

# Large homogeneous sample of X-ray selected AGN and its study

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**Abstract.** The combined catalogue of AGN selected from optical identifications of X-ray sources based on Hamburg–ROSAT and Byurakan–Hamburg–ROSAT catalogues is a homogeneous sample for statistical studies. Optically identified X-ray sources from ROSAT BSC and FSC are included, 4253 X-ray selected AGN in total. We carried out classification for 210 of these candidate sources based on available SDSS spectra and enlarged the sample of confirmed AGN. Statistical investigations of the sample were also carried out. Multiwavelength SEDs have also been constructed to link them to classifications.

**Keywords.** galaxies: nuclei, galaxies: Seyfert, galaxies: statistics, X-rays: galaxies

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Based on Hamburg–ROSAT Catalogue (HRC; Zickgraf *et al.* 2003) and Byurakan–Hamburg–ROSAT Catalogue (BHRC; Mickaelian *et al.* 2006), a combined homogeneous catalogue of AGN (ROSAT BSC/FSC AGN) selected from optical identifications of X-ray sources was created for statistical studies. Optically identified X-ray sources from ROSAT Bright Source Catalogue (BSC; Voges *et al.* 1999) and Faint Source Catalogue (FSC; Voges *et al.* 2000) are included, 4253 X-ray selected AGN in total (56.2% of all identified sources). All these sources are confirmed or candidate AGN based on Hamburg Quasar Survey (HQS) low-dispersion spectra. 3352 of them are listed in the Catalogue of QSOs and Active Galaxies (Véron-Cetty & Véron (2010; 13th version) and 387 are in the Multifrequency Catalogue of Blazars (Roma–BZCAT) by Massaro *et al.* (2015).

We carried out classification for 210 of these candidate sources based on available SDSS spectra and enlarged the sample of confirmed AGN to 3650. A special emphasis is made on narrow-line Sy1.0–Sy1.5 galaxies and QSOs, as many of them have soft X-ray, strong FeII lines, and relatively narrow lines coming from the Broad Line Region (BLR; “narrow broad lines”); we have classified 45 new AGN as such objects.

We carried out statistical investigations of the sample, including study of the luminosity function, flux-ratios for different ranges, luminosity evolution, etc.

Multiwavelength SEDs have also been constructed based on photometric points from gamma-ray to radio to follow their behavior for different kinds of AGN and link these SEDs to classifications. AGN and their candidates were grouped into subsamples showing similar features (spectral index, etc.) and these subsamples were compared to known spectral classes. The sample is a relevant sources for identification of new blazars.

## References

- Massaro, E., Maselli, A., Leto, C., *et al.* 2015, *Ap&SS*, 357, 75  
Mickaelian, A. M., Hovhannisyann, L. R., Engels, D., *et al.* 2006, *A&A*, 449, 425  
Véron-Cetty, M. P. & Véron, P. 2010, *A&A*, 518, A10  
Voges, W., Aschenbach, B., Boller, Th., *et al.* 1999, *A&A*, 349, 389  
Voges, W., Aschenbach, B., Boller, Th., *et al.* 2000, *IAU Circ.*, 7432R  
Zickgraf, F.-J., Engels, D., Hagen, H.-J., Reimers, D., & Voges, W. 2003, *A&A*, 406, 535