

# Multiwavelength Observations of TANAMI Sources

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in collaboration with

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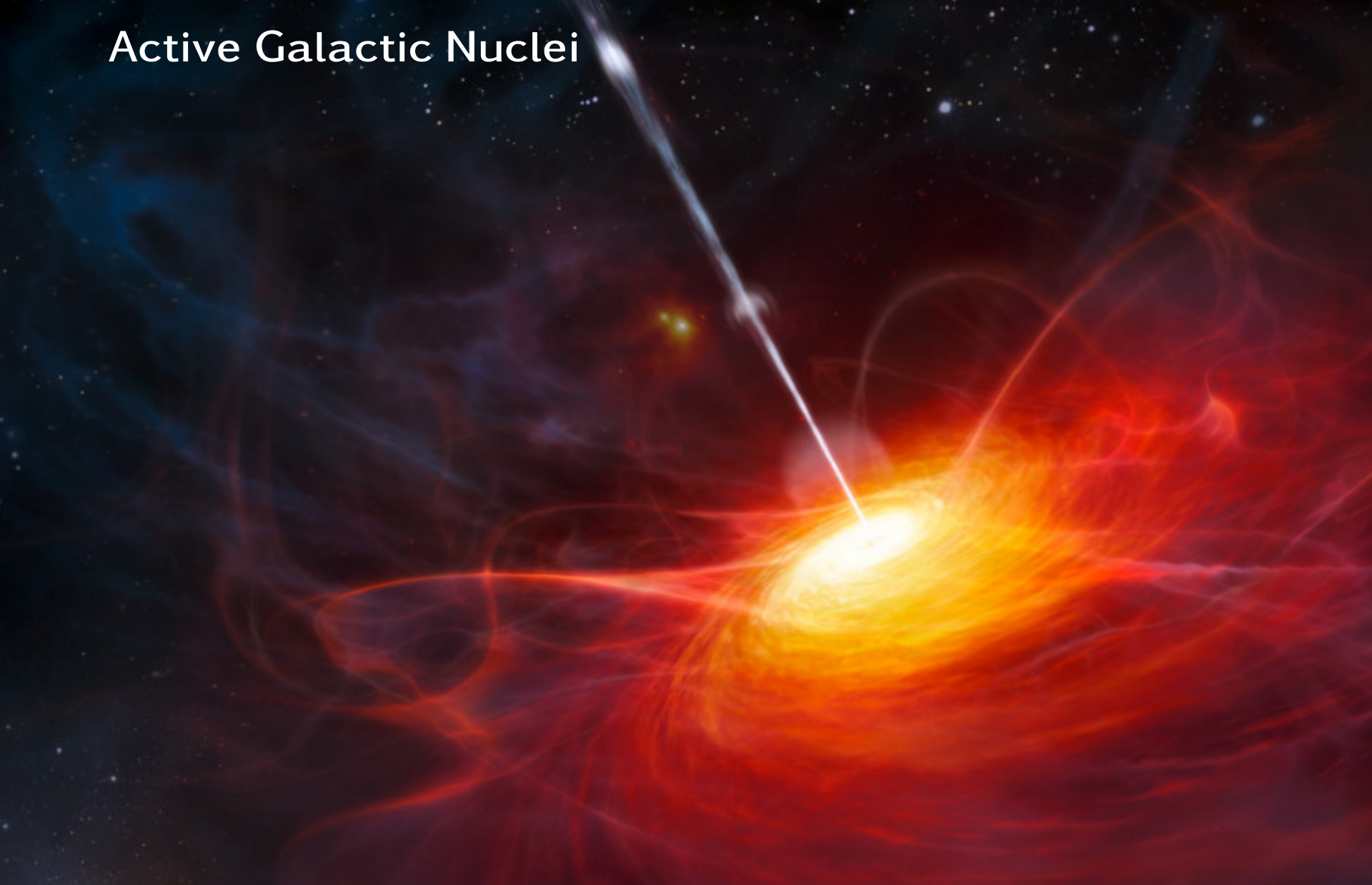
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<sup>5</sup> MPIfR, Bonn

3 June 2013

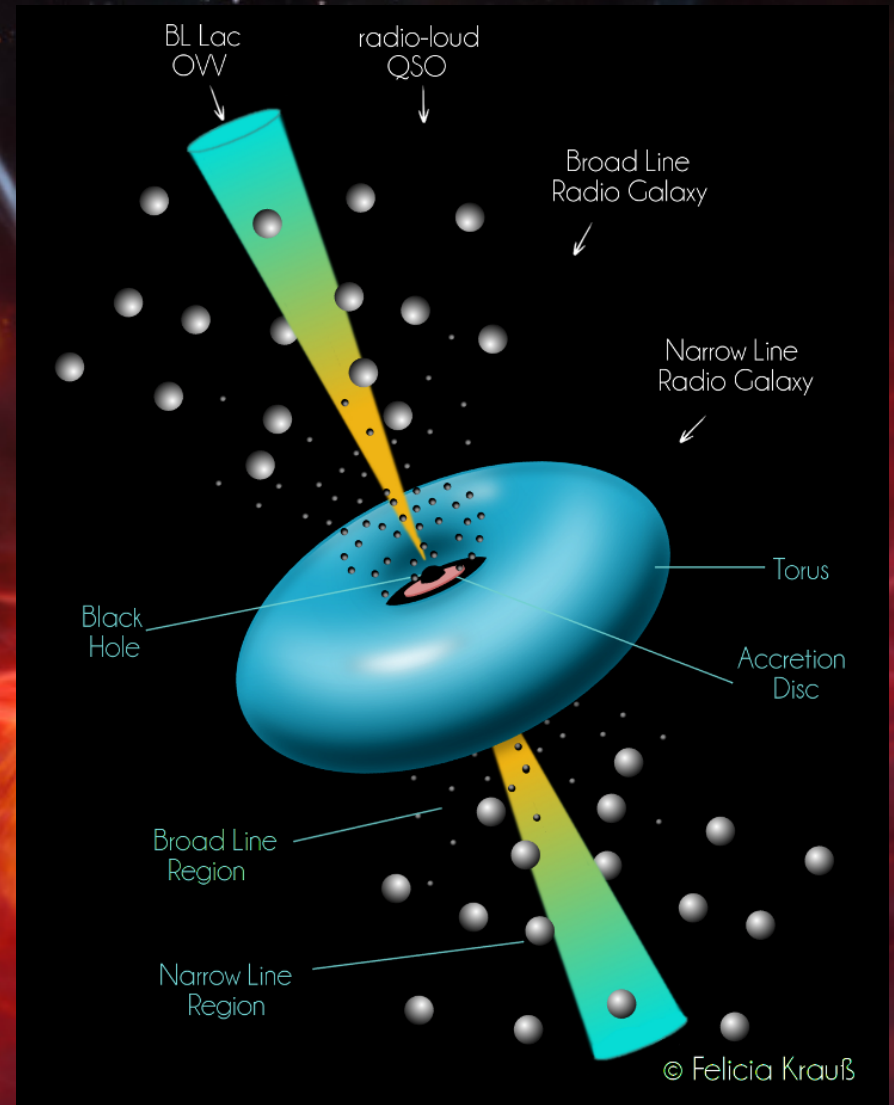
# Active Galactic Nuclei



(ESO/M. Kornmesser)

