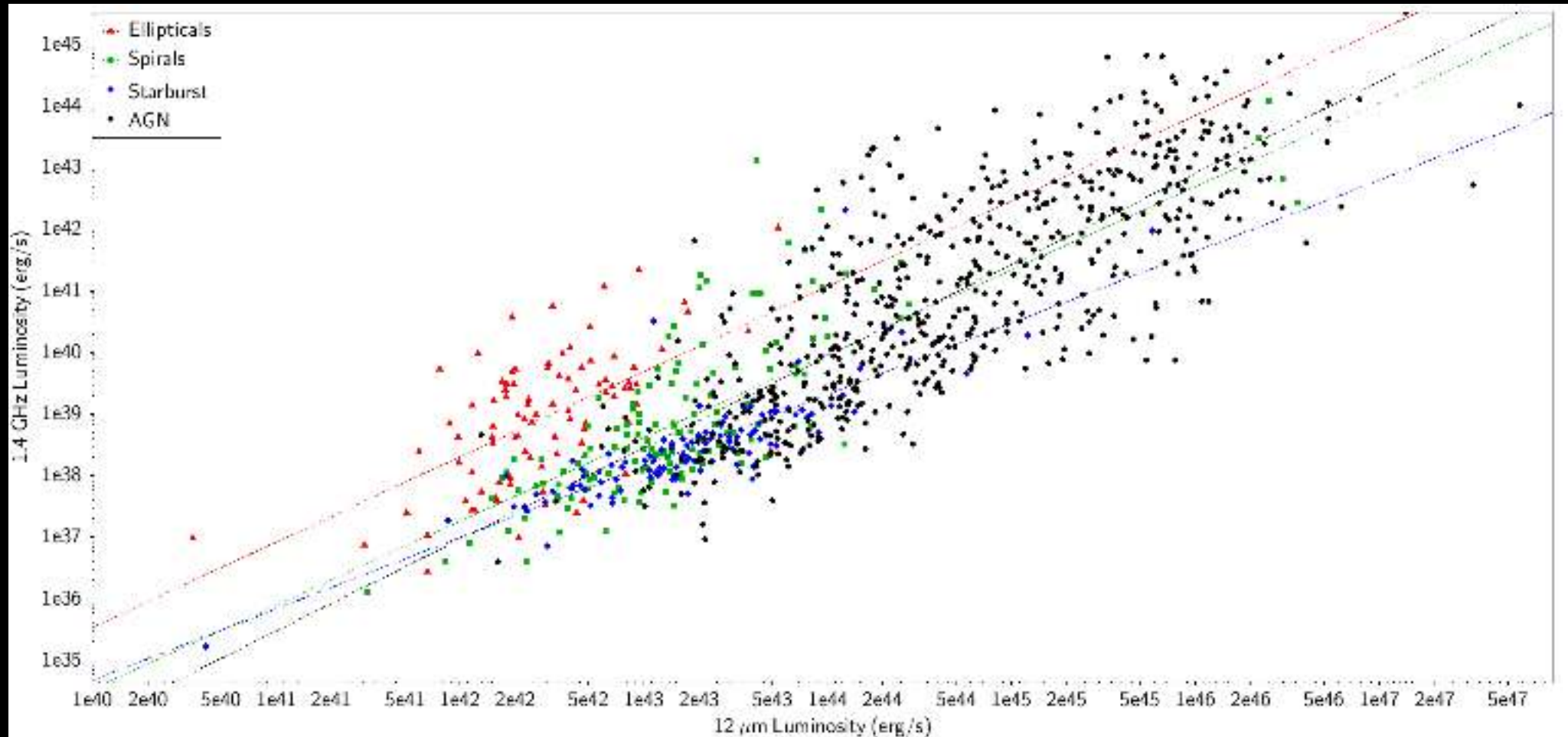
LERG have systematically lower X-ray fluxes

Get some z's



For each pop. The W3 rejected sources distrib. peaks at larger $z \rightarrow$ distance, not evolution

Let there be luminosities! (1)

