

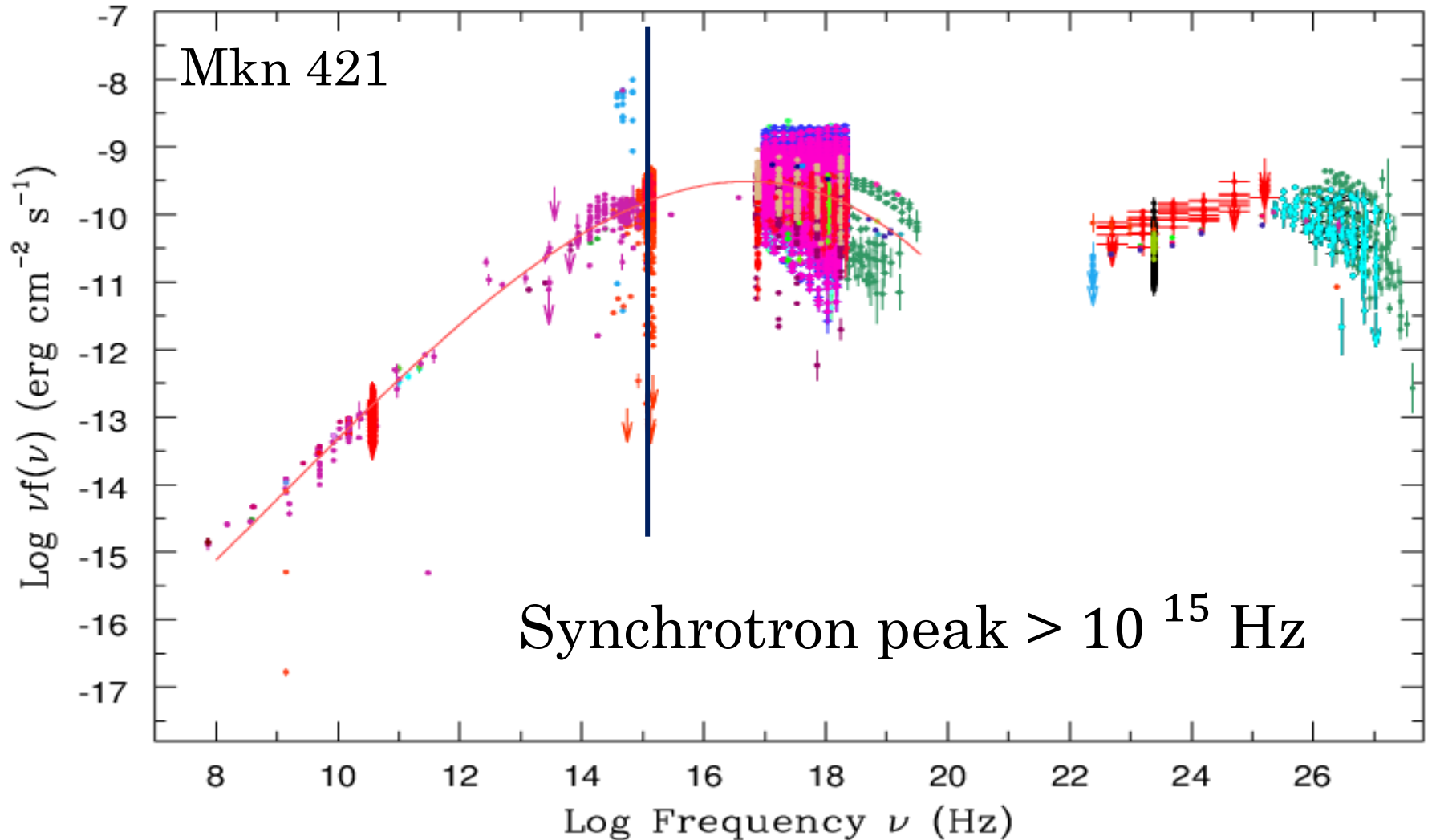
2WHSP: VHE BLAZAR CATALOG

Chang Yu Ling

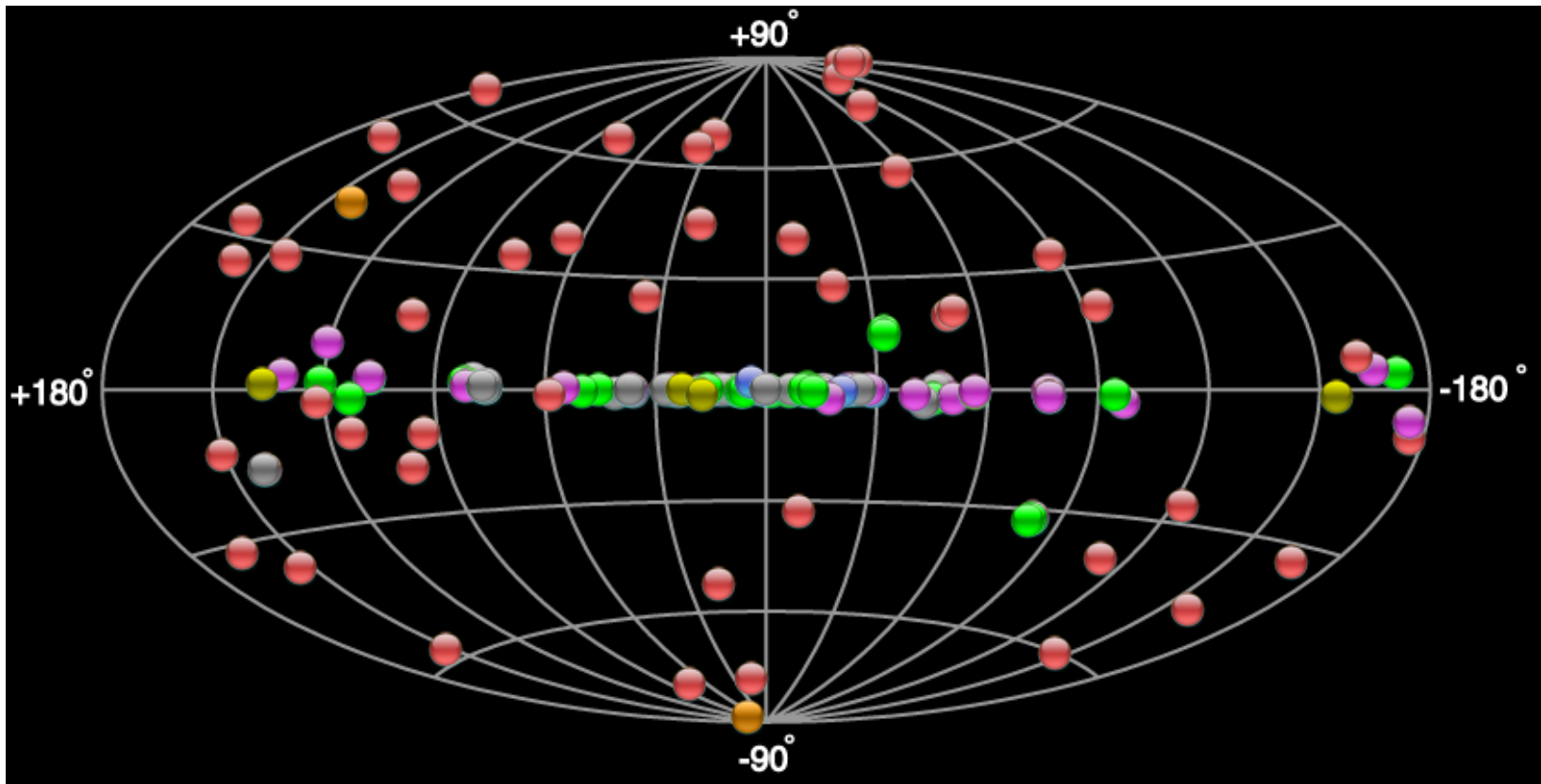
Bruno Arsioli
Paolo Giommi
Paolo Padovani



HIGH SYNCHROTRON PEAK BLAZAR (HSP)



HSP AND TEV CATALOG



TeVCat: <http://tevcat.uchicago.edu/>

Around **2/3** extragalactic TeV sources are HSPs.