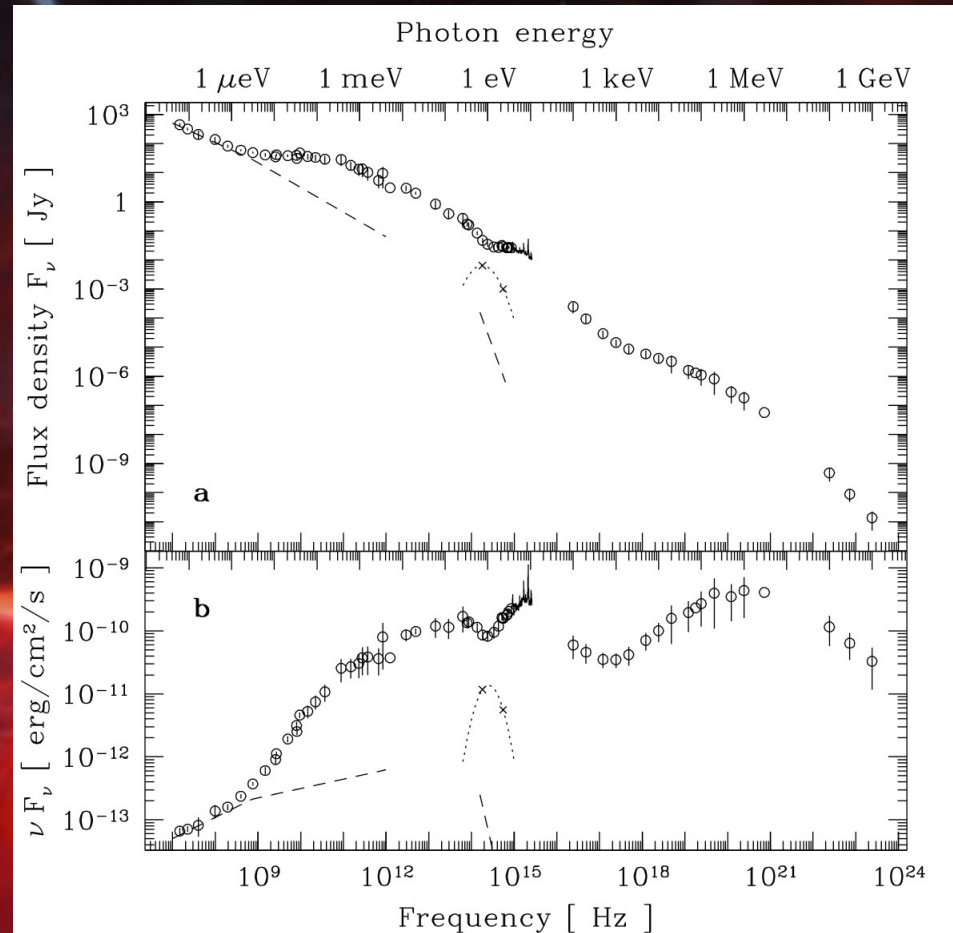
# Active Galactic Nuclei

- Unification model
- Accretion ( $1..2 M_{\odot} \text{ yr}^{-1}$ )
- nonthermal broadband continuum emission



# Blazar Spectral Energy Distribution

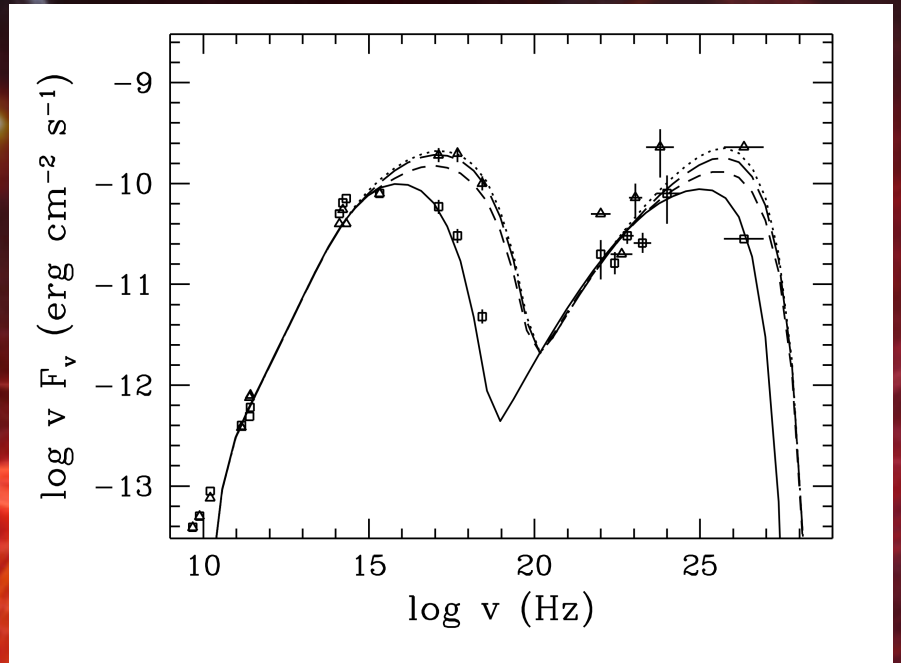
- Broadband emission
- Power law spectra:  
 $F_\nu \propto \nu^{-\alpha}$
- Variability



3C 273 (Türler et al., 1999A&AS..134...89T)

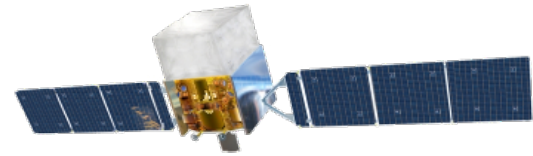
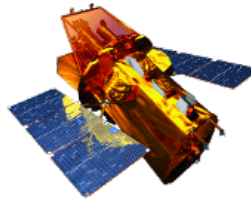
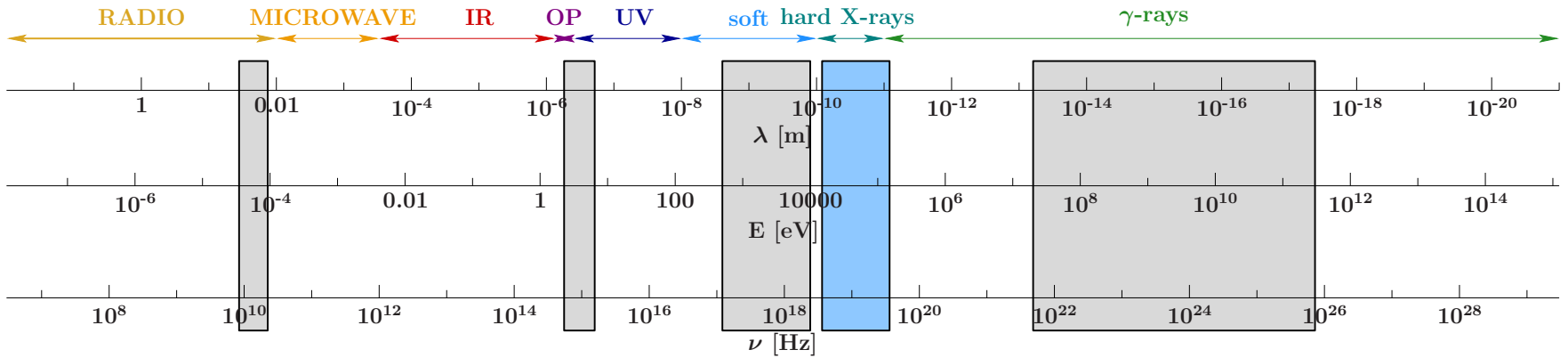
# Blazar Spectral Energy Distribution

- low energy component: synchrotron emission
- high energy component: SSC/IC – Hadronic



Mkn 421 (Mastichiadis, A. et al.,  
1997A&A...320...19M)