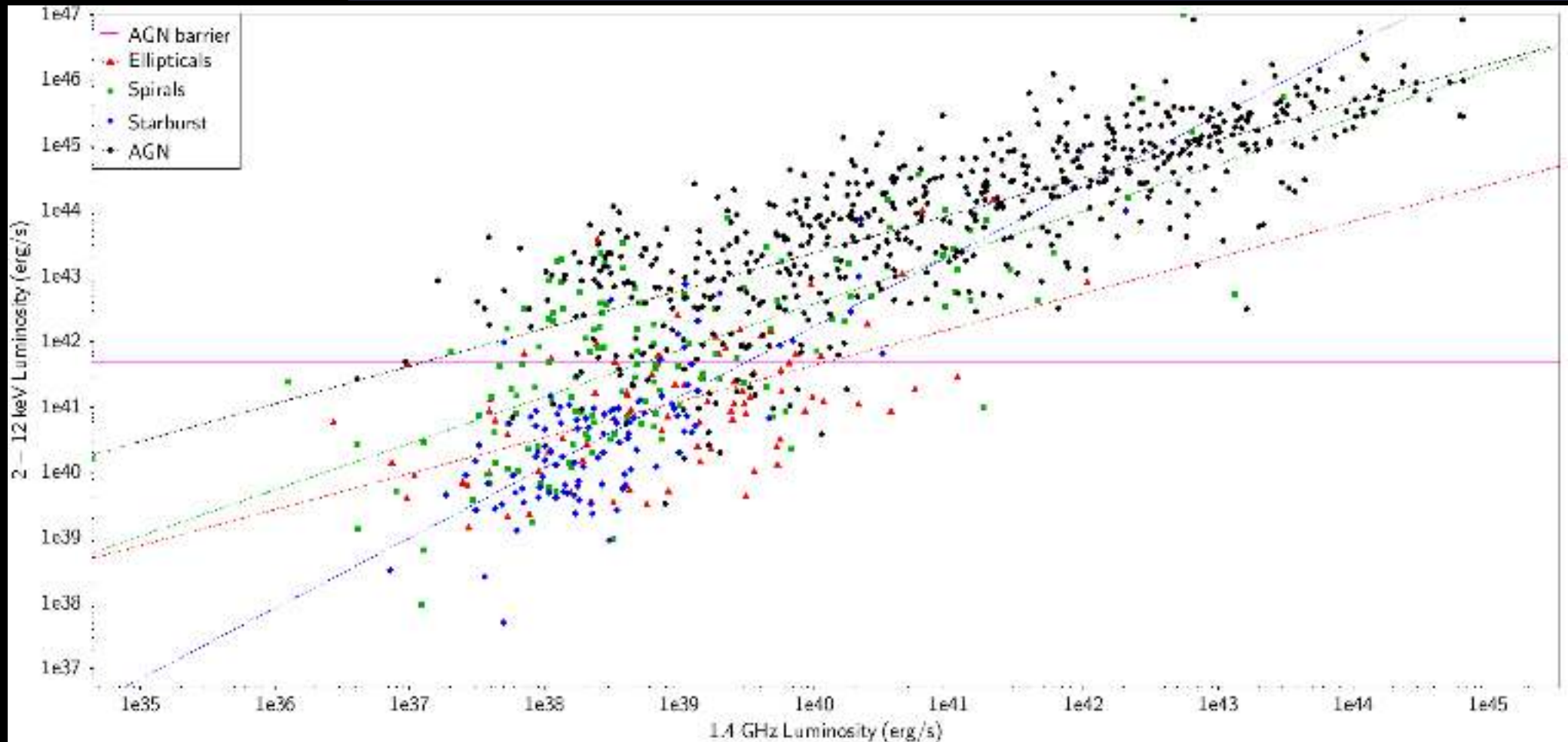


Radio/IR correlation for SF looks wonderful!