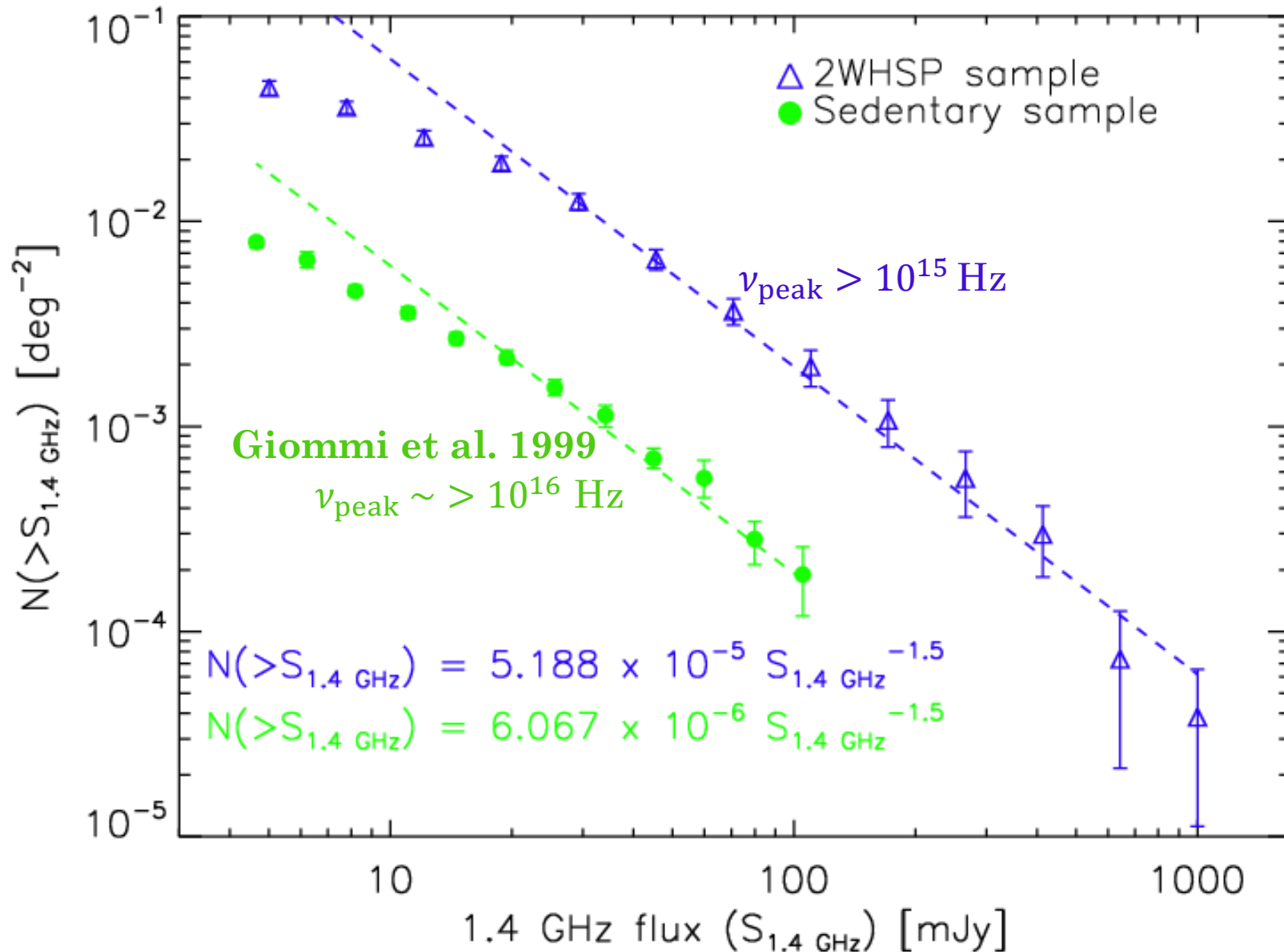


2WHSP CATALOG

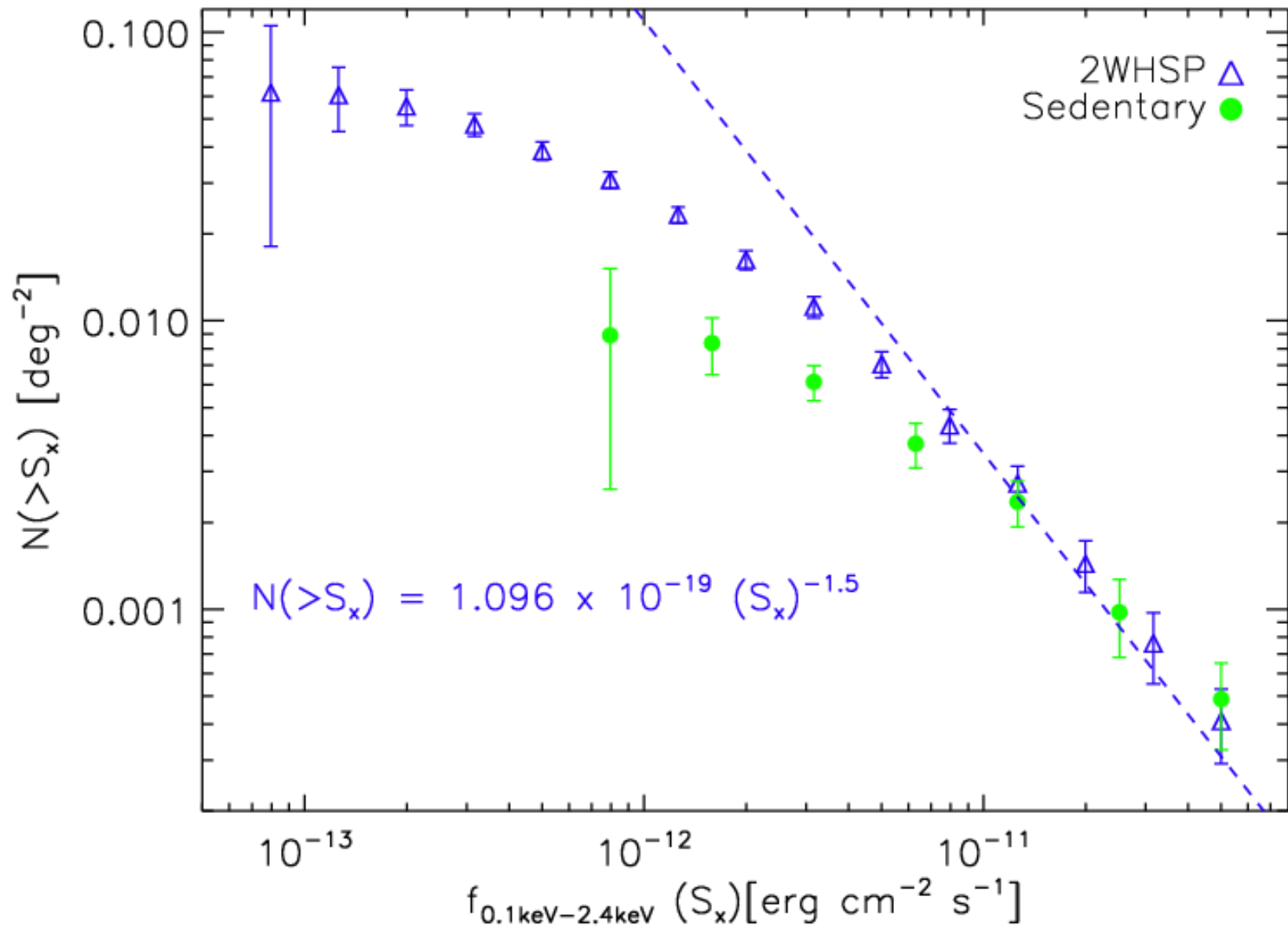
- 1WHSP, Arsioli et al, (2015) $|b| \geq 20$ degrees
- 2WHSP, extension of 1WHSP
 $|b| \geq 10$ degrees
 $\log \nu_{\text{peak}} \geq 15$ Hz
- 1694 sources in total
- comprises 290 new HSPs,
540 previously known HSPs,
815 HSP candidates