# Multiwavelength data



# The TANAMI Project



# The TANAMI Project

## Tracking Active Galactic Nuclei with Austral Milliarcsecond Interferometry



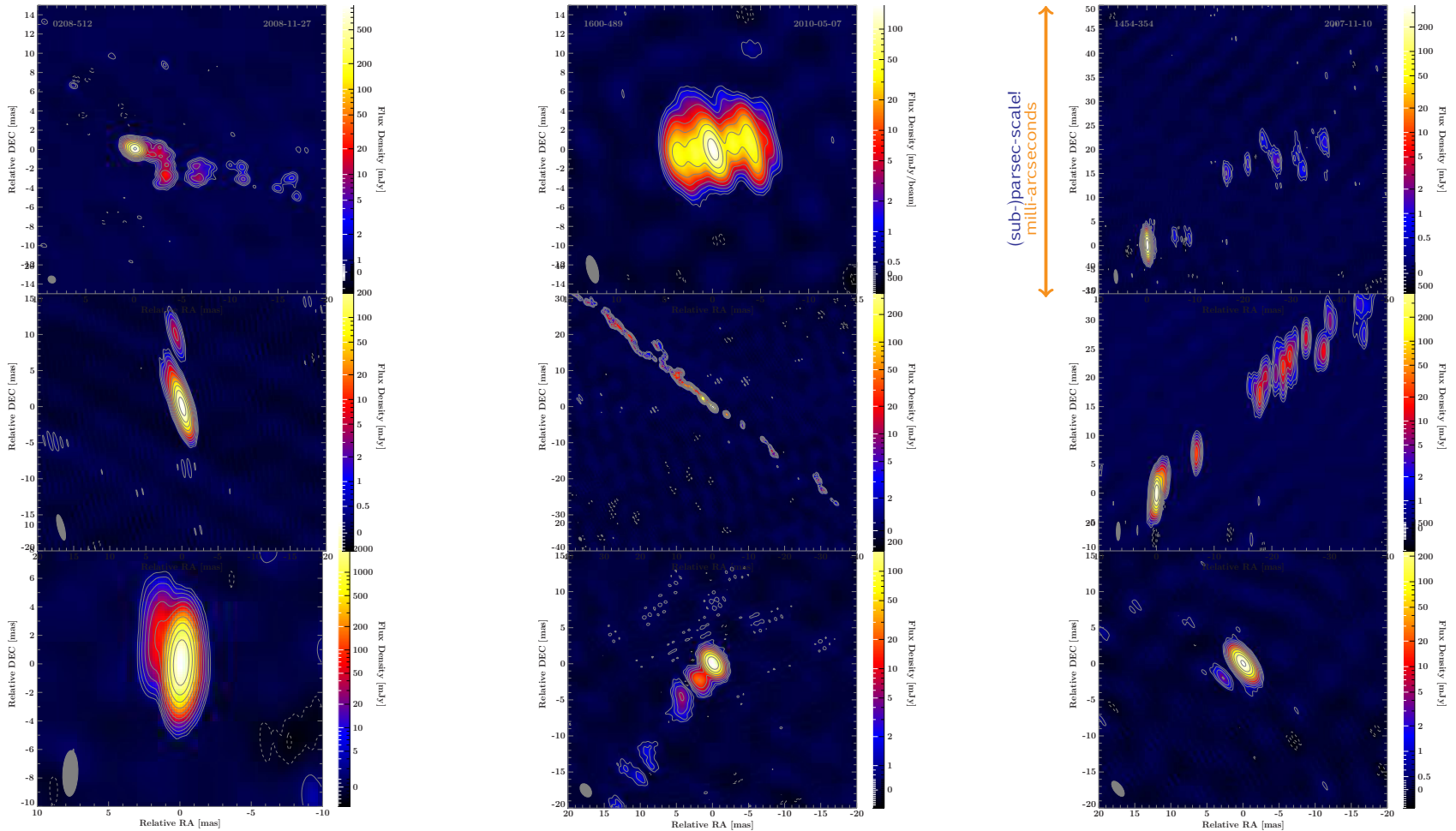
- VLBI Monitoring at 8.4 & 22.3 GHz
- Source sample: 84 sources

