GPS studies during ENIGMA era

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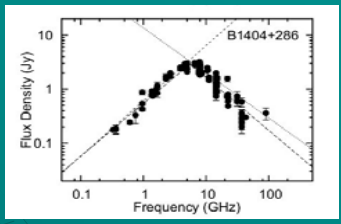
GPS sources

- Gigahertz-peaked spectrum sources
  - Small, luminous, low variability?
  - Young, frustrated, recurrent??
- Both galaxy and quasar type sources
  - Often considered different populations with only similar radio spectrum



GPS studies during ENIGMA project

- Original idea:
  - All-sky surveys done at ~low frequencies, sources peaking at high freq. easily ignored
  - Evidence for sources with high-peaking spectra (eg. Edge et al, 1996, 1998)
  - These high-peaking sources could affect the Planck foreground
  - HOW MANY HIGH-PEAKING SOURCES ARE THERE??

First sample

- Are there any high-peaking GPS sources in the Metsähovi monitoring sample?
- All possible radio data collected also for the GPS sources from the literature
- Sample included 44 previously identified inverted-spectrum sources and 16 candidates
  - Mostly quasar-type objects

First sample: results

- No new GPS sources among the candidates!
- 5 genuine GPS sources among the previously identified GPS sources
- Prominent variability in the previously identified GPS sources
- Many sources with temporarily inverted spectra

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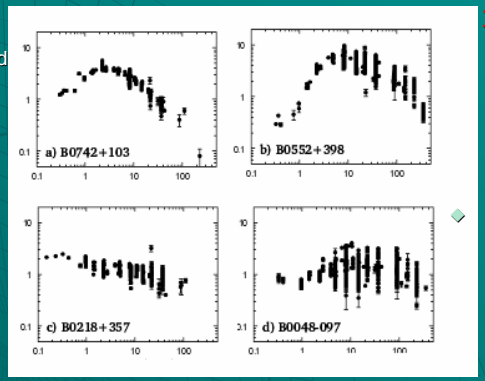
First sample: results

- Genuine GPS sources:
  5 sources
  - Low variability
  - Constant shape and peak in the spectrum
- Flat-spectrum sources:
  29 sources
  - High variability
  - Bright at high frequencies



- Variable inverted-spectrum sources:
  12 sources
  - High variability
  - Shape and peak of the spectrum not constant
- Flat-spectrum sources with inverted spectra during flares:
  12 sources
  - Very high variability
  - Bright at high frequencies

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Second sample

- Will the galaxy samples turn out to be as contaminated as the first sample??
- ~All bright galaxy-type GPS sources from the literature: 96 sources
- All possible radio data from the literature, observations

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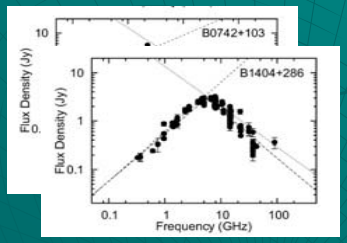
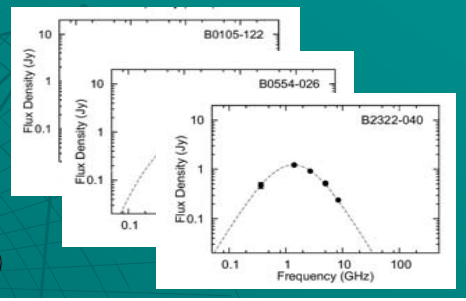
Second sample: results

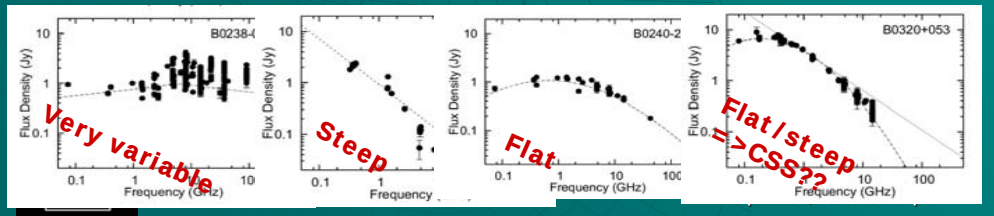
- GPS: 29 sources



- Not enough data for GPS classification: 28



- Other kinds of sources: 39



Summary

- Many of the GPS sources have been classified without sufficient monitoring
  ⇒Unreliable or false identifications!!
- Identification of GPS galaxies seems more proper compared to GPS quasars
  - Note! Bias:
    - Quasars selected from well monitored samples
      => more variability
    - Galaxies just picked up from literature
      => many sources with just a few data points
      => some added only recently to our monitoring prog.
      => no reliable estimates on long-term behaviour

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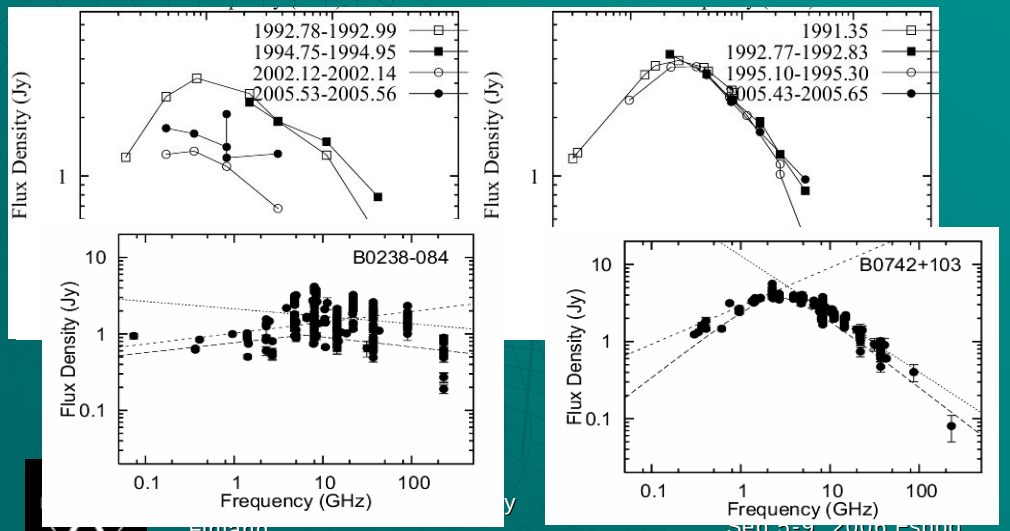
The need for monitoring



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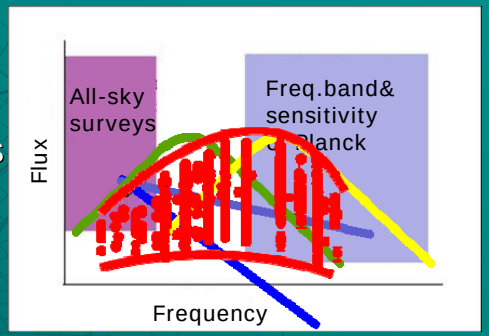
GPS sources and Planck foreground science?

- AGNs v.0.0
  - "Normal" and flat-spectrum AGNs
- AGNs v.0.1
  - v.0.0 + "traditional" GPS sources
- AGNs v.0.2
  - v.0.1 + high-peaking GPS sources
- AGNs v.1.0
  - v.0.2 + sources with inverted spectrum during flares



=> Complicated situation

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Future

- The monitoring continues
- Self-organized neural maps on GPS sources:
  - 209 sources from literature
  - Both gal and qso
  - All possible parameters

  => To cluster the similar sources

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