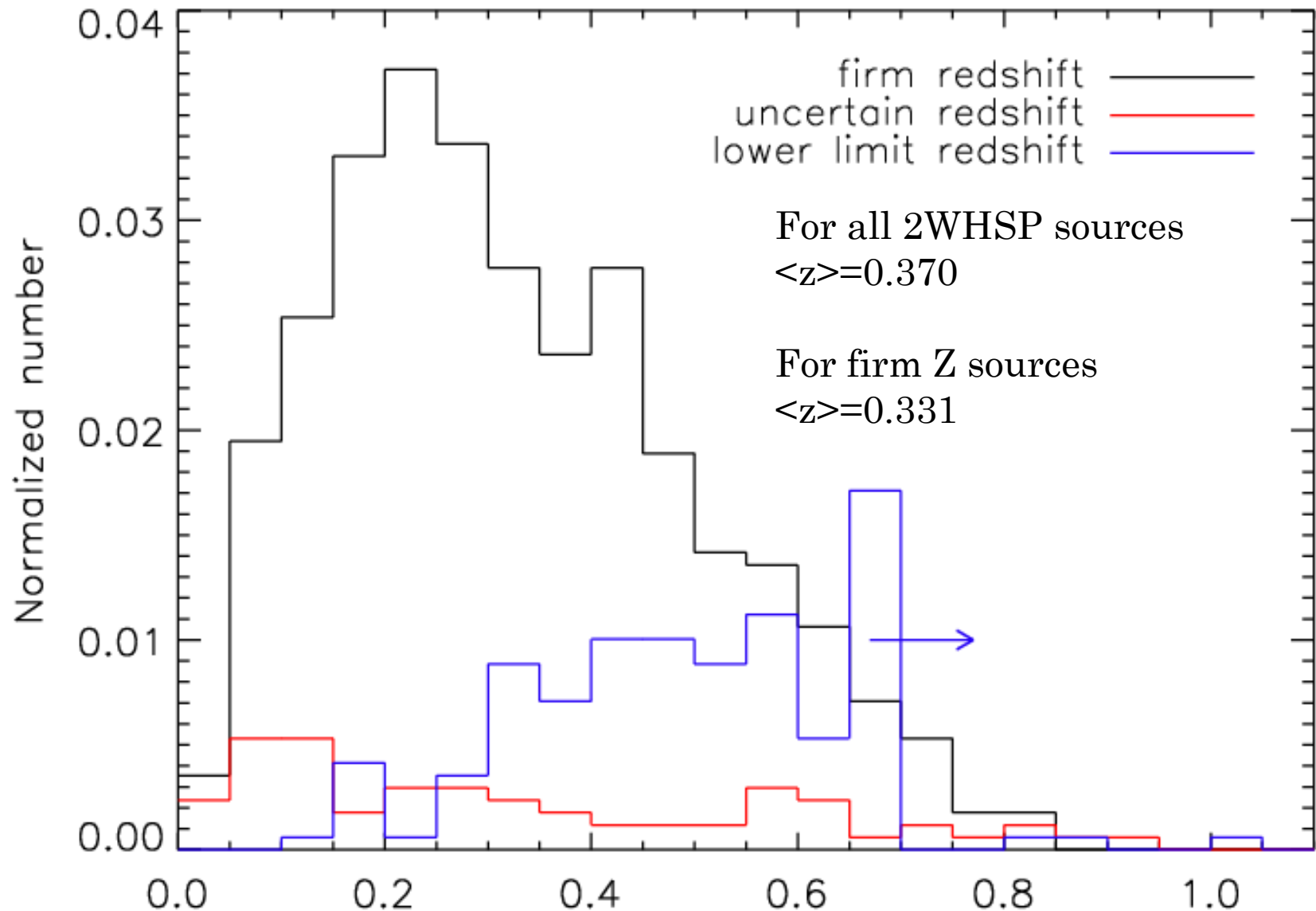
RADIO LOGN-LOGS



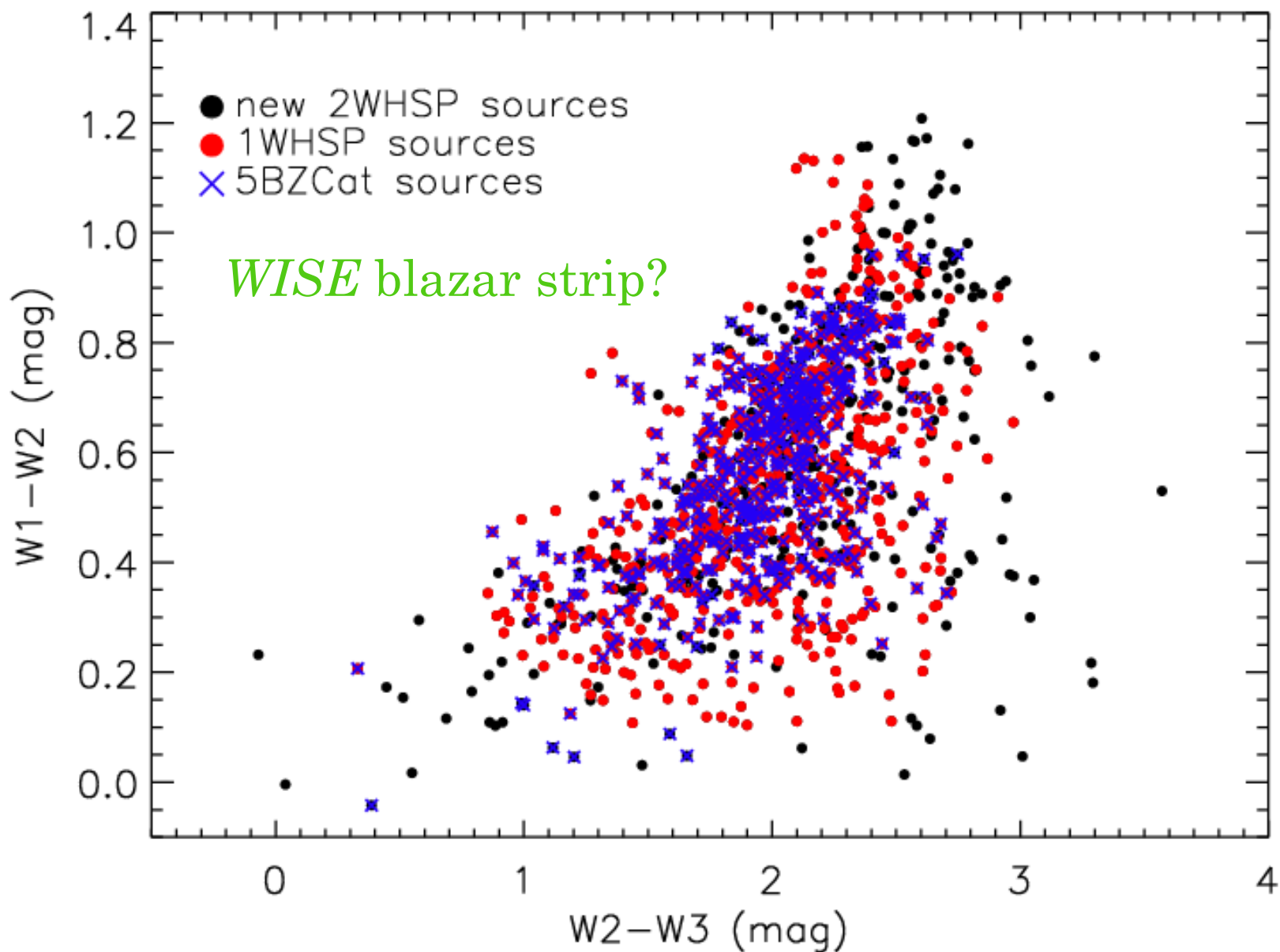
X-RAY LOGN-LOGS



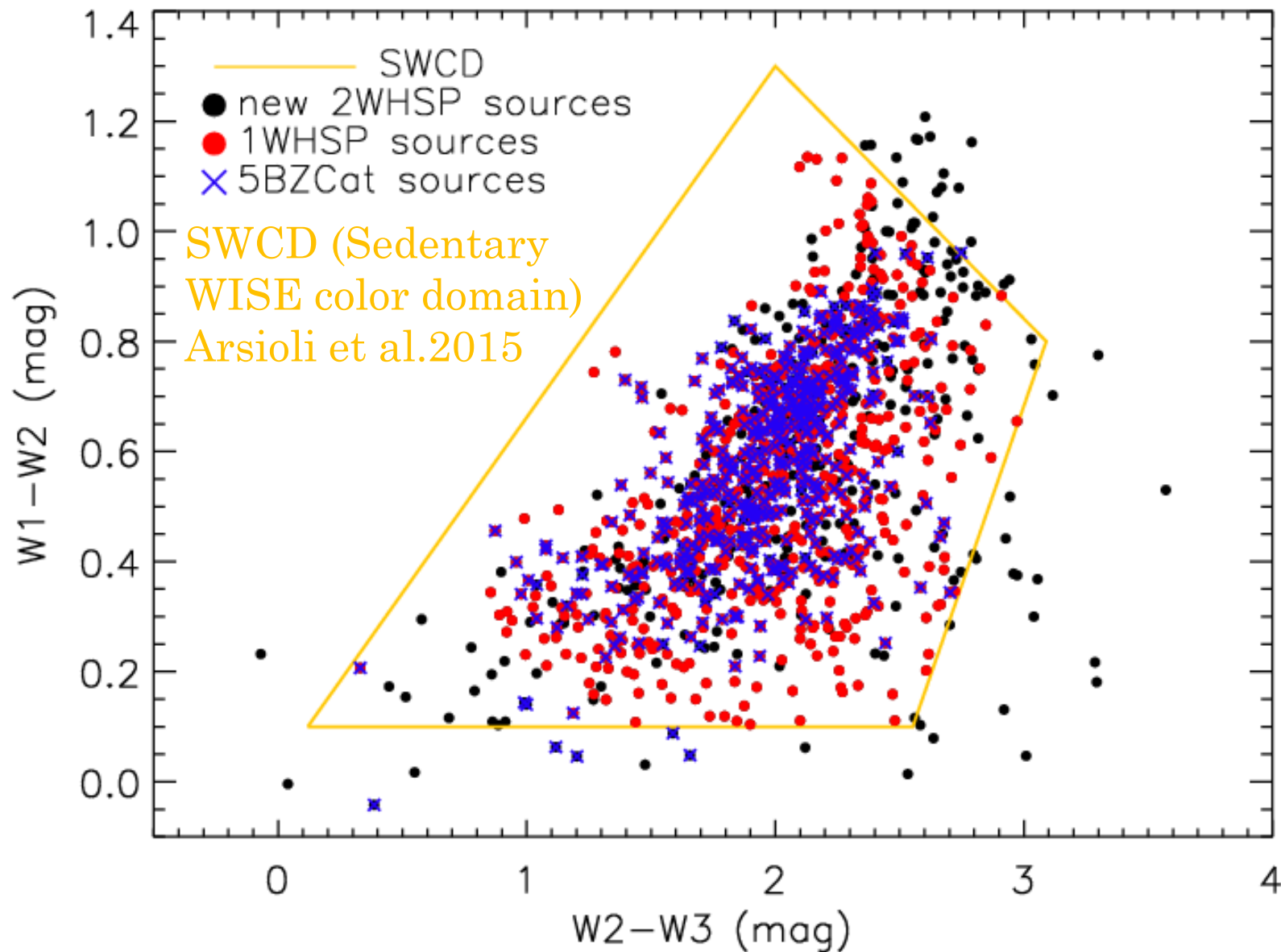