<http://pulsar.sternwarte.uni-erlangen.de/tanami>

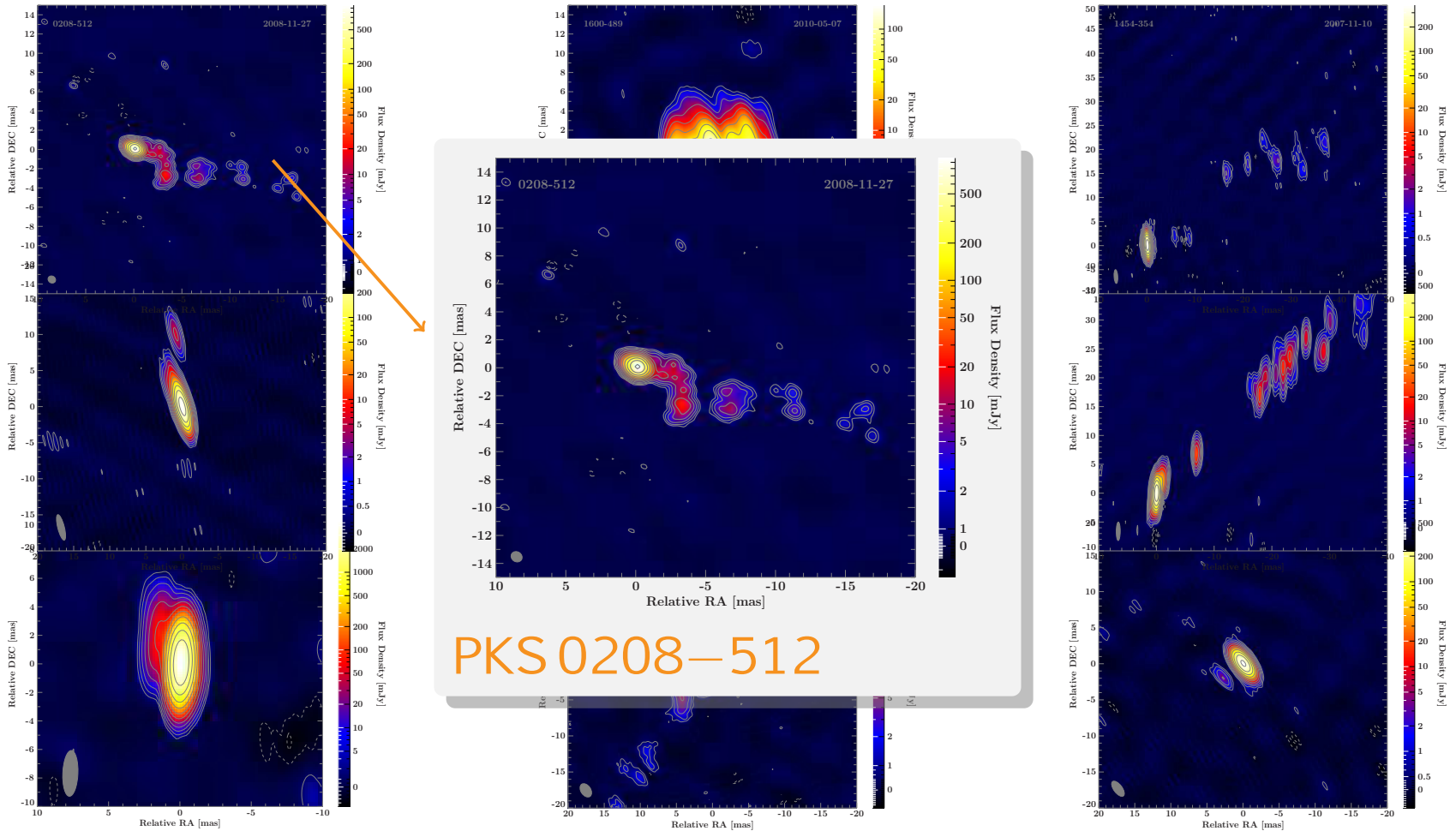
Ojha et al. 2010, A&A, 519, A45



# Monitoring & Imaging

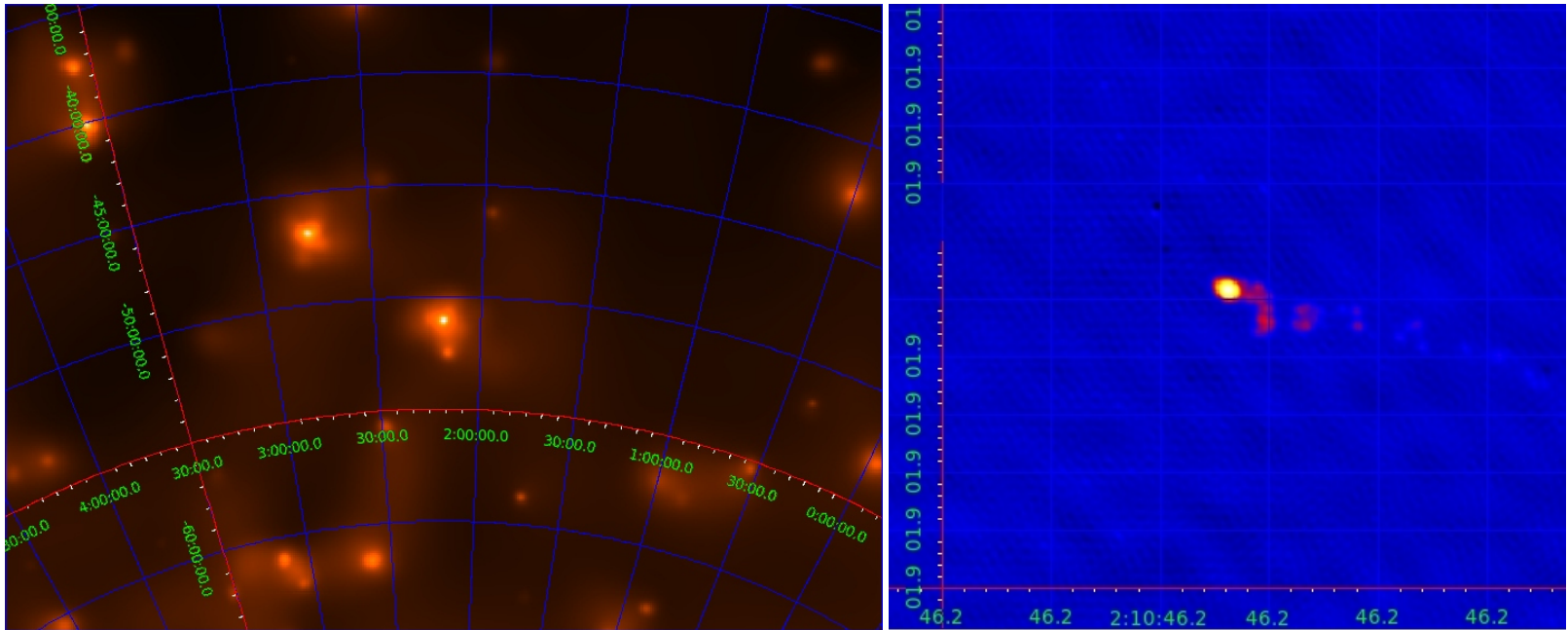


# Monitoring & Imaging



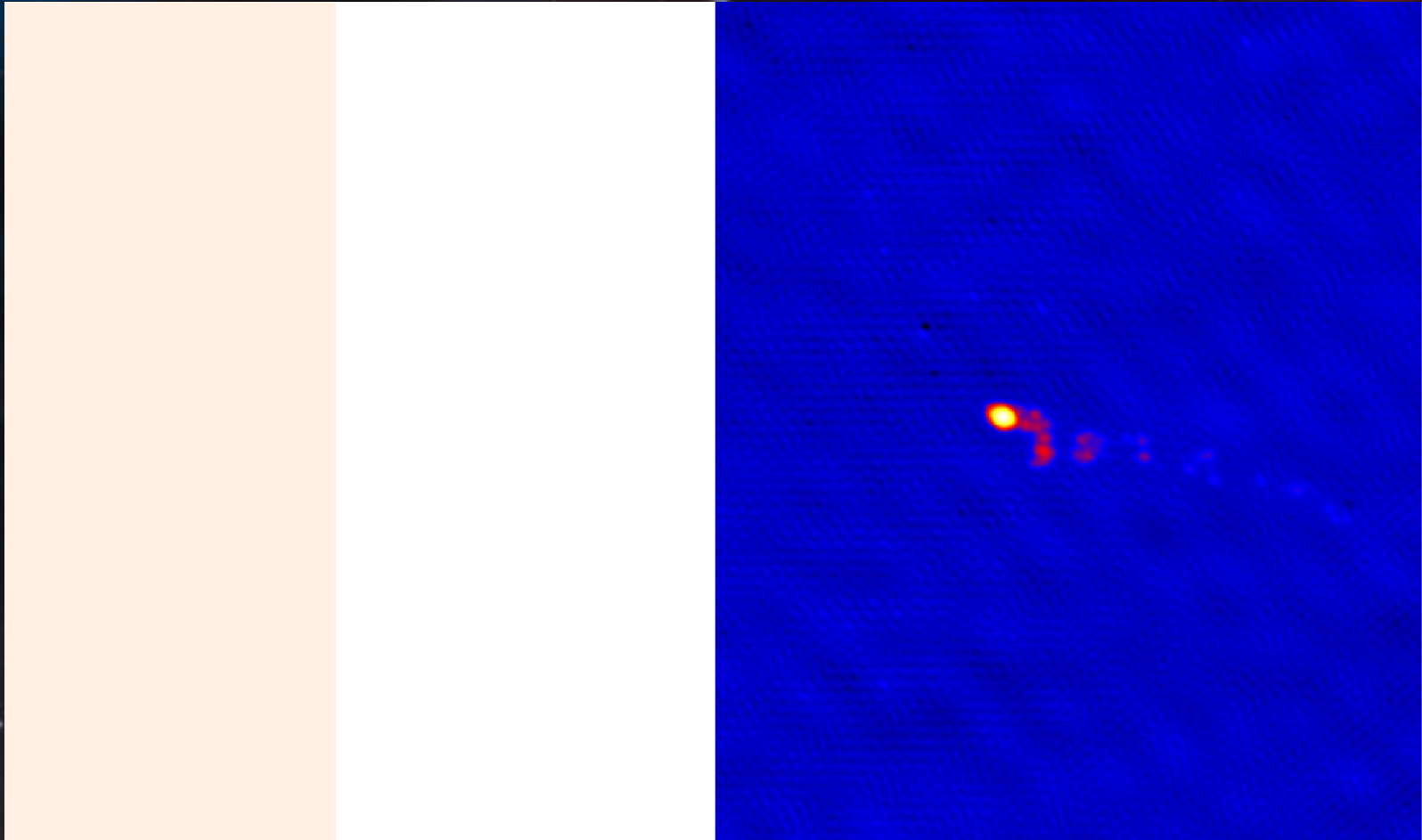
