Automated Source Classification of New Transient Sources

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1 Exploring the data in the time domain

Aperioidic Variability of 3XMM Sources

- systematic study of aperiodic, short-term variability
- characterizing the bulk of 3XMM sources on all possible time scales
- generates power spectra based on Fourier analysis, or optimally-binned light curves based on Bayesian Blocks analysis
- extraction of synthetic parameters for each source to quantify variability

Search for Periodicity in 3XMM Sources

- first systematic search for periodicity ever performed on the EPIC database
- performing state-of-the-art timing analysis techniques to unbinned photon times of arrival

Long-Term Variability of 3XMM and XSS Sources

- large number of overlapping observations performed at different epochs (repeated pointings or slew)
- provide photometric snapshots that sample long-term light curves (up to 15 yrs)

2 Multiwavelength Characterization of New Transient Sources

A first characterization is based on the X-ray spectrum of the transient source. The 3XMM source catalogue serves a control sample. The following information is used:

- Phenomenological characterization through hardness ratios
- Spectral analysis using six spectral models (e.g. absorbed power law, blackbody, ...)

3 Search for Positional Counterparts of 3XMM Sources

Crossmatch of the 3XMM-DR4 catalogue against 40 catalogs from different wavebands, e.g.:

Radio: PKS, PMN, AT20G, CGRABS, CRATES, WNSS...
Infrared: 2MASS, WISE, IRAS, SDWFS, USNO-B, GLIMPSE...
Optical/UV: 2MASS, EUVE, SDSS, UVEX...
X-rays: RASS, CSC, 2E, BAT70...
γ-rays: EGRET, IBSC

4 Automated Classification

All spectral information (variability and timing information planned) from the 3XMM is used as input for the automated classification algorithm. The 3XMM sources serve as a test sample for the machine learning algorithm (performed in R; randomForest (Breiman, 2001) in supervised mode). Not surprisingly, the Galactic N_H yields the total amount of sources within that class in the training set. Numbers on the blue diagonal equal correctness.

Contact

For more information, visit www.extras-fp7.eu

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