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Theseus SXI and AGN

Paolo Giommi

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Active Galactic Nuclei: what's in a name?

P. Padovani · D. M. Alexander · R. J. Assef · B. De Marco · P. Giommi · R. C. Hickox · G. T. Richards · V. Smolčić · E. Hatziminaoglou · V. Mainieri · M. Salvato

The Astronomy and Astrophysics Review
2017 arXiv 1707.07134

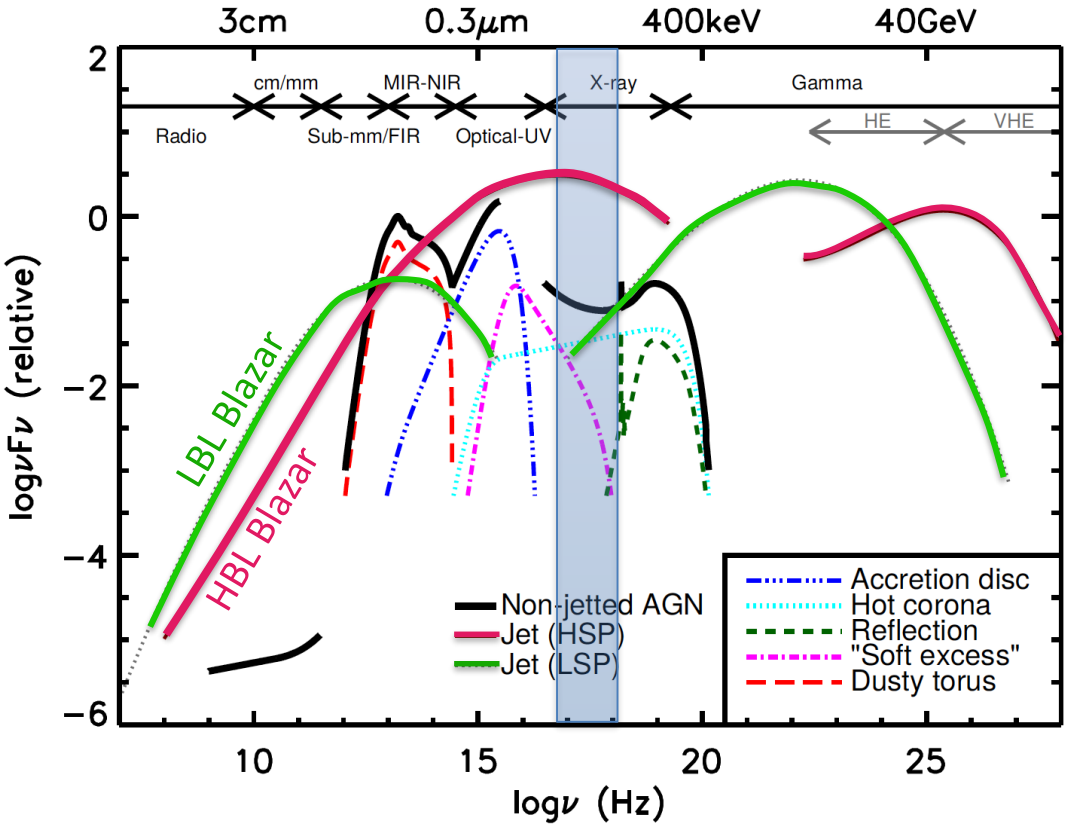

Fig. 1 A schematic representation of an AGN spectral energy distribution (SED), loosely based on the observed SEDs of non-jetted quasars (e.g. Elvis et al., 1994; Richards et al., 2006a). The black solid

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SXI 1 day exposure

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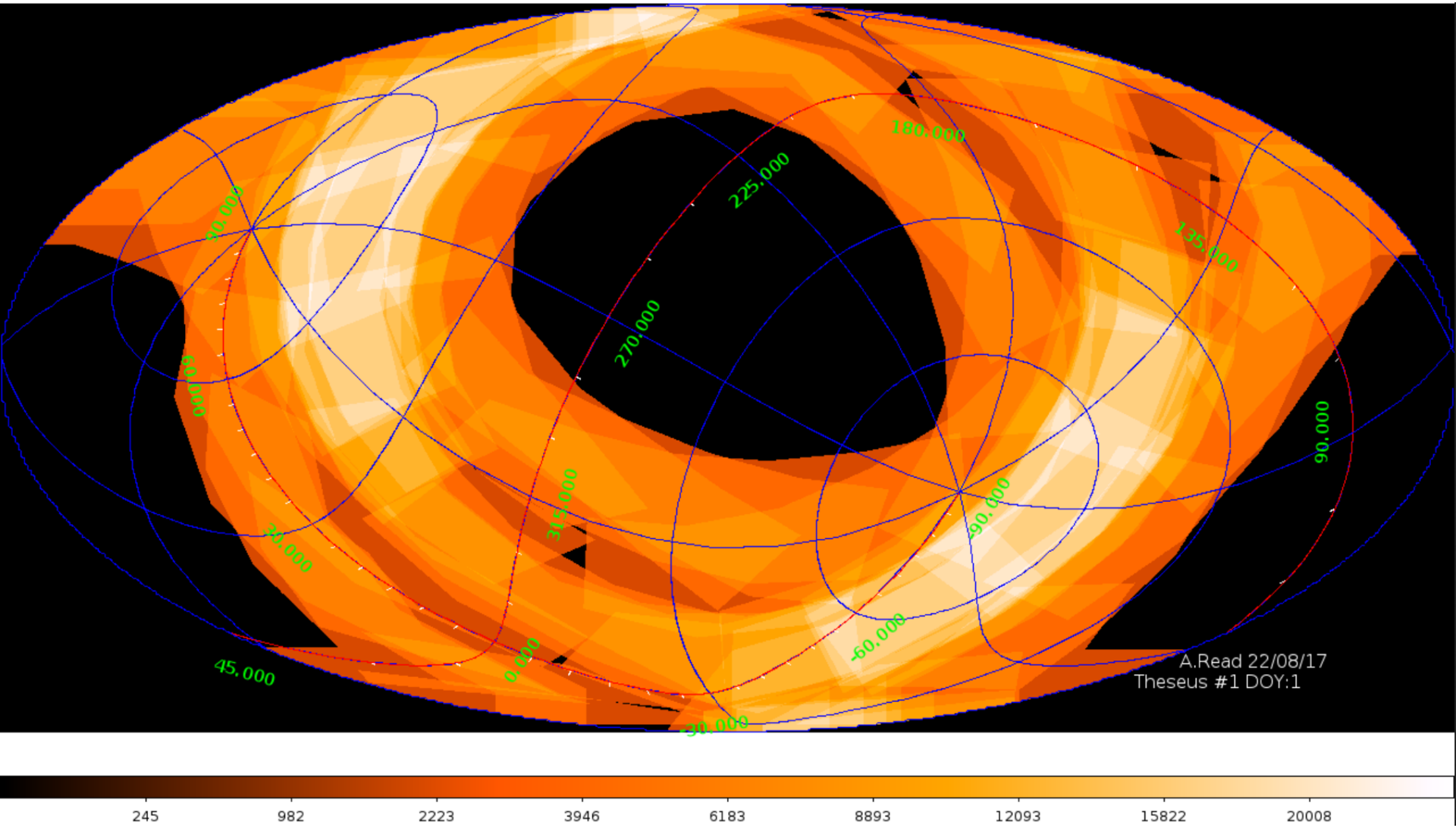
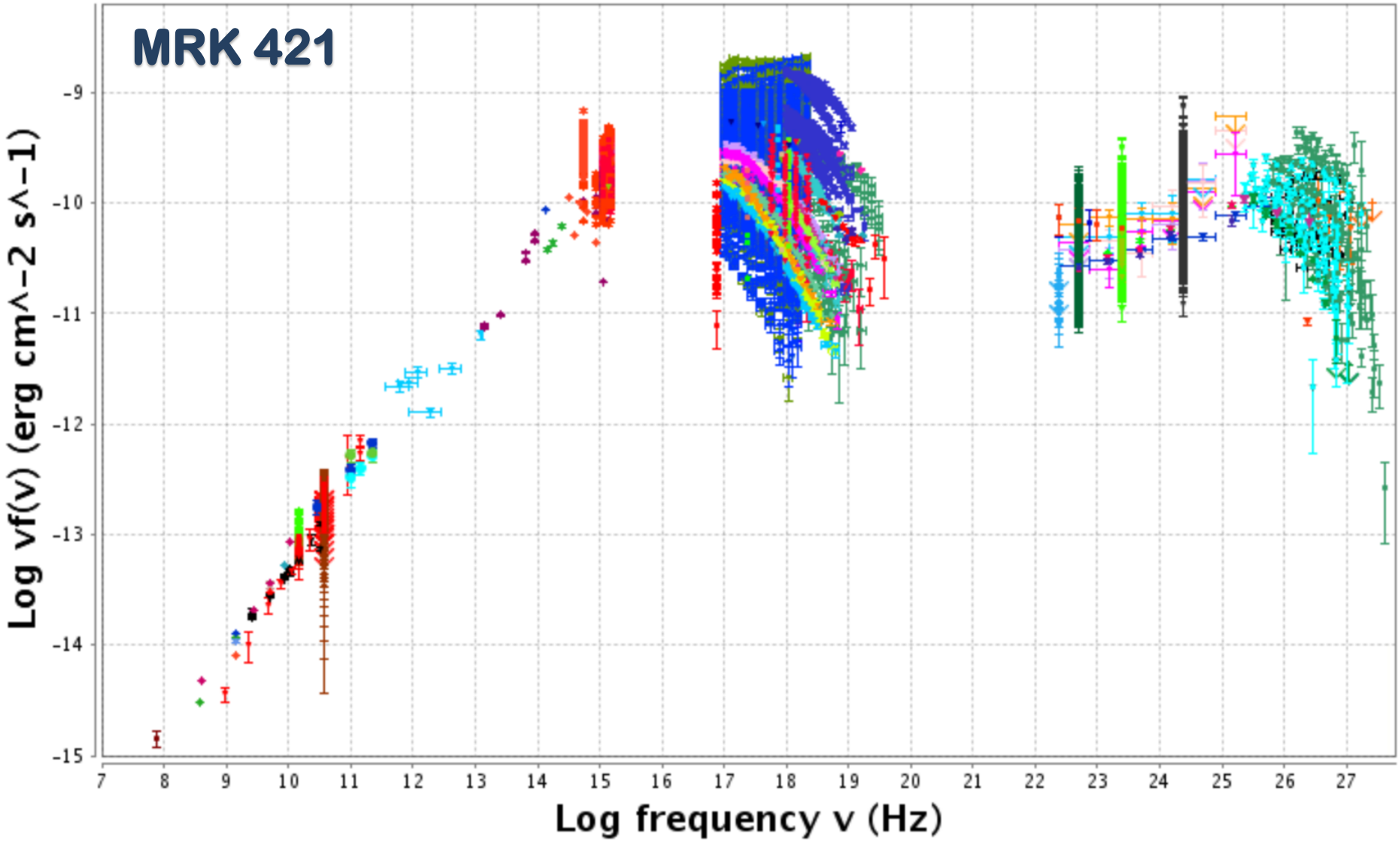
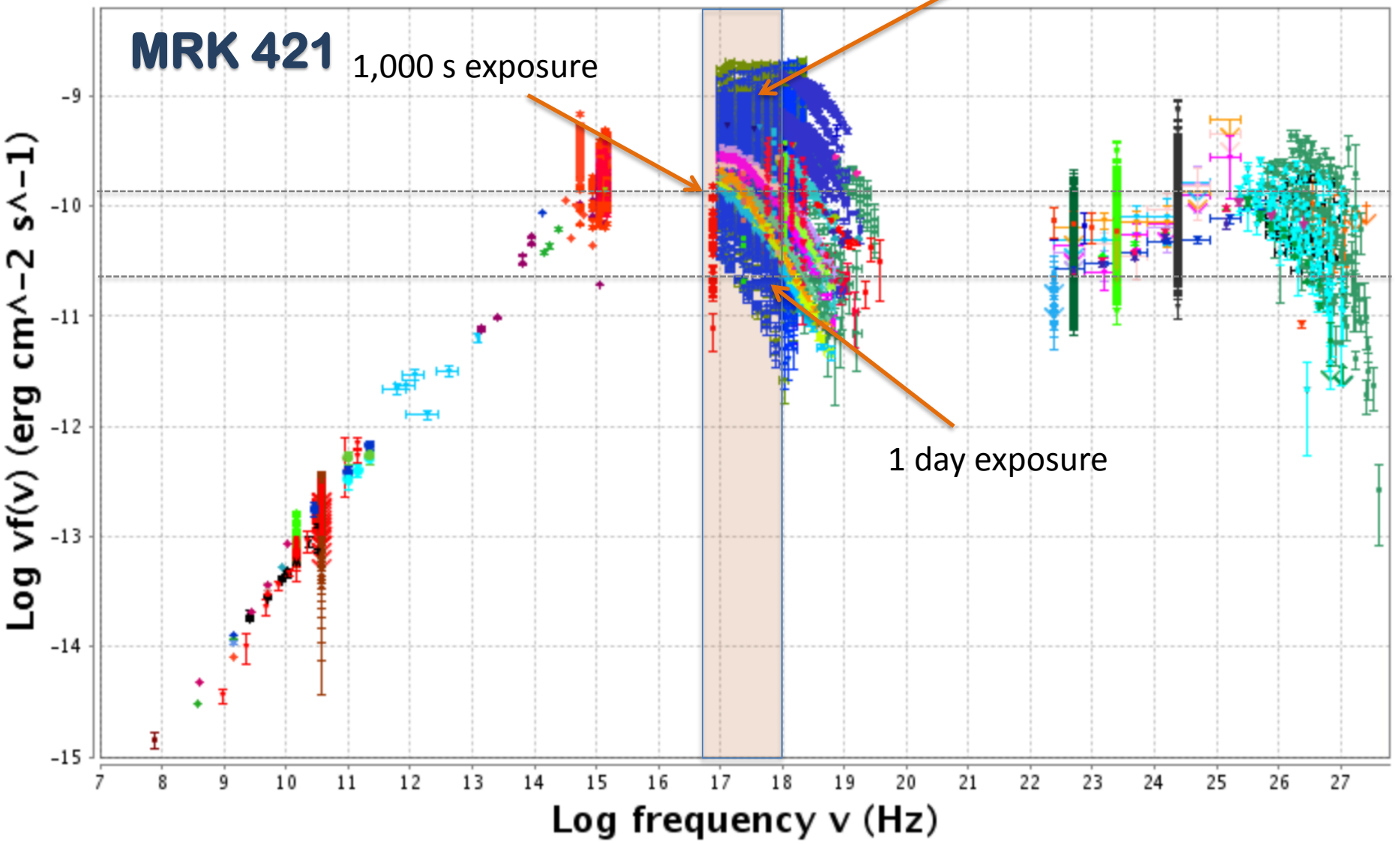