# Fermi - Radio

PKS 0208–512 as seen by *Fermi* and TANAMI

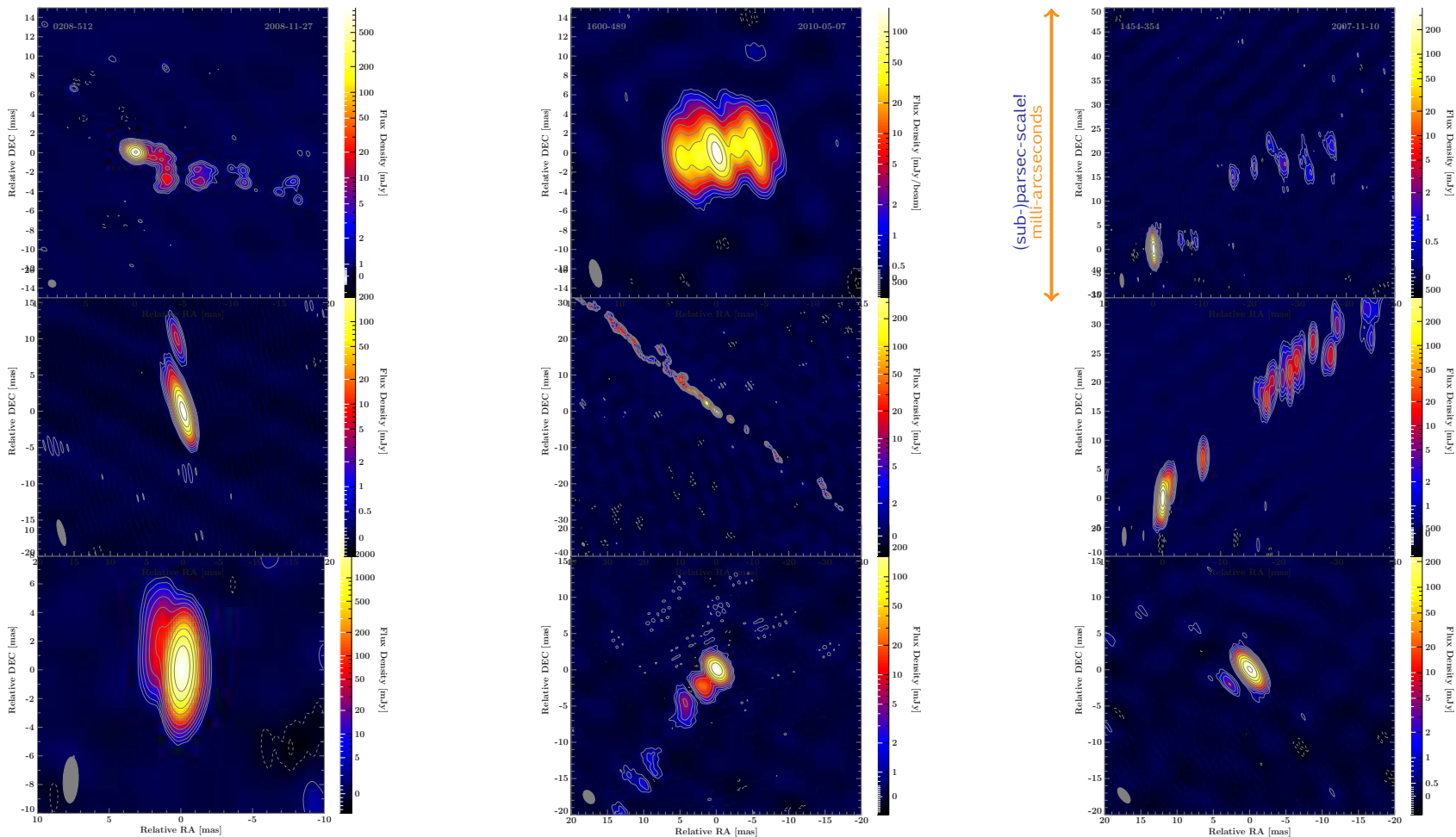


# Fermi - Radio

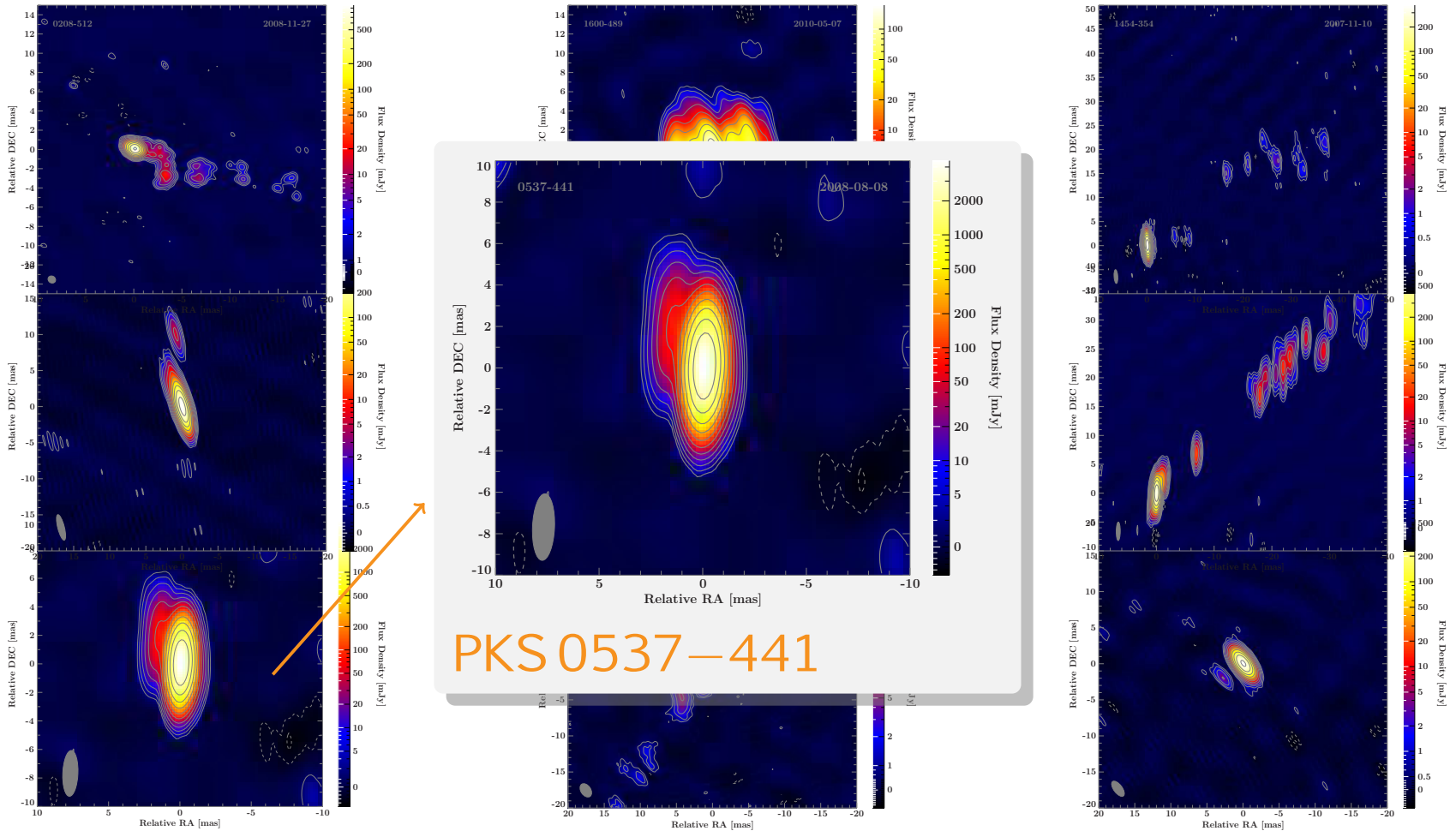
PKS 0208–512 as seen by *Fermi* and TANAMI