REDSHIFT DISTRIBUTION

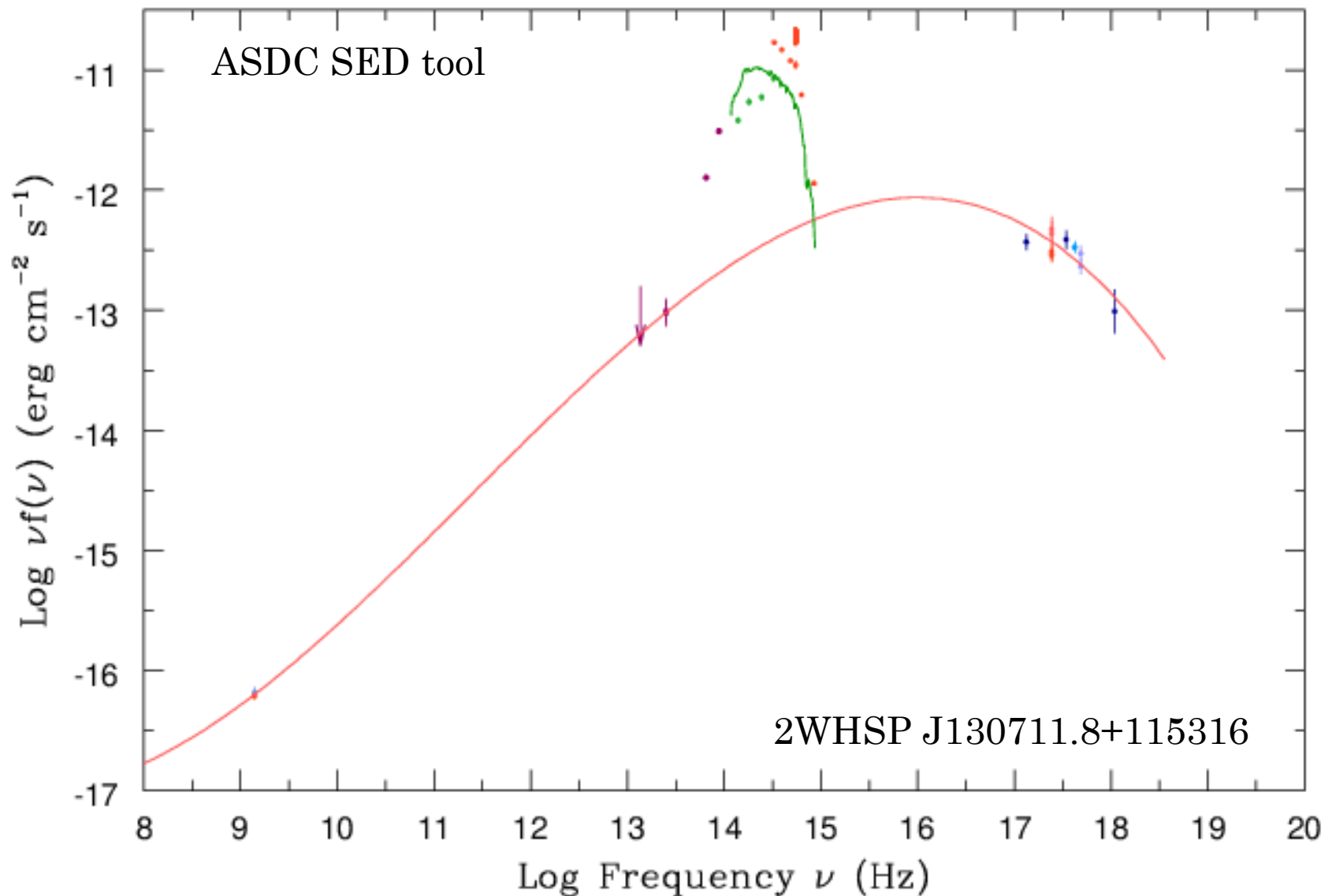


IR COLOR-COLOR



IR COLOR-COLOR

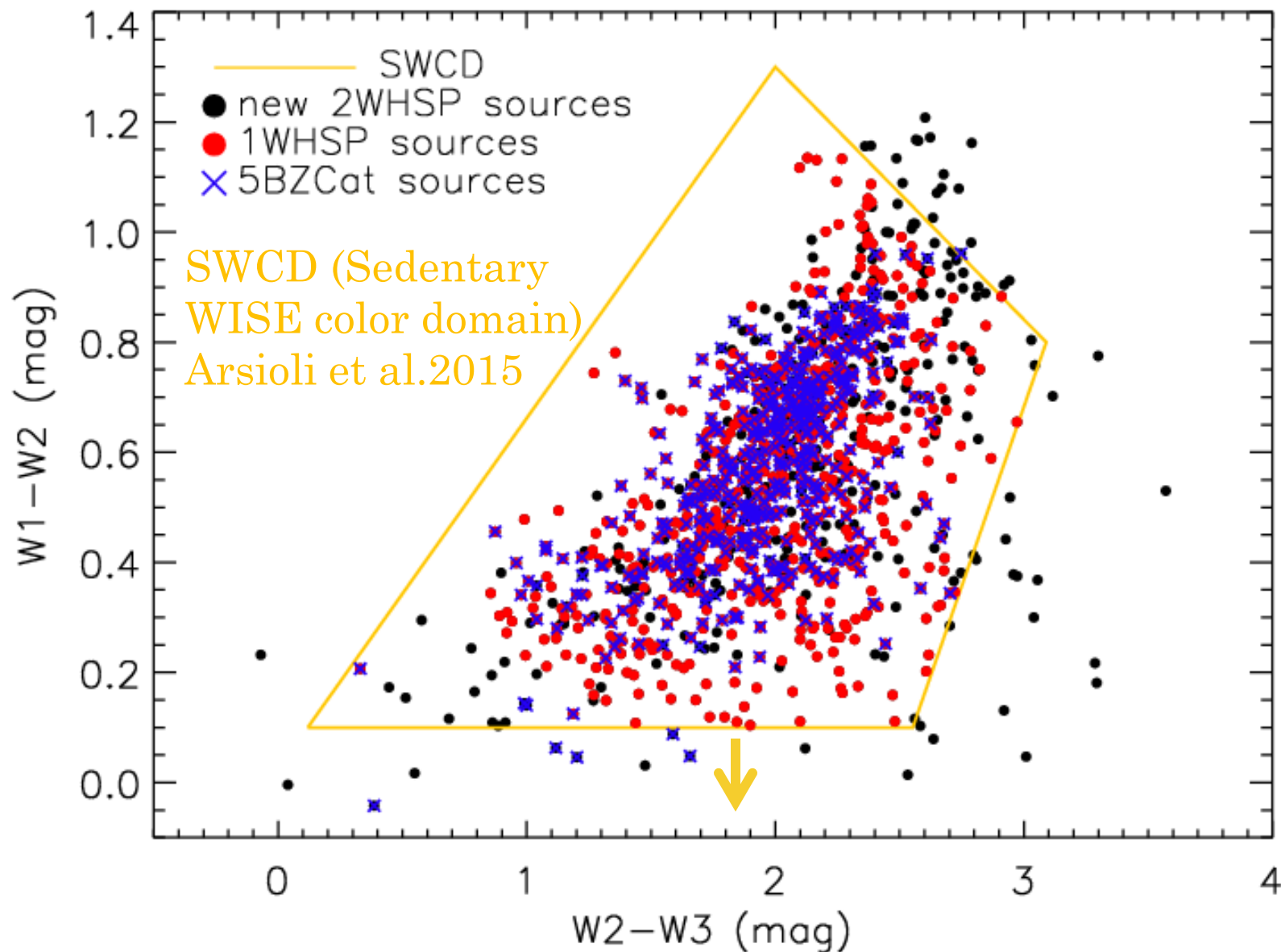