MRK 421
Log vf(v) (erg cm^-2 s^-1)
-9
-10
-11
-12
-13
-14
-15
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
Log frequency v (Hz)


MRK 421
1,000 s exposure
SXI energy band
1 day exposure
Log vf(v) (erg cm^-2 s^-1)
Log frequency v (Hz)
-9
-10
-11
-12
-13
-14
-15
7
8
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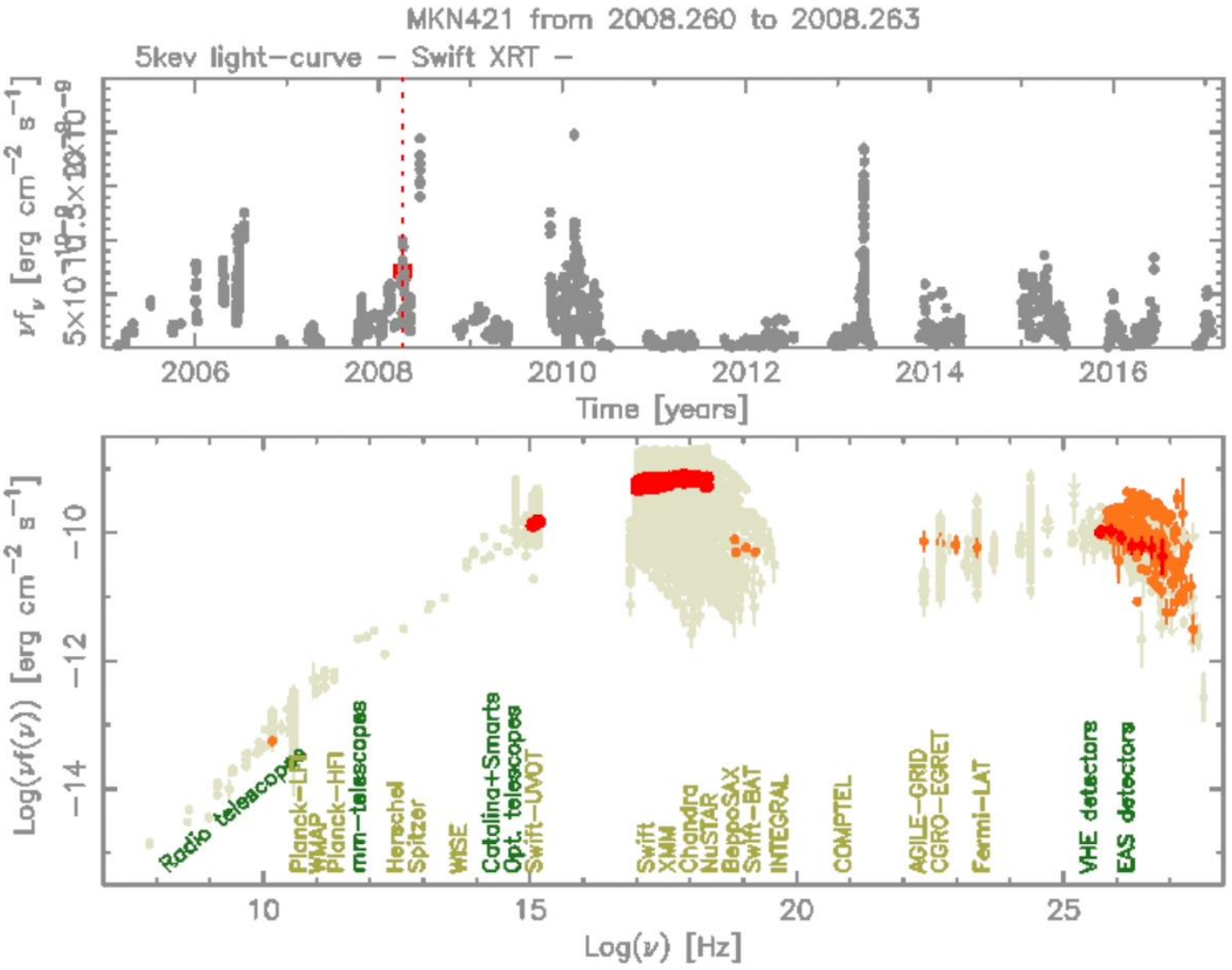
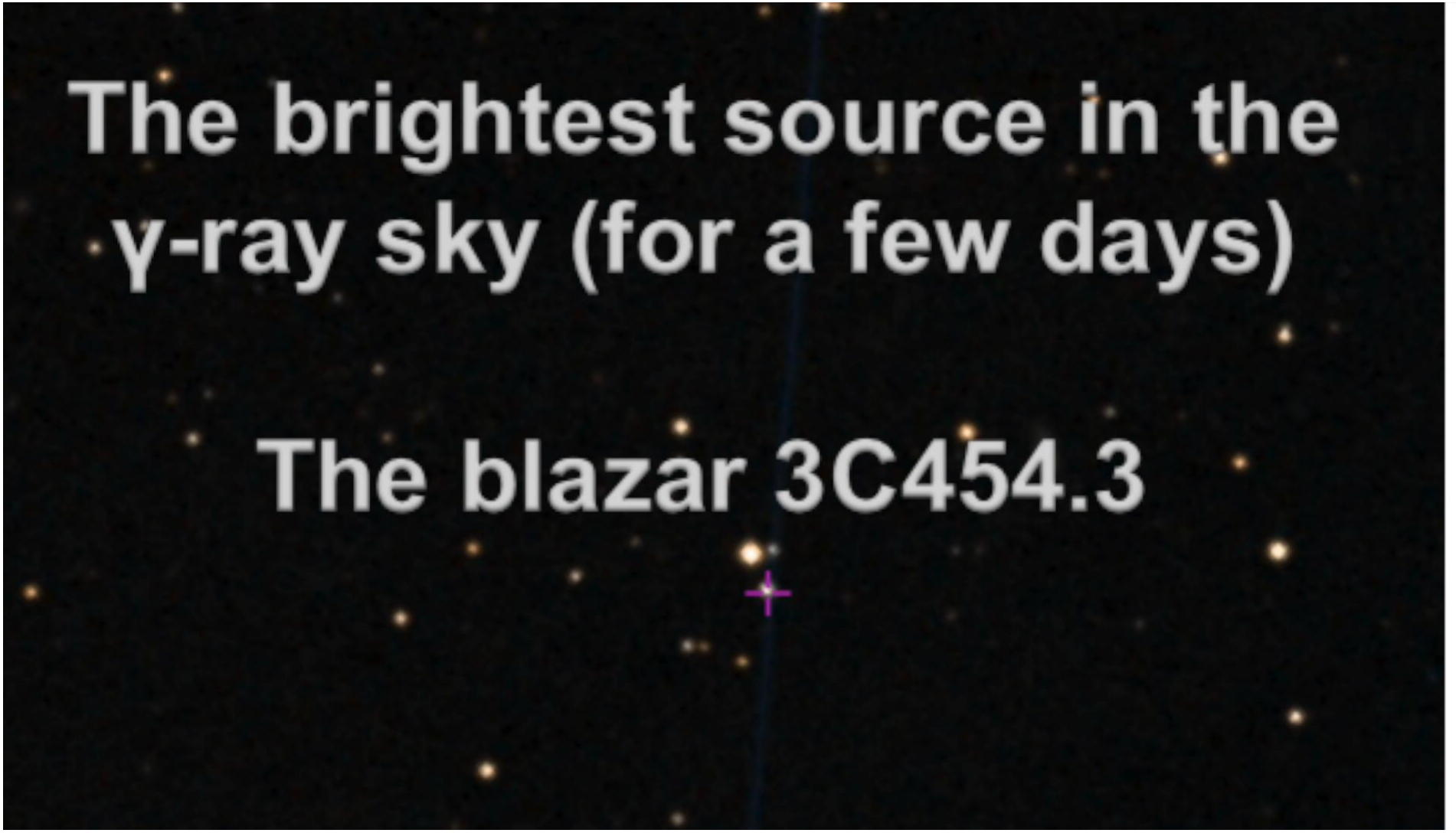