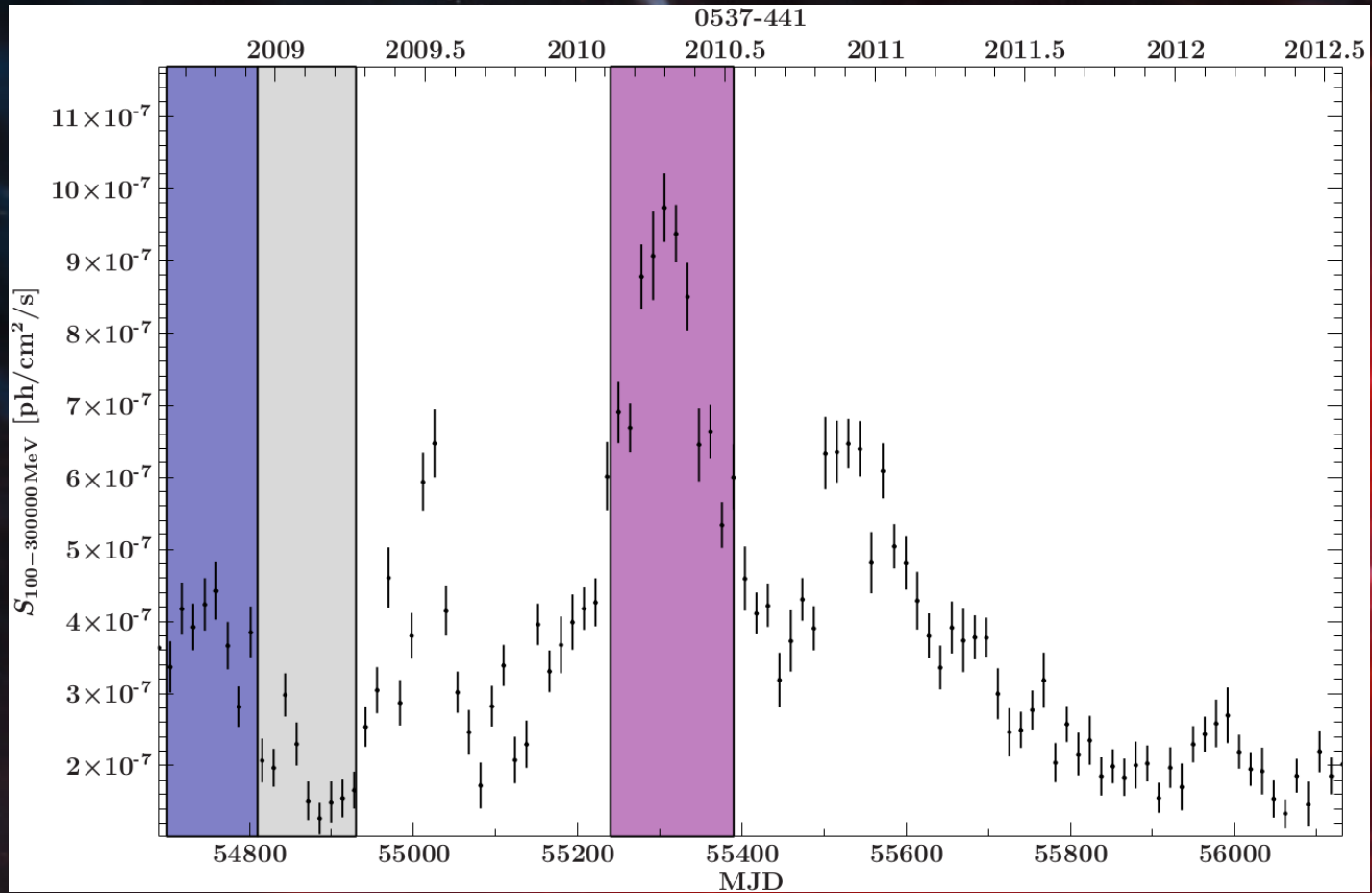
# Monitoring & Imaging



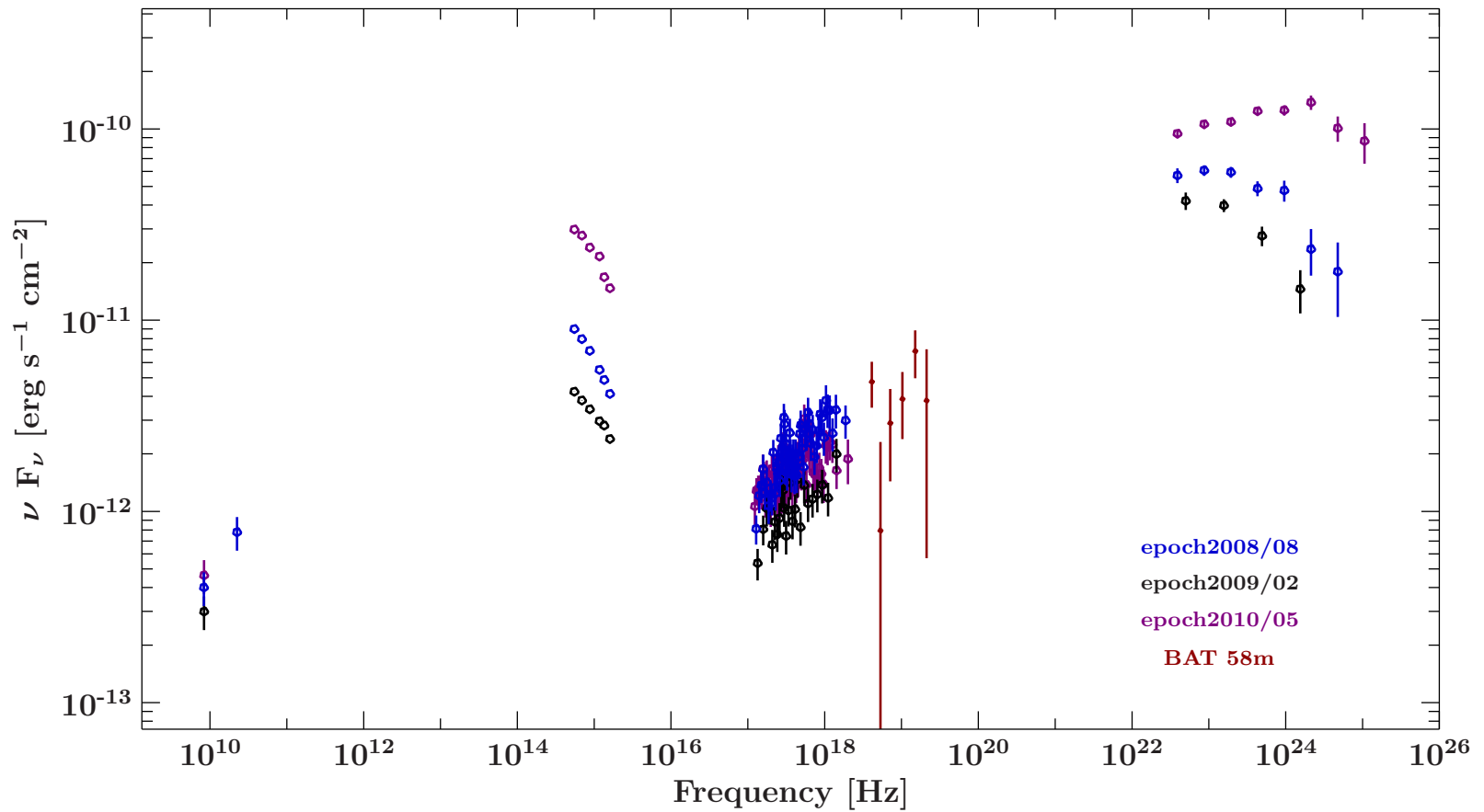
# Monitoring & Imaging



# Blazar Variability