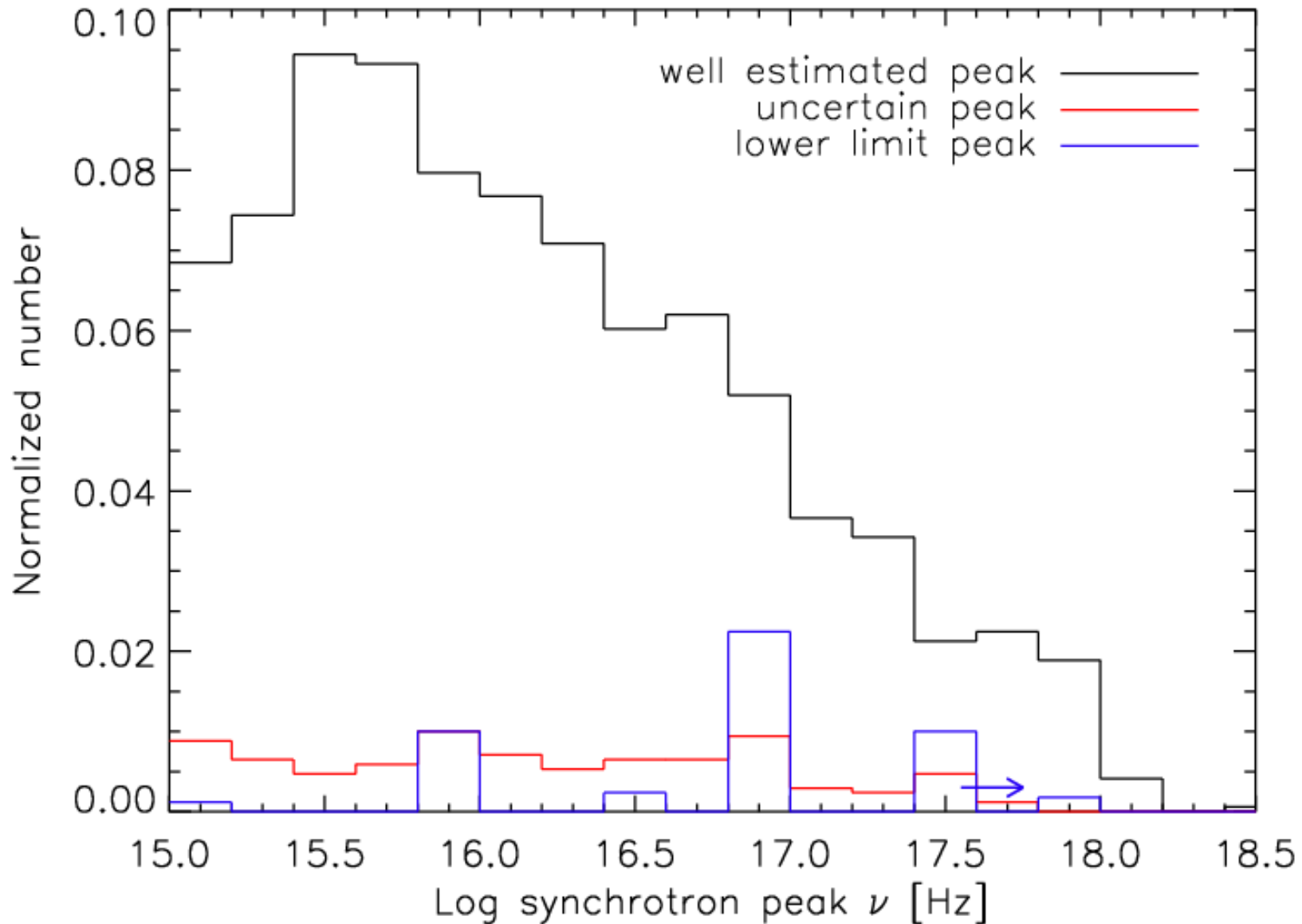
Thermal galaxy emission dominates in IR and optical; however, the non-thermal Synchrotron emission is also very clear.