MKN421 from 2008.260 to 2008.263
5kev light−curve − Swift XRT −
νf_ν [erg cm^{-2} s^{-1}]
2006
2008
2010
2012
2014
2016
Time [years]
Log($\nu f(\nu)$) [erg cm^{-2} s^{-1}]
−10
−12
−14
Radio telescopes
Planck−LFI
WMAP
Planck−HFI
mm−telescopes
Herschel
Spitzer
WISE
Catalina+Smarts
Opt. telescopes
Swift−UVOT
Swift
XMM
Chandra
NuSTAR
BeppoSAX
Swift−BAT
INTEGRAL
COMPTEL
AGILE−GRID
CGRO−EGRET
Fermi−LAT
VHE detectors
EAS detectors
10
15
20
25
Log(ν) [Hz]


The brightest source in the
γ-ray sky (for a few days)
The blazar 3C454.3

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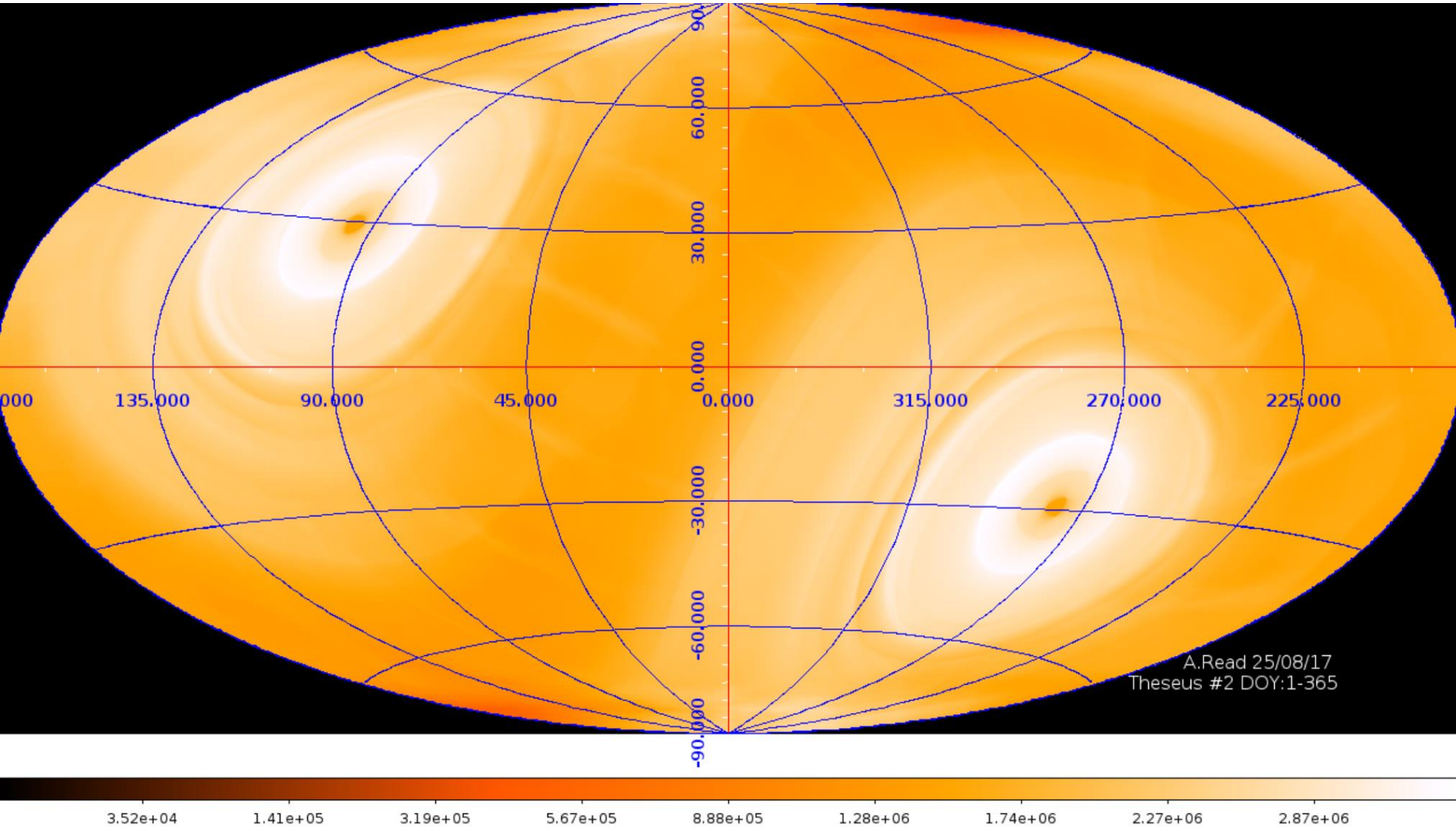
SXI 1 year exposure