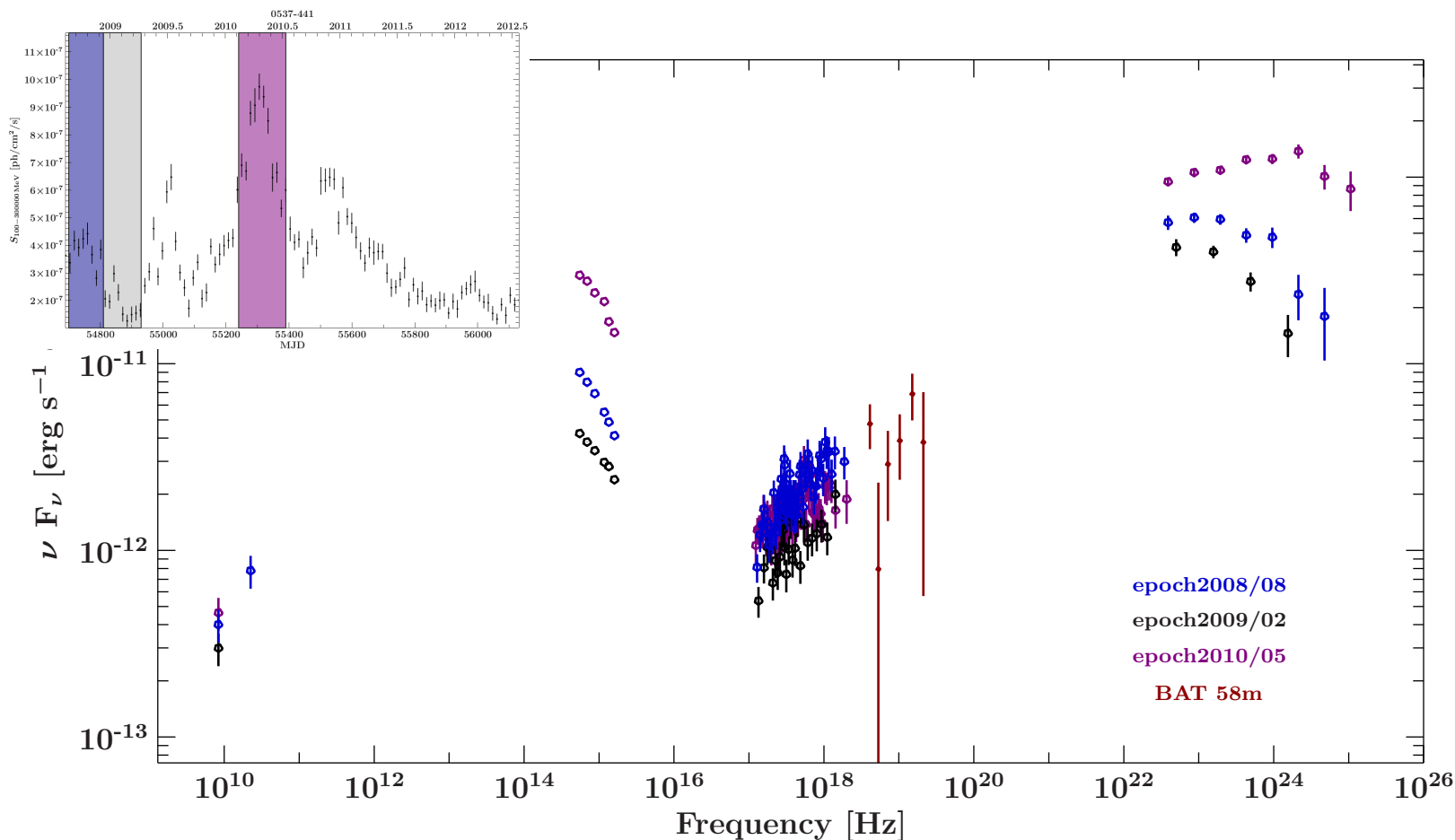
# Broadband Spectral Energy Distribution



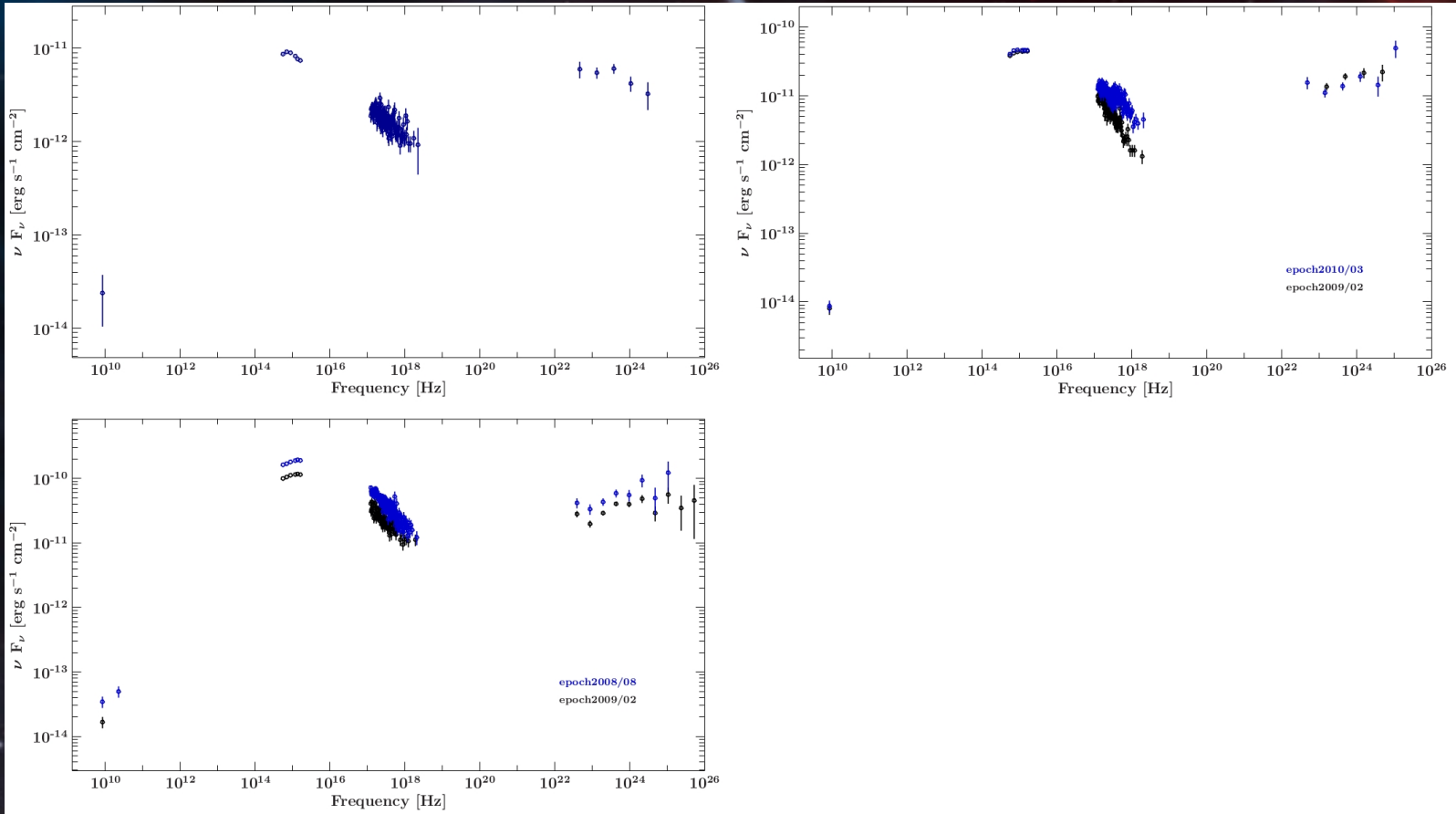
SED of PKS 0537-441 with BAT 58 month data