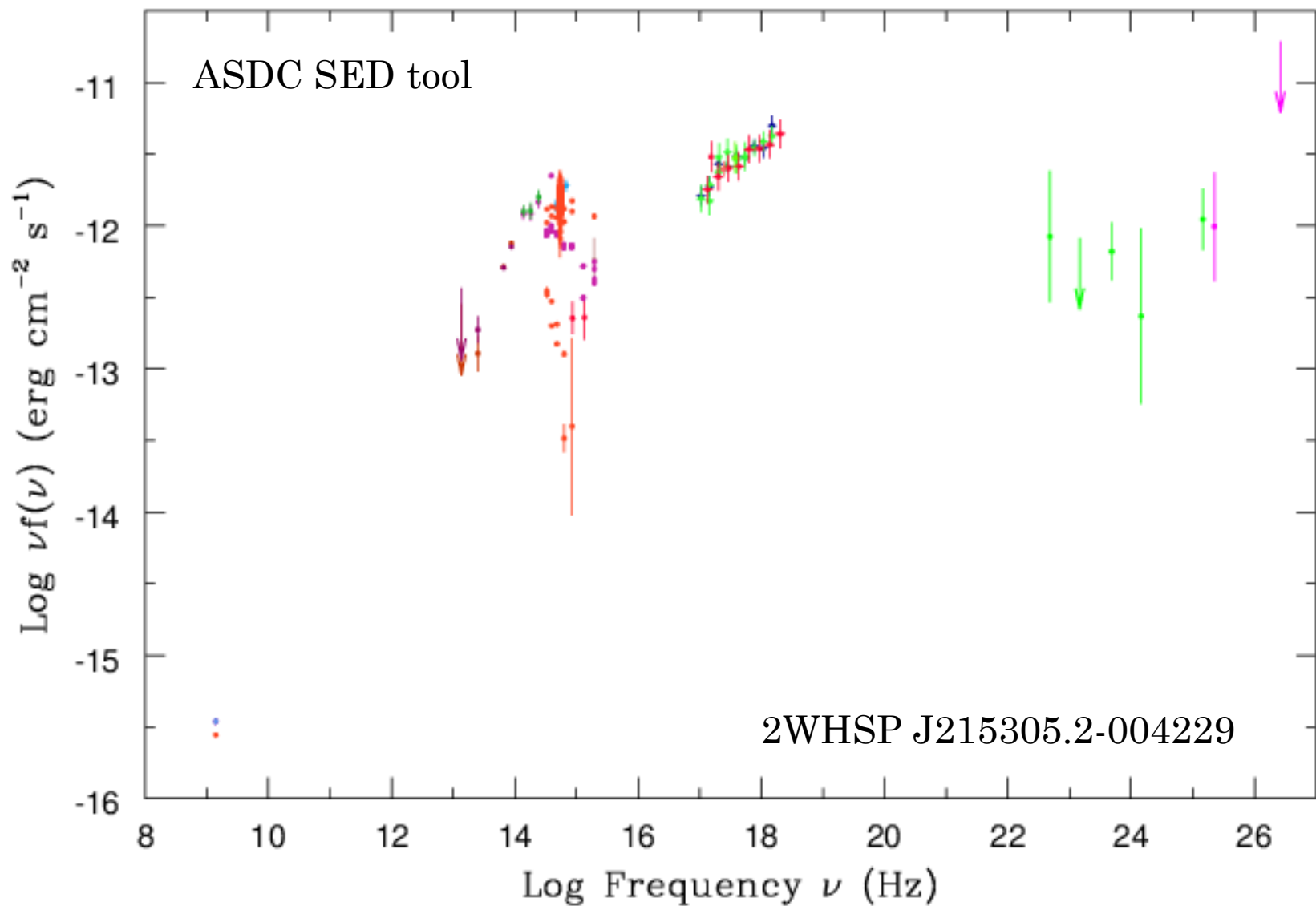


IR COLOR-COLOR



ν_{PEAK} DISTRIBUTION

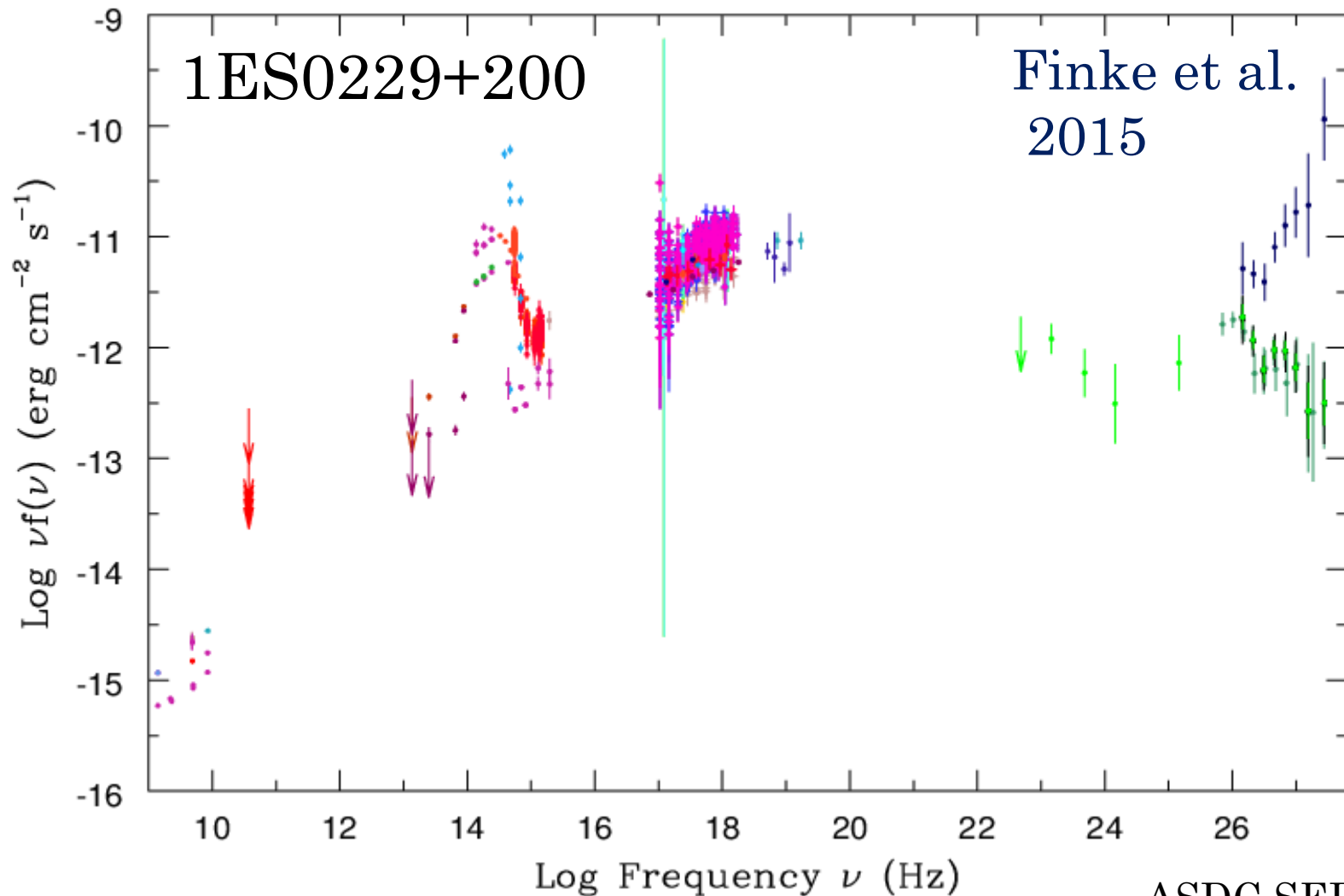




Synchrotron peak frequency is very high.
Not sure where is the peak, but could give a lower limit