LERG clearly separated from the rest

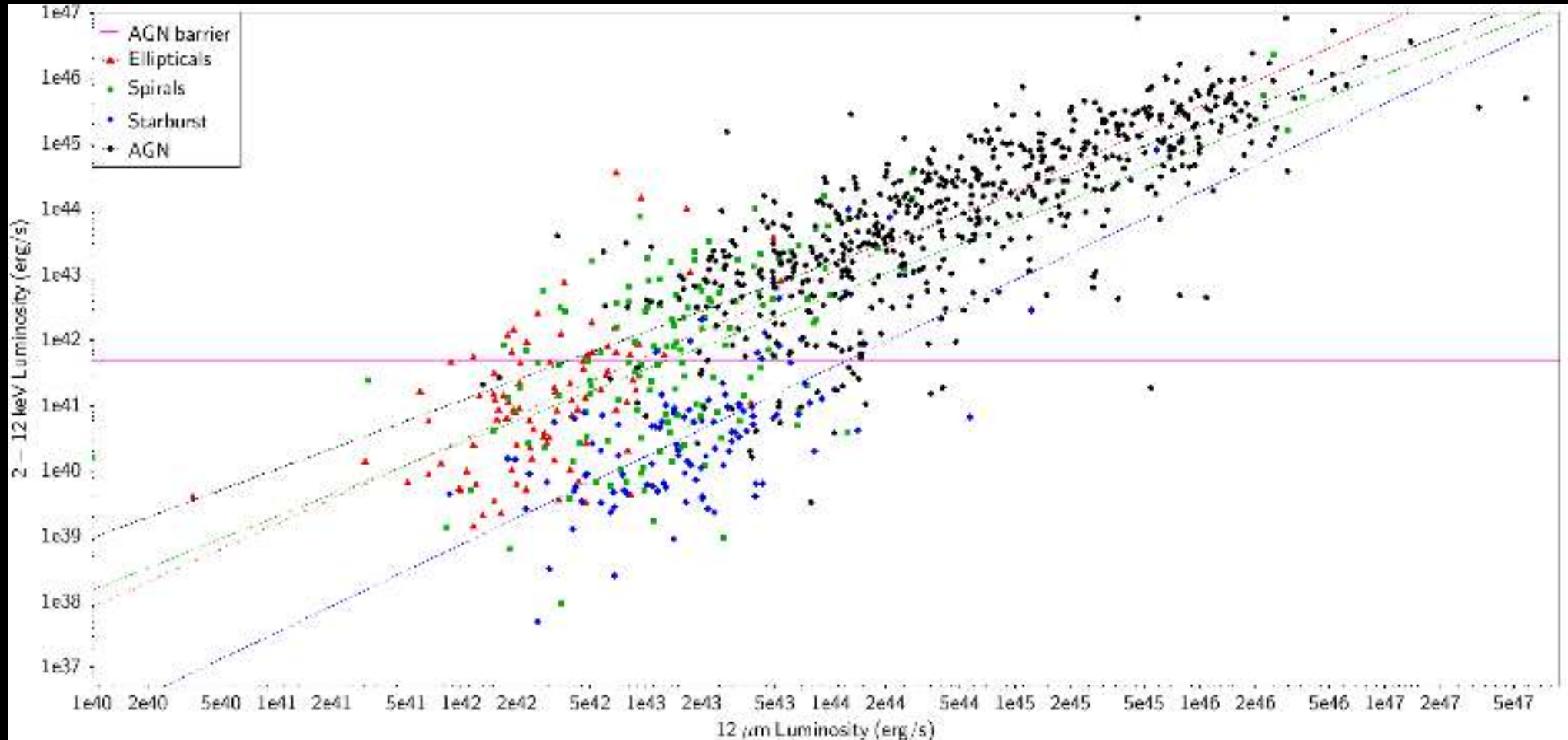
AGN: wide range of radio L for a given mid-IR L \rightarrow Mingo+ 2014

Let there be luminosities! (2)



SF, LERG and AGN populations clearly separated
Wide range of radio L for given X-ray L
Several Spirals harbouring AGN!

Let there be luminosities! (3)



Narrow distribution of AGN (with outliers – obscuration or misclassified?)

Conclusions

- Diagnostic plots: useful when you don't have z !
 - SF radio/IR correlation is tight and fairly reliable
 - Useful also to identify RQ AGN
- X-ray/radio, IR/radio, IR/X-ray L are sensible!
 - LERG are underluminous in X-ray, IR
 - Tight SF radio/IR correlation
 - Wide range of radio power for given L_{bol}
 - Overall, IR classifications are reliable, BUT many AGN classified as spirals! $\rightarrow w_1 - w_2 > 0.5$ leaves out lots of interesting AGN
 - Radio is great! More data, please! :)