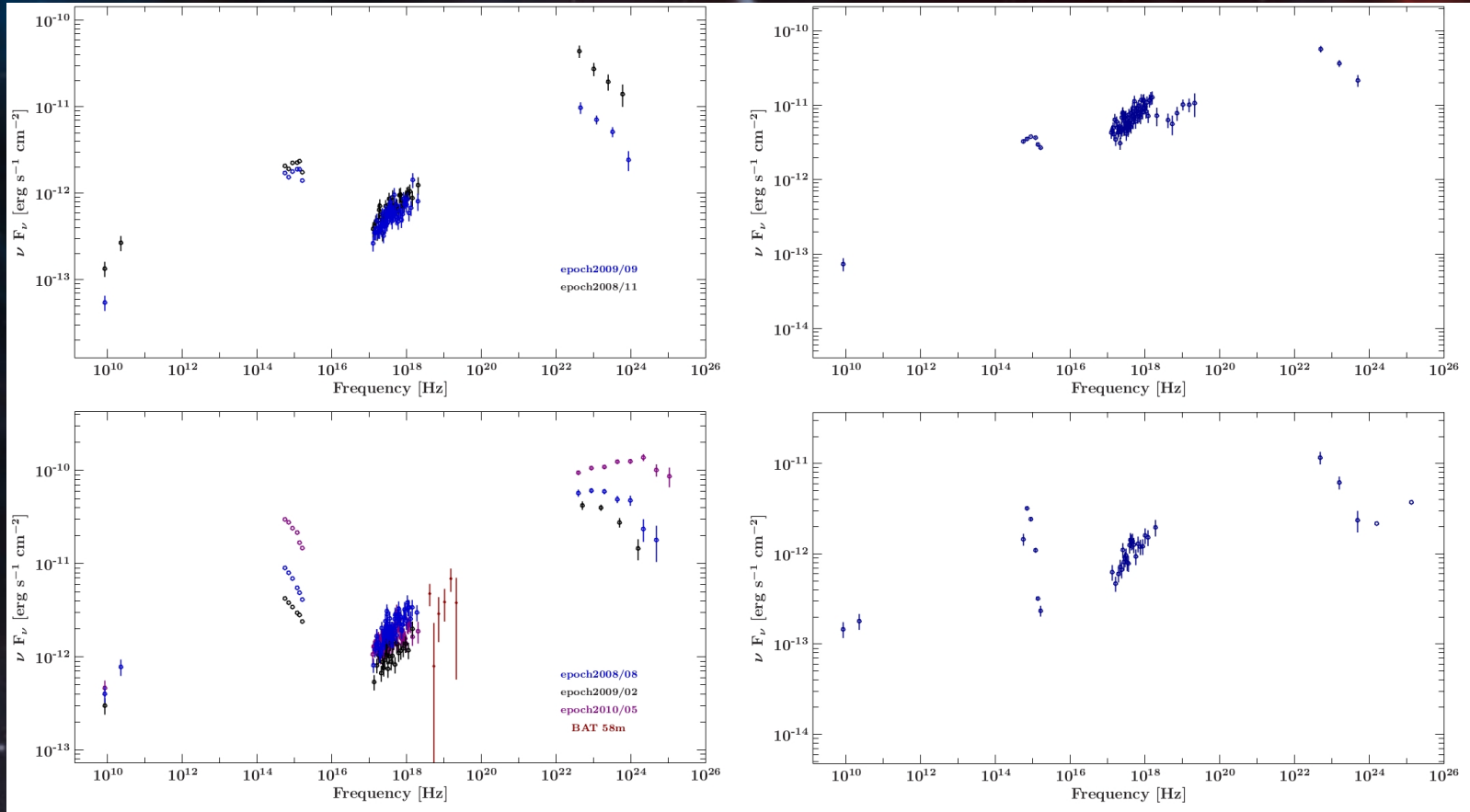
# Broadband Spectral Energy Distribution



# Broadband Spectral Energy Distribution



# Broadband Spectral Energy Distribution



# Log parabolic Fit

- Log parabola:

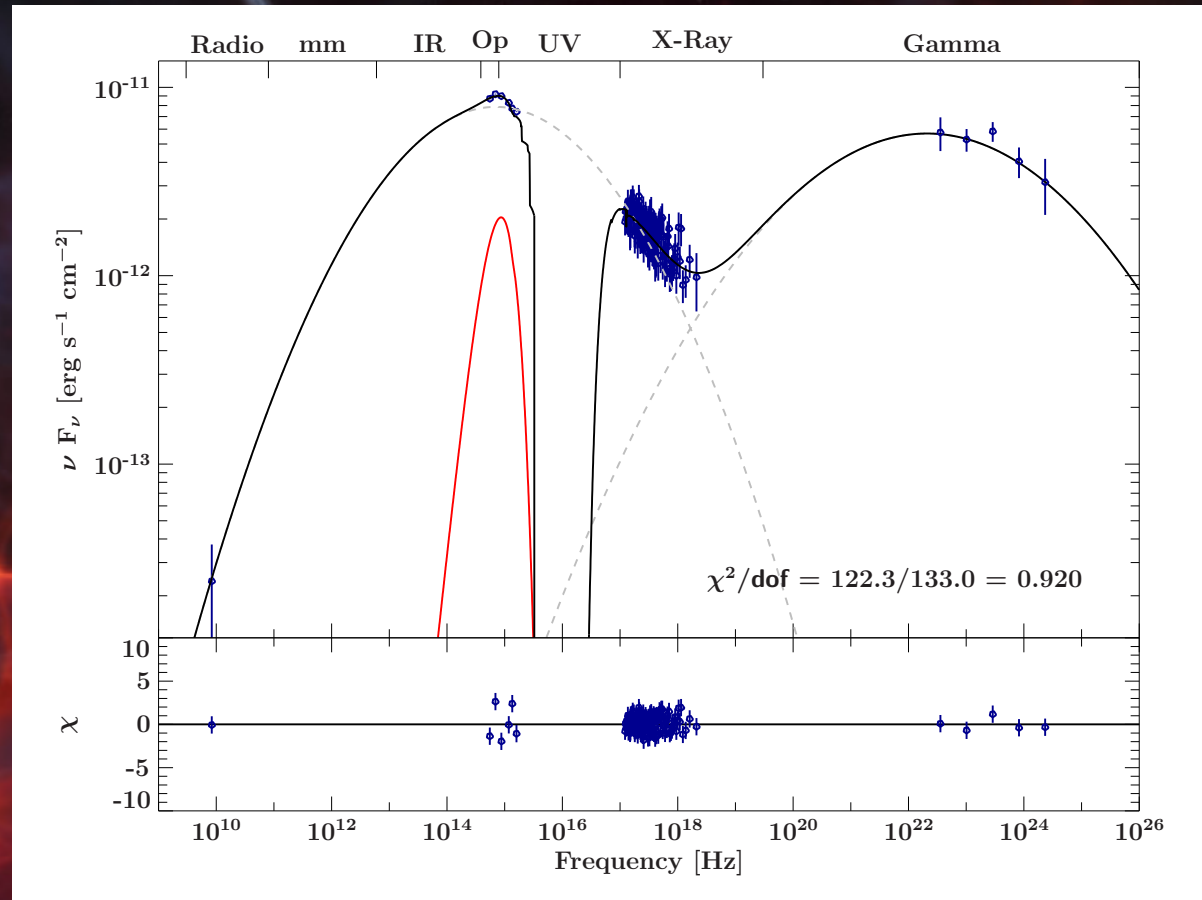
$$F_E \propto \left(\frac{E}{E_1}\right)^{-a+b \log(E/E_1)}$$

$$\nu F_\nu =$$

$$\log(\nu_p F(\nu_p)) - b \left[ \log\left(\frac{\nu}{\nu_p}\right) \right]^2$$

- quasi-simultaneous data

- fit in detector space



SED of PMN J0334-3725

# Summary & Outlook

- Multiwavelength data of TANAMI sources
  - Blazar Variability
  - Quasi-Simultaneous SEDs
- 
- ◆ EBL de-absorption
  - ◆ extend source sample
  - ◆ ATCA/Ceduna + archival data
  - ◆ apply physical model



(ESO/M. Kornmesser)

# TANAMI Bibliography

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- Müller C., Kadler M., Ojha R., et al., 2011, Astron. Astrophys. 530, 11, <http://www.aanda.org/articles/aa/abs/2011/06/aa16605-11/aa16605-11.html>
- Müller C., Krauβ F., Kadler M., et al., 2013, In: 11th European VLBI Network Symposium & Users Meeting., <http://arxiv.org/abs/1301.4384>
- Ojha R., Kadler M., Böck M., et al., 2010, A&A 519, A45, <http://www.aanda.org/articles/aa/abs/2010/11/aa12724-09/aa12724-09.html>