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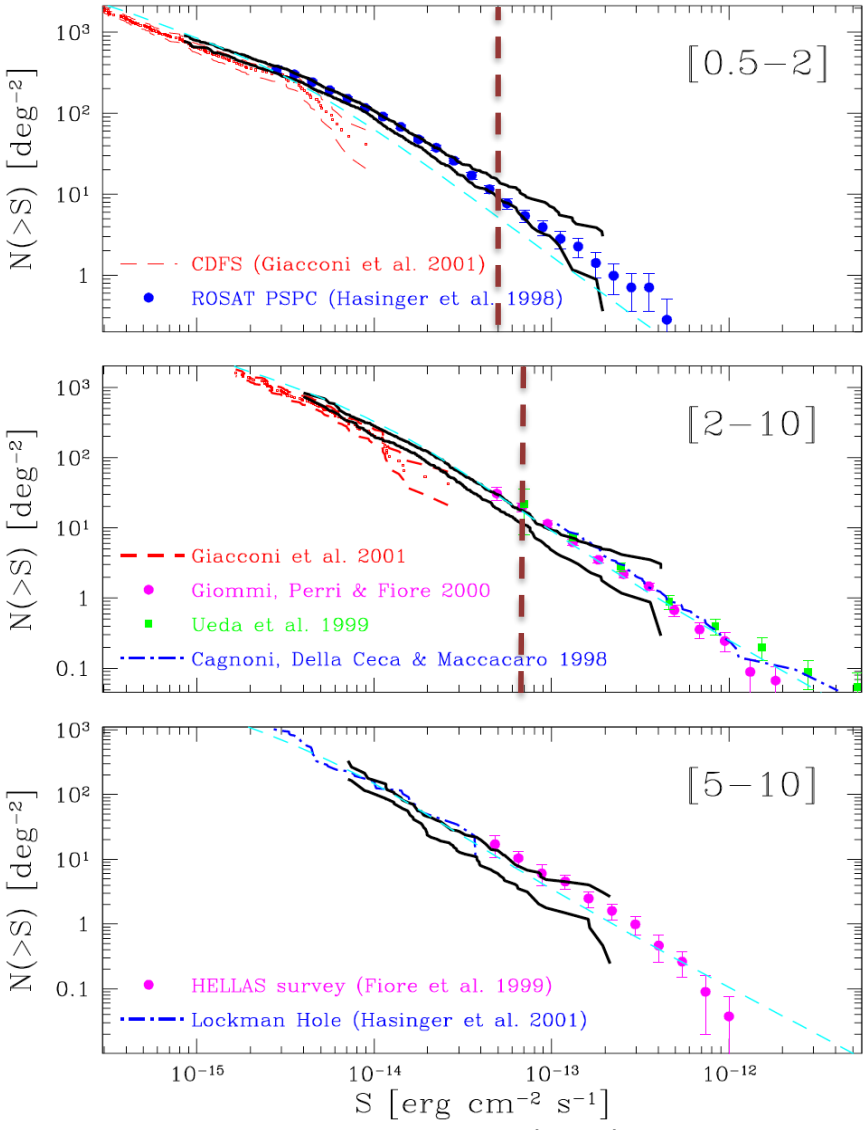
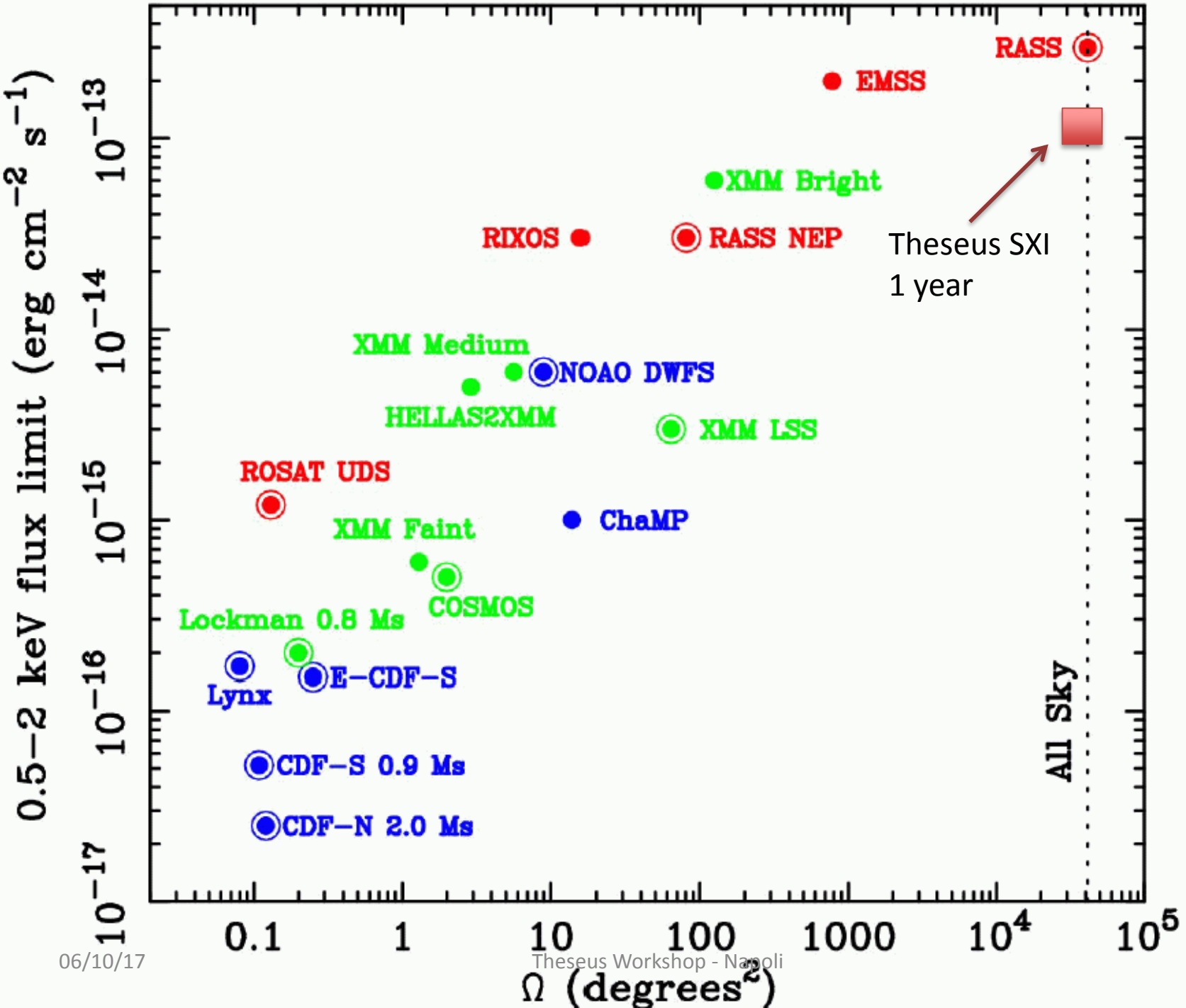
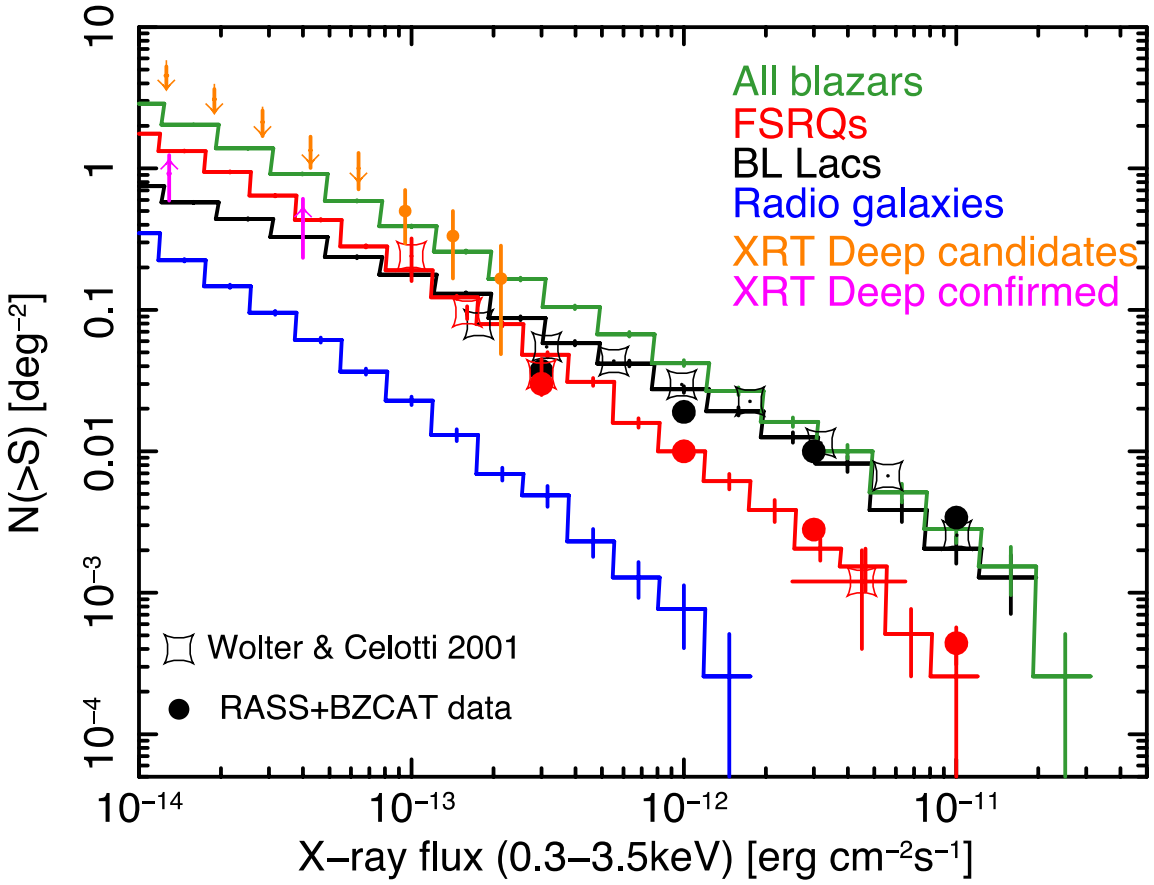
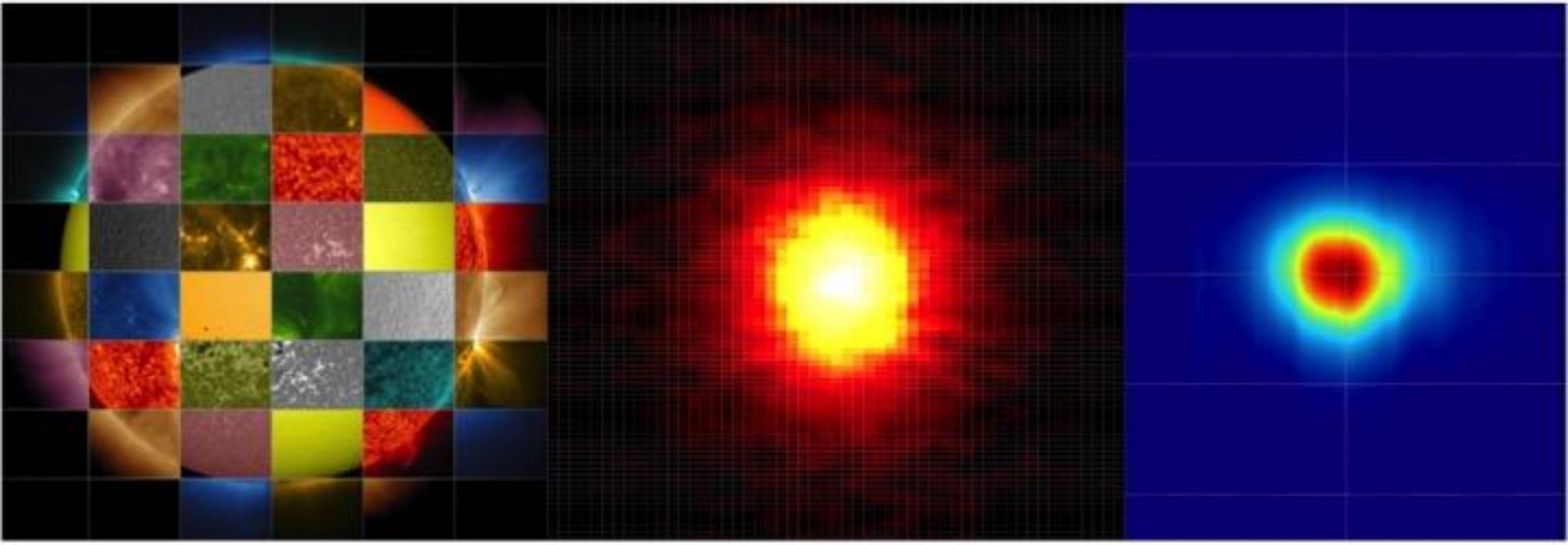
Baldi et al. 2001