EXTREME PEAK SOURCE



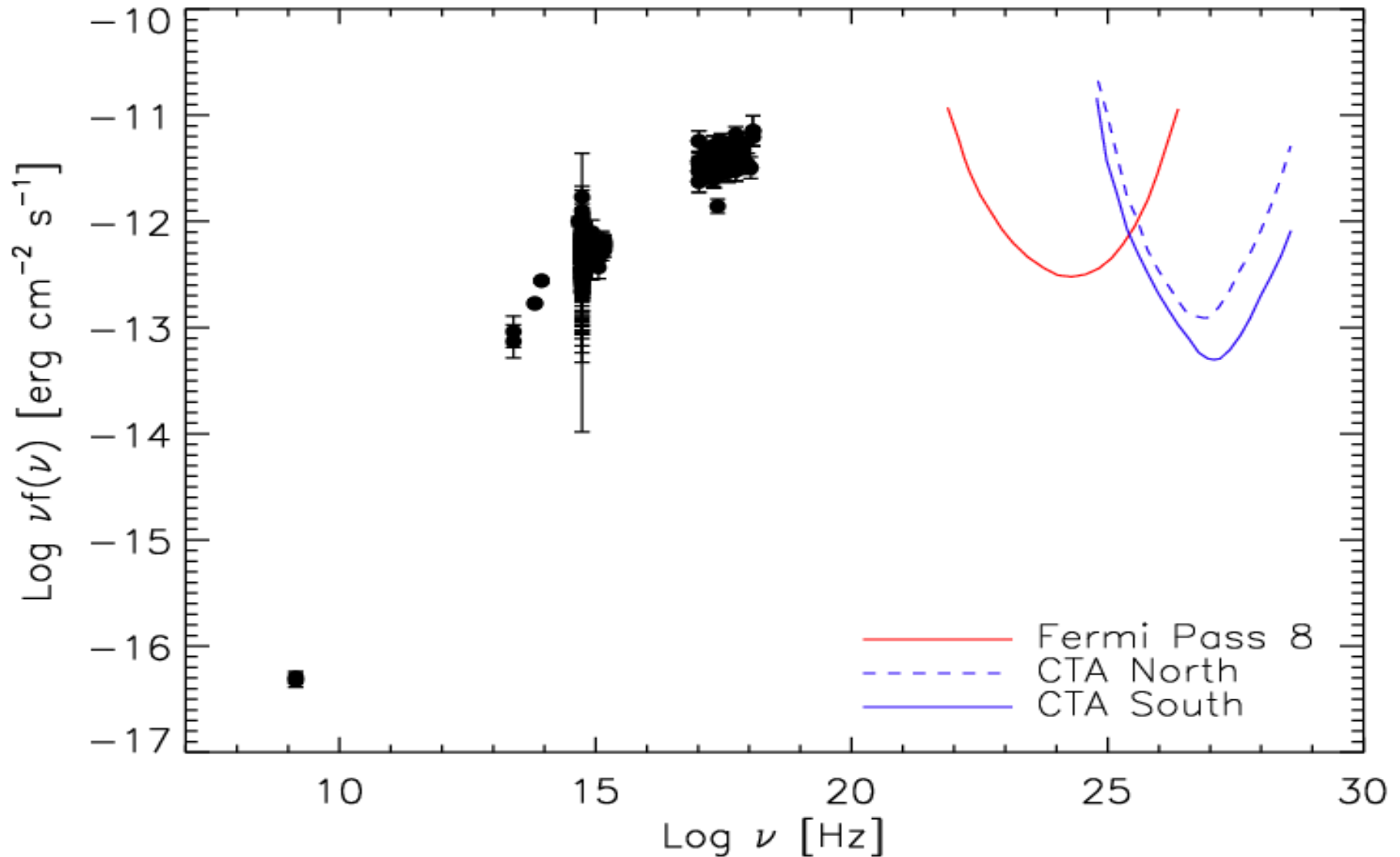
ASDC SED tool

- Extreme sources are very important for future VHE observations since the inverse Compton peak of them may extend to TeV or even higher energy.
- They may be the candidates for VHE observations.
- There are ≈ 40 extreme sources in 2WHSP catalog.



VHE CANDIDATE

SED 2WHSP J225147.5-320611

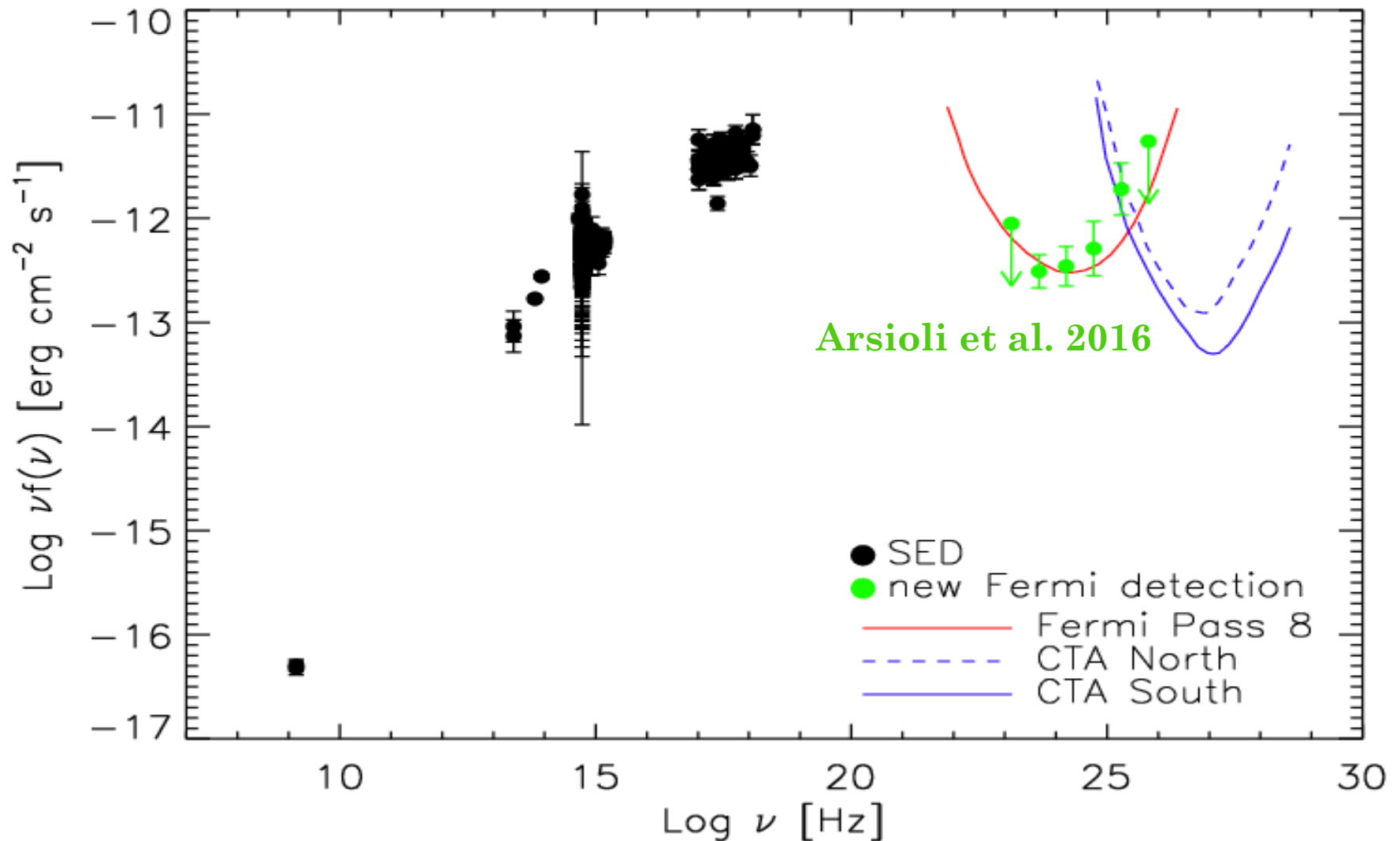


- Arsioli & Chang (2016, submitted to A&A) performed a dedicated γ -ray analysis of all bright 2WHSP sources, using archival *Fermi*-LAT observations integrated over 7.2 years of observations.
- By using the position of 2WHSP sources as seeds for the data analysis, found ~ 150 new detections, which are above $\sim 3\sigma$ level.