RASS
EMSS
XMM Bright
RIXOS
RASS NEP
Theseus SXI
1 year
XMM Medium
NOAO DWFS
HELLAS2XMM
XMM LSS
ROSAT UDS
ChaMP
XMM Faint
COSMOS
Lockman 0.8 Ms
Lynx
E-CDF-S
CDF-S 0.9 Ms
CDF-N 2.0 Ms
All Sky
0.5–2 keV flux limit (erg cm^{-2} s^{-1})
10^{-13}
10^{-14}
10^{-15}
10^{-16}
10^{-17}
0.1
1
10
100
1000
10^4
10^5
Ω (degrees^2)


All blazars
FSRQs
BL Lacs
Radio galaxies
XRT Deep candidates
XRT Deep confirmed
Wolter & Celotti 2001
RASS+BZCAT data
N(>S) [deg^{-2}]
X–ray flux (0.3–3.5keV) [erg cm^{-2}s^{-1}]
10
1
0.1
0.01
10^{-3}
10^{-4}
10^{-14}
10^{-13}
10^{-12}
10^{-11}

Multi-messenger pictures of our Sun



Multi-frequency
Electromagnetic radiation
NASA

Neutrinos
SuperKamiokande

Cosmic Rays
Moon Mapping Project
Data from Chang'e-1

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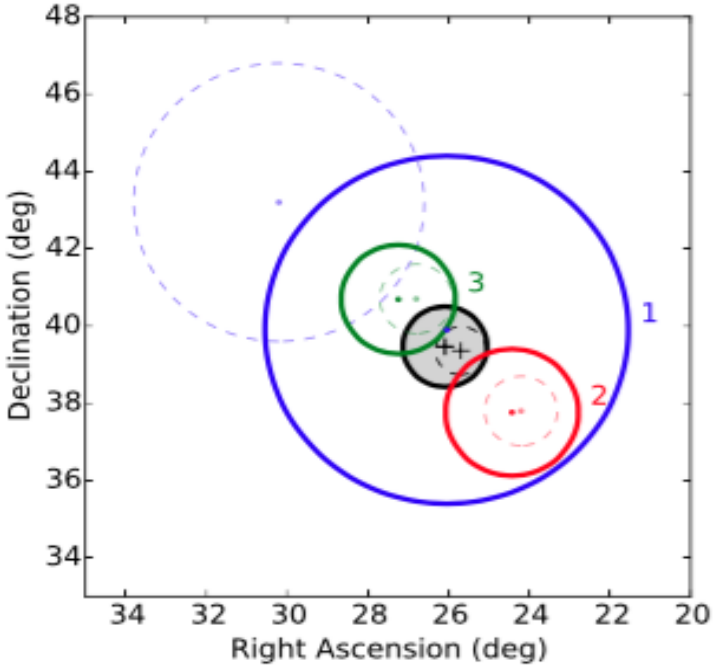
Multiwavelength follow-up of a rare IceCube neutrino multiplet

IceCube: M. G. Aartsen[2], M. Ackermann[114], J. Adams[28], J. A. Aguilar[16], M. Ahlers[66], M. Ahrens[99], I. Al Samarai[42], D. Altmann[40], K. Andeen[68],

Aartsen et al. 2017, arXiv: 1702.0613

On February 17 2016, the IceCube real-time neutrino search identified, for the first time, three muon neutrino candidates arriving within 100 s of each other which are consistent with a point source origin. Such a triplet is expected only once every 13.7 years as a random coincidence of background events. However, considering the lifetime of the follow-up program the probability to detect at least one triplet from atmospheric backgrounds is 32%. Follow-up observatories were notified in order to search for an electromagnetic counterpart. Observations were obtained by



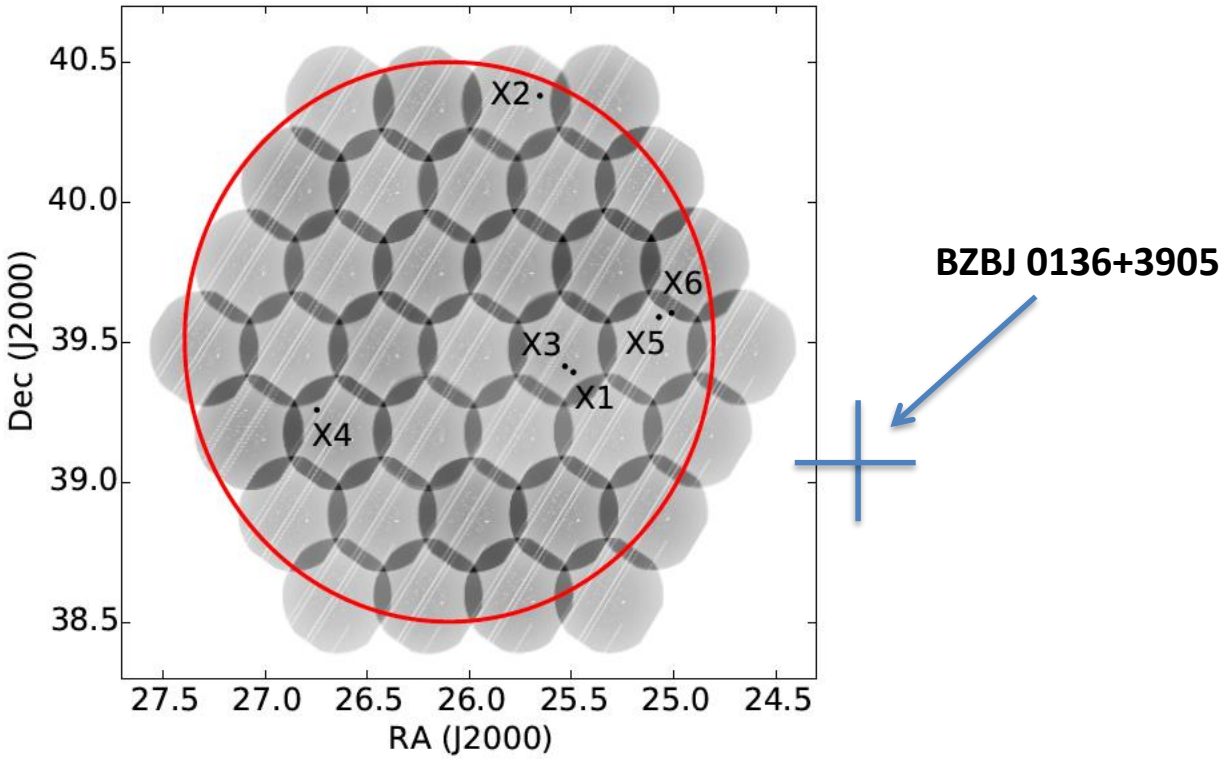


Fig. 3: Exposure map of the 37 *Swift* XRT pointings averaging 320 s per tiling. The red circle shows the 50% confidence bound to the triplet position. XRT sources (compare Table 3) are shown as black points.

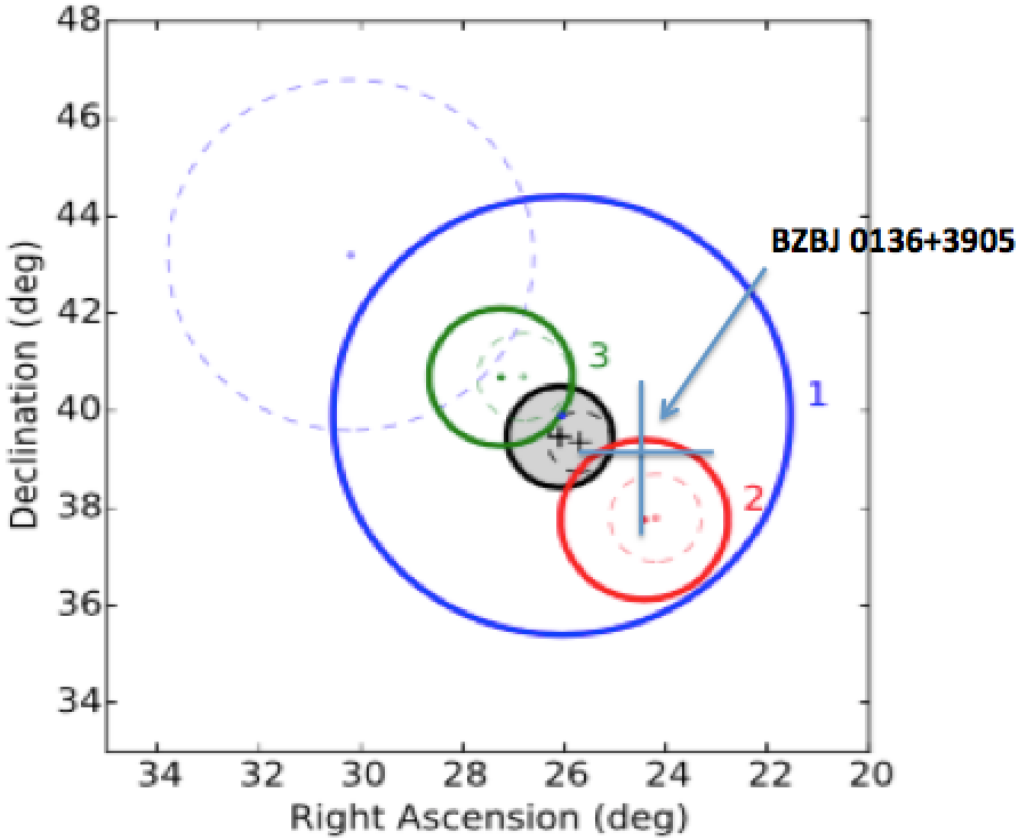


Fig. 1: Location of the three neutrino candidates in the triplet with their 50% error circles. The plus sign shows the combined direction and the shaded circle is the combined 50% error circle. The solid circles show the results of the MPE reconstruction which is as the default reconstruction in the following and the thin dashed circles correspond to the results of the Spline MPE reconstruction (compare Table 1).

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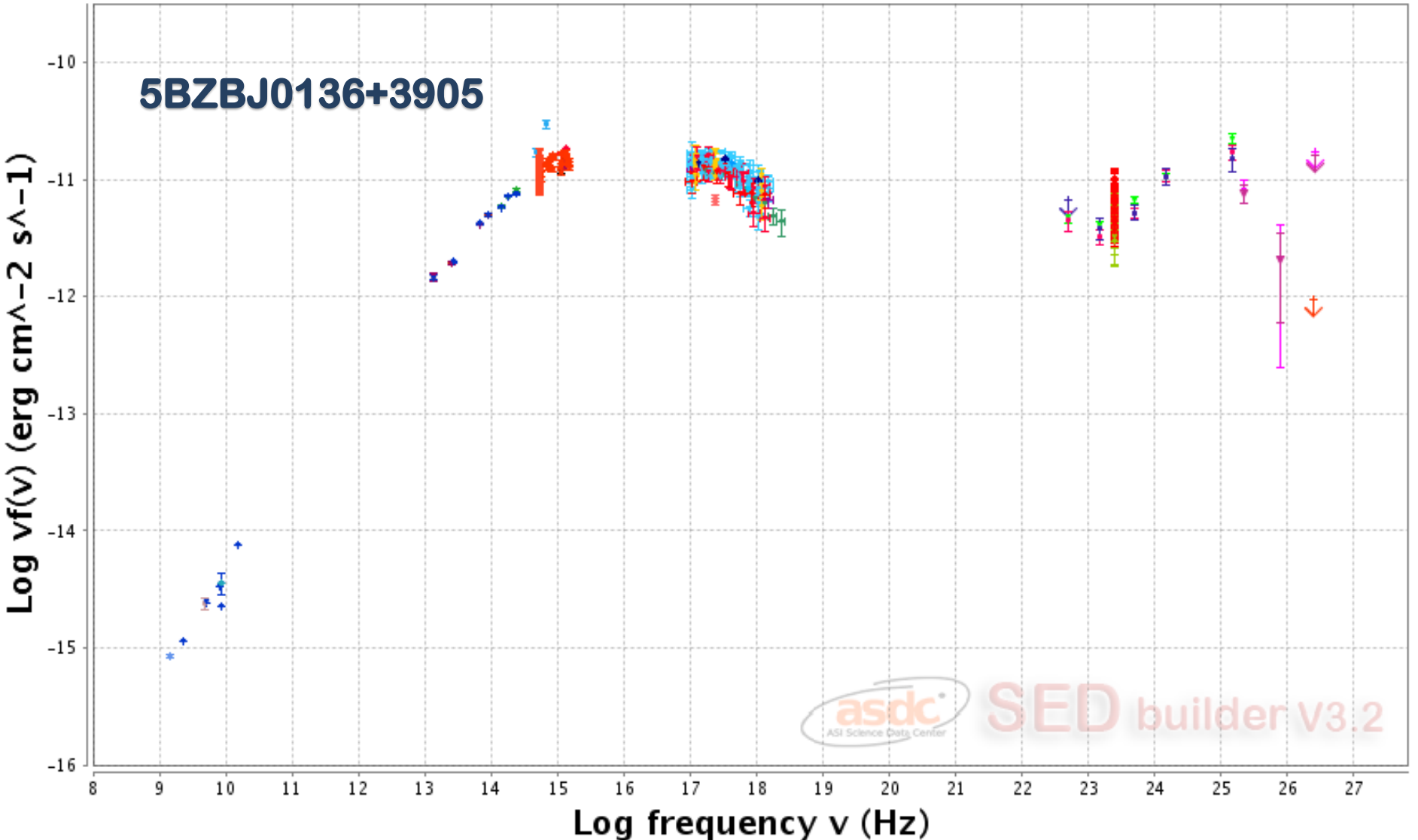
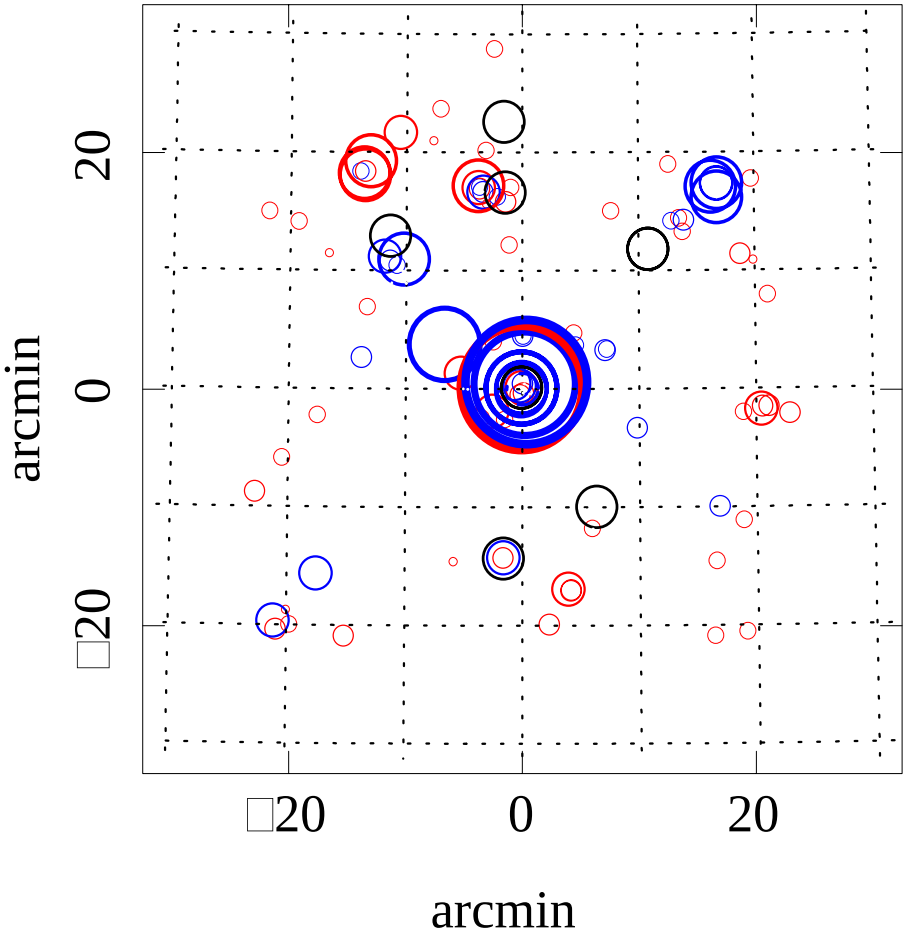
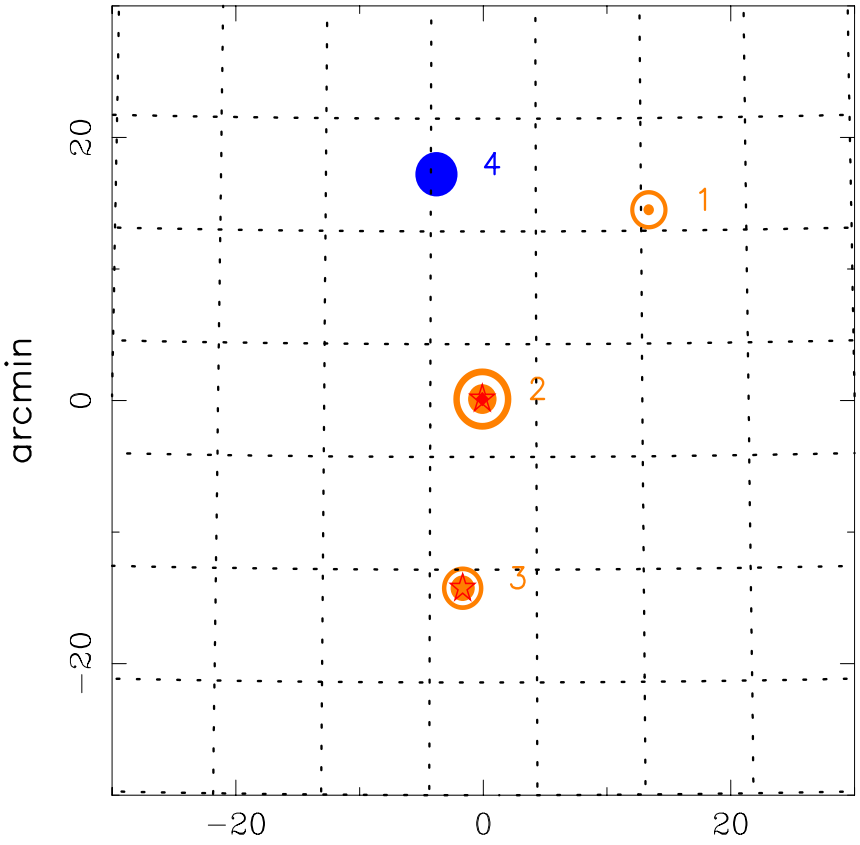