VHE CANDIDATE

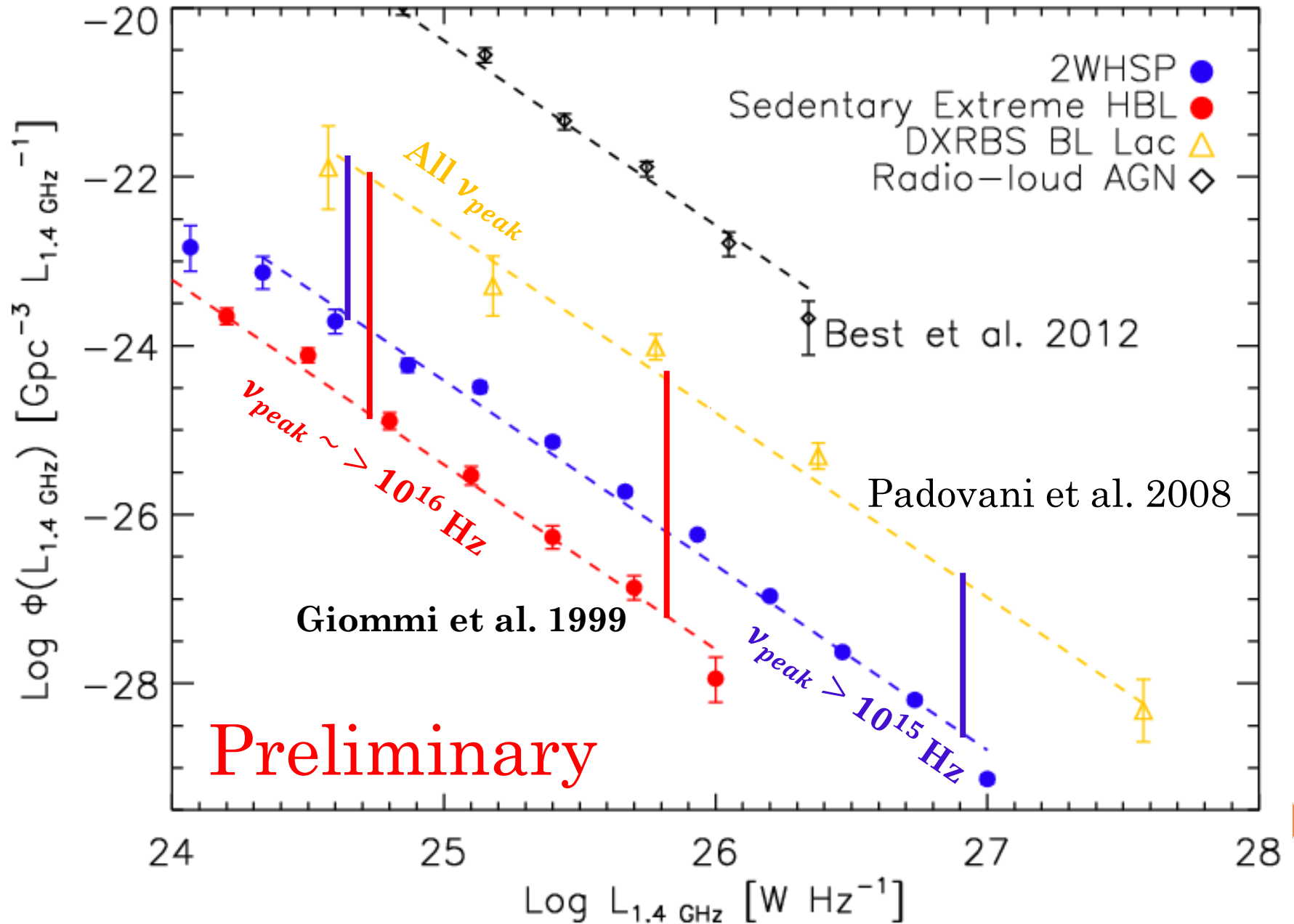
SED 2WHSP J225147.5–320611



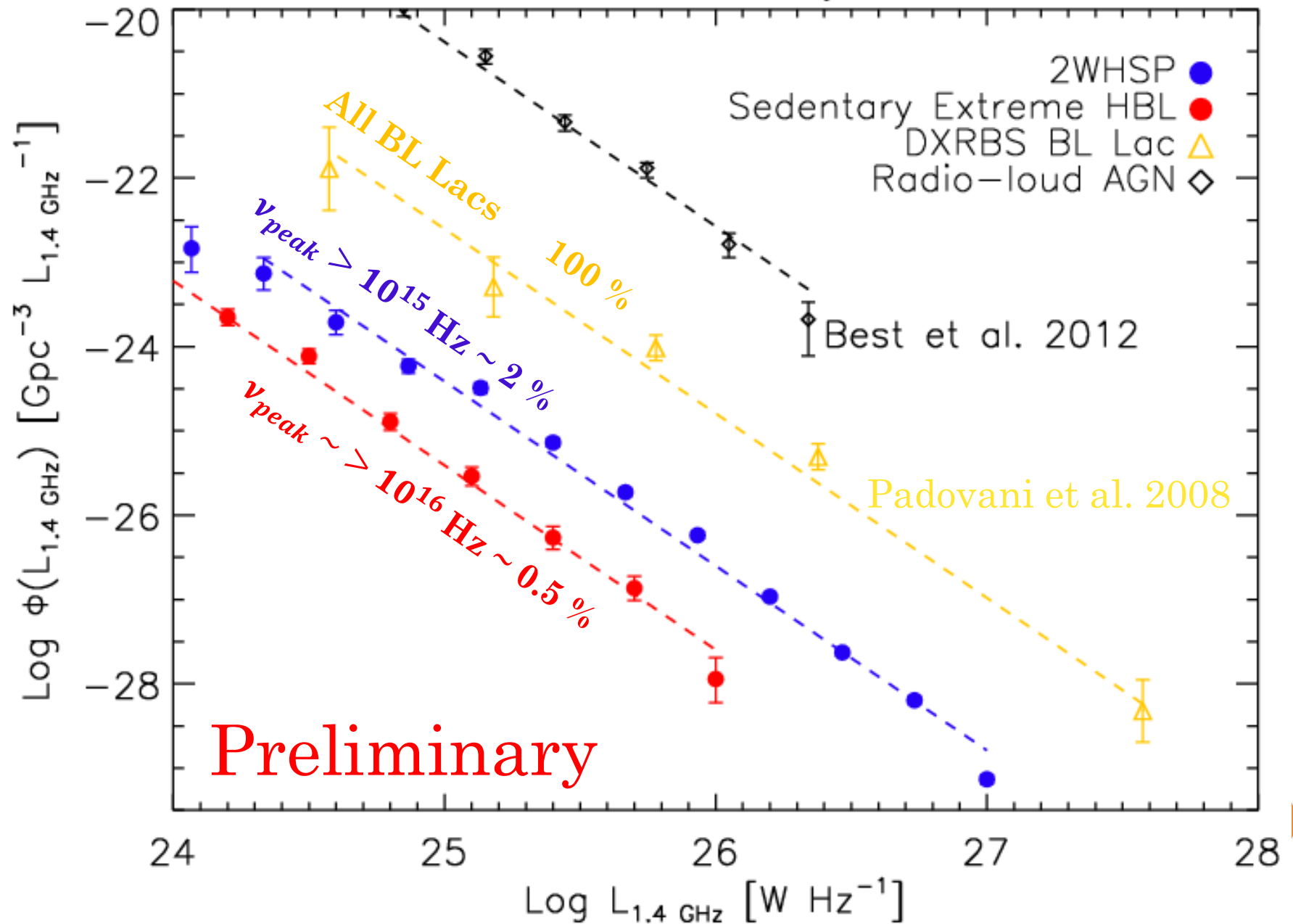
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- By using the position of 2WHSP sources as seeds for the data analysis, found ~ 150 new detections, which are above $\sim 3\sigma$ level.
- These results demonstrate the potential of HSP catalogs for the detection and identification of γ -ray and VHE sources.



The radio luminosity function



The radio luminosity function



SUMMARY

- We build a most complete HSP catalog, 2WHSP.
- Even though the catalog suffers the deficiency in the faint end, the catalog is complete in the bright end.
- In order to select more HSPs, *WISE* blazar strip should be enlarged.
- The HSPs catalog may be the candidates for future VHE surveys.
- All kinds of BL Lacs may have similar evolution process.

THE END

THANK YOU VERY MUCH