Fermi 3FHL J1517.7+6525





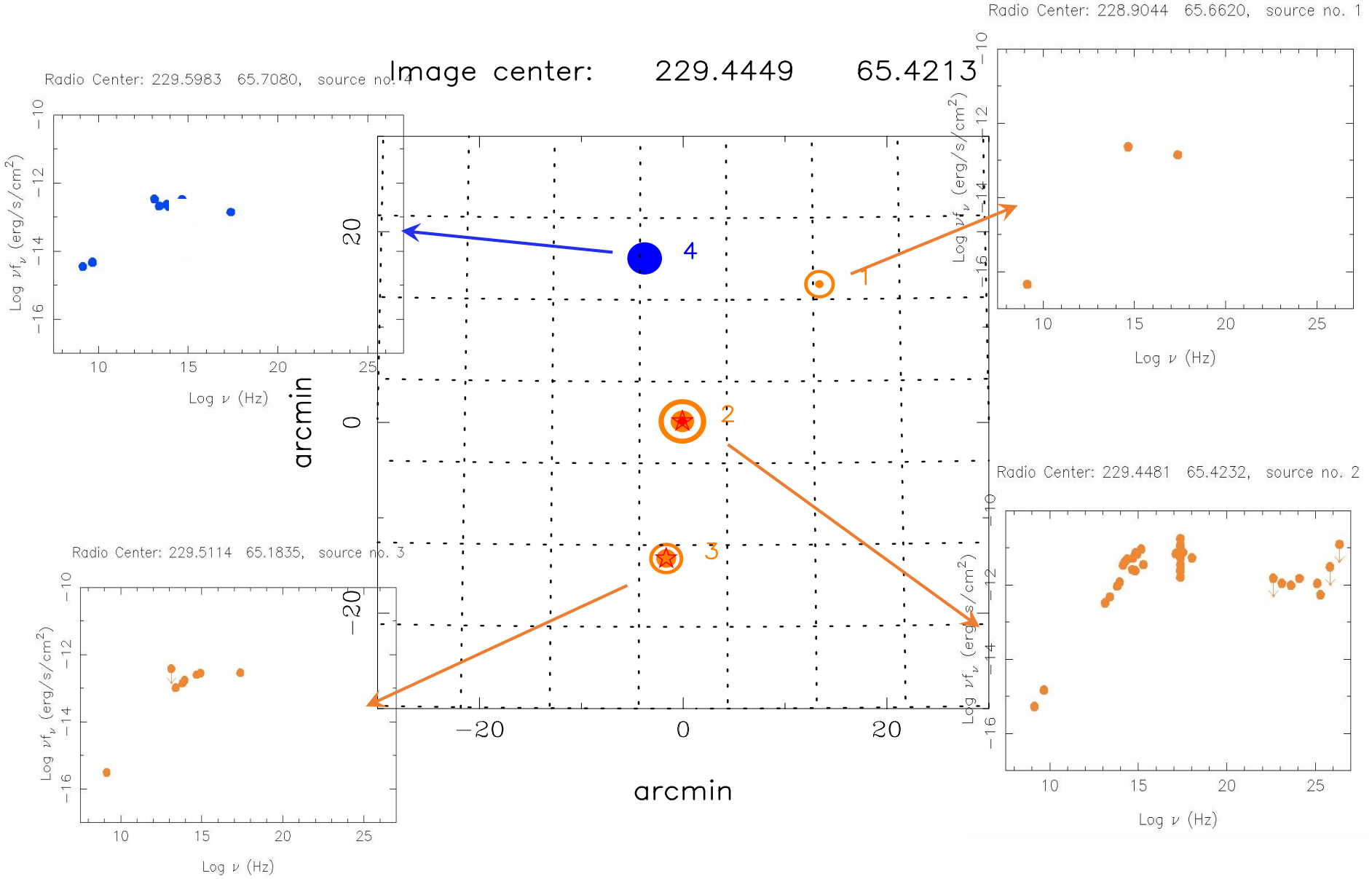
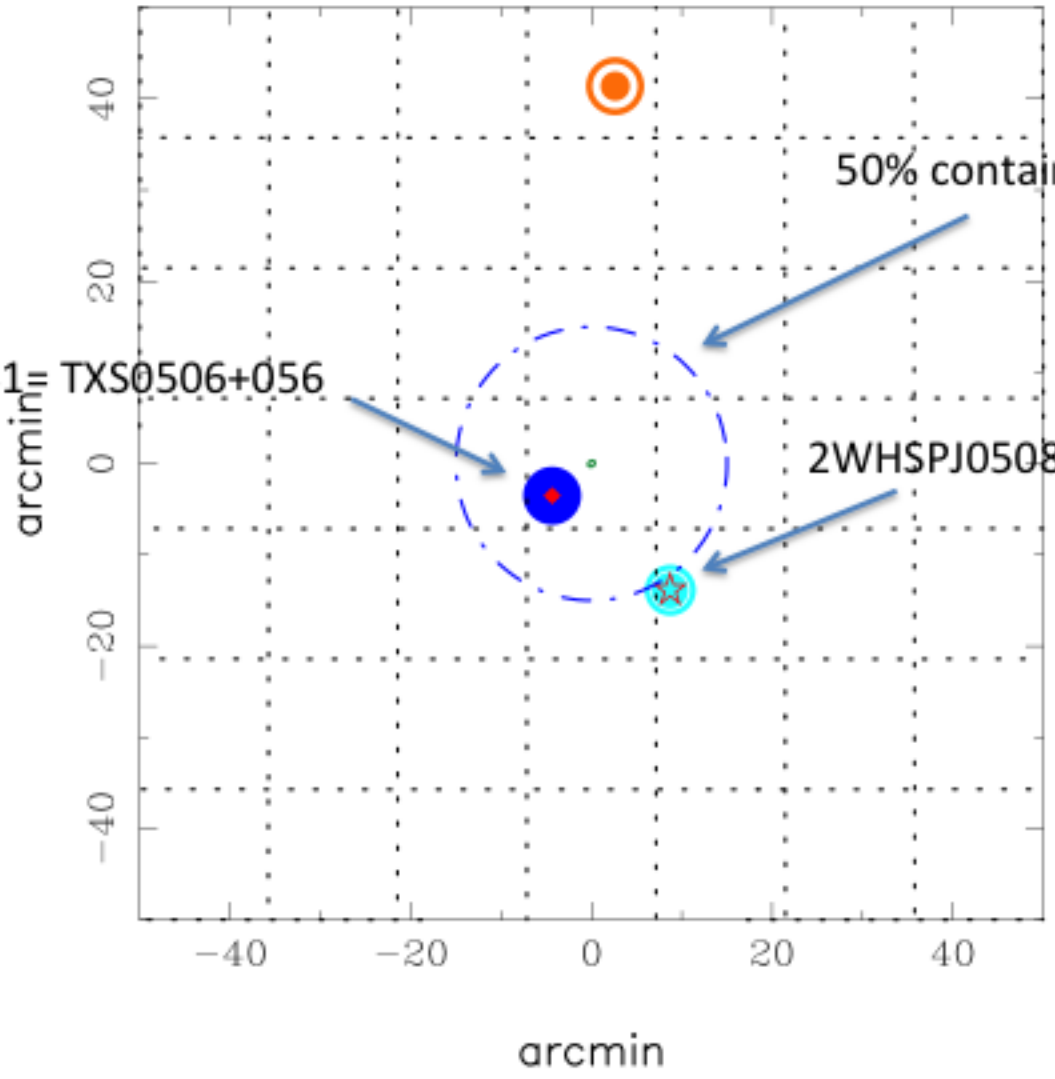


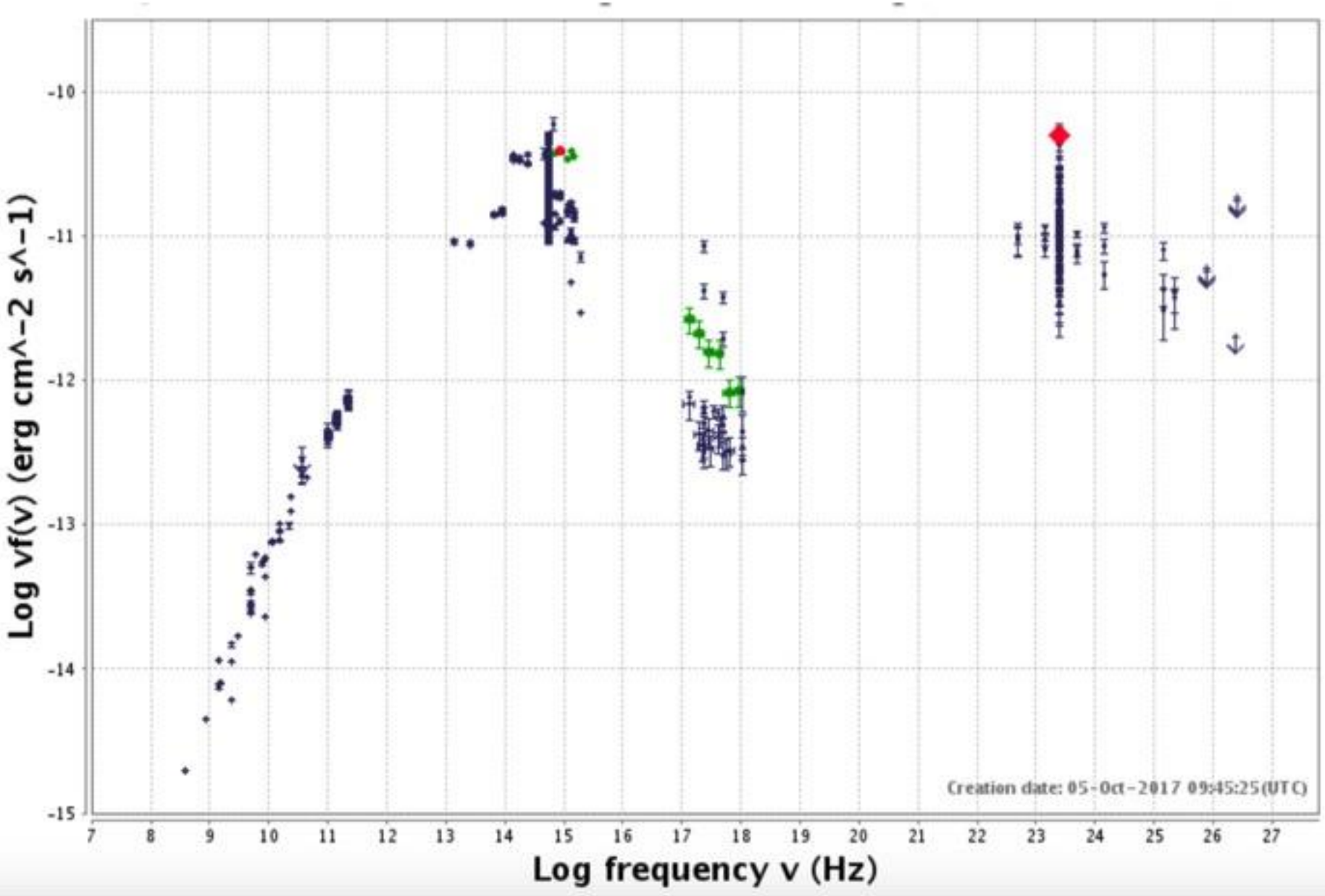
Image center: 229.4449 65.4213
Radio Center: 228.9044 65.6620, source no. 1
Radio Center: 229.5983 65.7080, source no. 4
Radio Center: 229.4481 65.4232, source no. 2
Radio Center: 229.5114 65.1835, source no. 3
1
2
3
4
arcmin
arcmin
Log ν (Hz)
Log νf_ν (erg/s/cm²)

Neutrino ICE-Cube 170922

Image center: 77.2854 5.7517



5BZBJ0509+0541= TXS0506+056



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Open UNiverse

”Open Universe” is an initiative under the auspices of the UN COPUOS with the objective of stimulating a large increase of the utilization of space science data (e.g. astrophysics, planetary science, cosmic rays), extending the potential of scientific discovery to new participants in all parts of the world.

Open Universe was proposed by Italy at the 2016 COPUOS session where it was included among the activities in preparation of UNISPACE+50, in line with the thematic priority “Capacity Building”, with focus on Science, Technology, Engineering and Mathematics.

A very wide range of communities will benefit from Open Universe: professional scientists, citizen scientists, teachers and students, potentially any citizen interested in space science.

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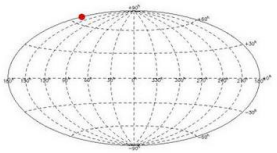
Open UNiverse for astronomy

Open Universe @ ASI | Space Astronomy » | Ground Astronomy » | Planetary Science » | ISS » | VO and General services » | Bibliographic services » | Cosmic Rays » | Astronomical tools » | Image galleries » | Other Initiatives » | Educational contents » | Help »



Source Name(s) : **MKN421**
R.A.(J2000) = **11 04 27.34 (166.11392 deg)**
Dec.(J2000) = **+38 12 32.4 (38.209 deg)**

Prototype v.1.0 — Login

Object name or coordinates: MKN421 (ASDC)

MKN421 — Reset

W | NED | SIMBAD

ESASky | SKY-MAP.ORG | Google Sky | SDSS SkyServer | Aladin Lite | MAST Archive | SuperCOSMOS | Radio Surveys | ASDC Catalogs | Astronomical Catalogs
CADC Archive | ESO Archive | NRAO Archive | ALMA Archive | ISDC - HEAVENS | ASDC Archive | Radio Telescope DC | INAF IA2 | Multi-freq. Explorer | SED builder | SED movie | Bibliographic Search

CDS | Portal | Simbad | VizieR | Aladin | X-Match | Other | Help | ALADIN

Aladin Lite

Target:

166.11392 38.209

Surveys:

Fermi
GALEXGR6/AIS
DSS2
DSS2/red
DSS2/blue
SDSS9
Mellinger
2MASS

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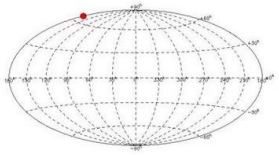
Open UNiverse for astronomy



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Prototype v.1.0

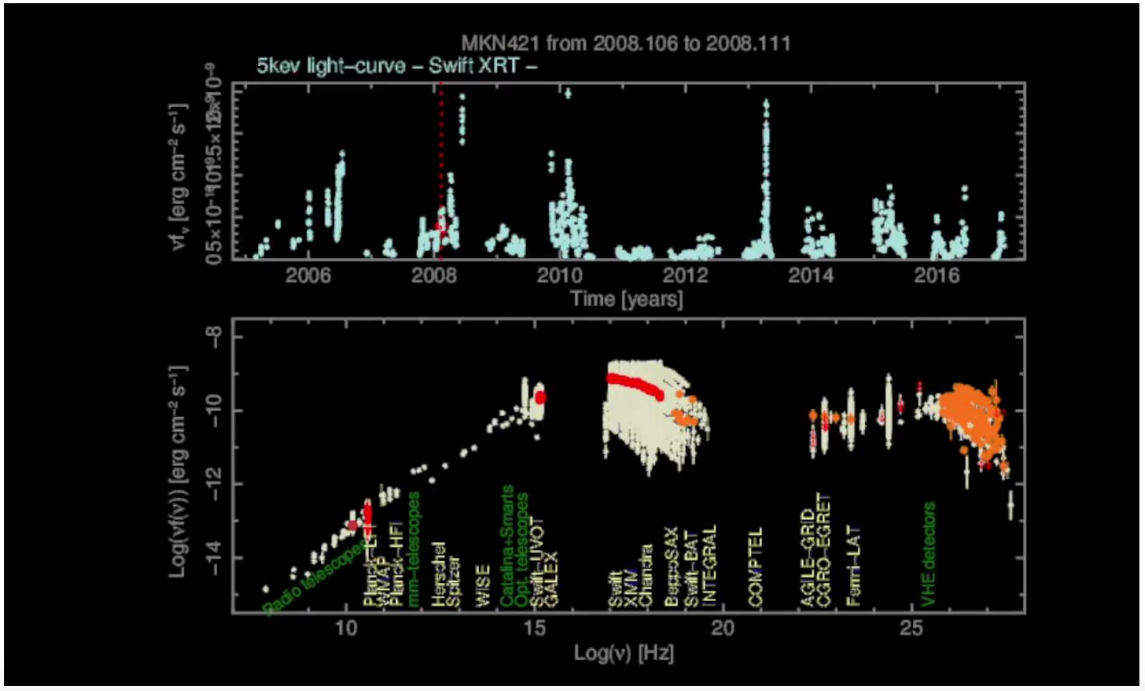
Login

Object name or coordinates: MKN421 (ASDC)

MKN421

Reset

ESASky | SKY-MAP.ORG | Google Sky | SDSS SkyServer | Aladin Lite | MAST Archive | SuperCOSMOS | Radio Surveys | ASDC Catalogs | Astronomical Catalogs
CADC Archive | ESO Archive | NRAO Archive | ALMA Archive | ISDC - HEAVENS | ASDC Archive | Radio Telescope DC | INAF IA2 | Multi-freq. Explorer | SED builder | SED movie | Bibliographic Search



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Conclusions

- Large all sky survey with ~100,000-300,000 extragalactic sources (Confusion limited?)
- > 10,000 blazars, a fair fraction of it potentially detectable by CTA
- Many flaring blazar to trigger IACTS (e.g. CTA) observations
- Blazar flaring data to compare with astrophysical neutrinos
- Plenty of variability studies of Jetted and non-jetted AGN