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Activity types for X-ray candidate AGN from SDSS

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Abstract. The Joint Catalogue of Hamburg ROSAT Sources (HRC/BHRC) is the result of merging of HRC and BHRC catalogs built on the basis of optical identifications of ROSAT BSC and ROSAT FSC. Altogether, 8132 sources are present. Based on this catalogue, we have compiled a sample of ROSAT AGN, including candidate ones. In this paper we classify candidate AGN (those that previously had not been spectroscopically classified) by their activity type. The sample contains 955 objects with count rate of photons $CR > 0.04$ ct/s in the area with galactic latitudes $|b| > 30$ and declinations $\delta > 0$, however only 217 objects have SDSS DR10 spectra. The classification led to the following results: 95 AGN, 71 absorption-line galaxies, 42 stars, and 9 unclassified objects.

Keywords. surveys, cross-correlations, X-ray: AGN, AGN candidates, spectroscopy

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By merging Hamburg-ROSAT (HRC, Zickgraf *et al.* 2003) and Byurakan-Hamburg-ROSAT (BHRC, Mickaelian *et al.* 2006) catalogs made up on the basis of optical identifications of ROSAT BSC (Voges *et al.* 1999) and ROSAT FSC (Voges *et al.* 2000) sources by means of Hamburg Quasar Survey (HQS, Hagen *et al.* 1995) low-dispersion spectra, we have built the Joint Catalogue of Hamburg ROSAT Sources (HRC/BHRC, Paronyan & Mickaelian 2014) containing 8132 ROSAT sources. The sample of AGN and AGN candidates consists of 4253 objects, out of which 3352 are found in the Catalogue of QSOs and AGN (Veron-Cetty & Veron 2010) and Rome Blazar Catalogues (Massaro *et al.* 2009). There are 2908 objects in the SDSS DR10 (Ahn *et al.* 2013) giving possibility of their classification, particularly the activity types for AGN. There are 955 candidate AGN, i.e. objects that previously had not been spectroscopically classified. In this paper we classify SDSS spectra of these candidate AGN by their activity type, a smaple with count rate of X-ray photons $CR > 0.04$ ct/s in the area with galactic latitudes $|b| > 30$ and declinations $\delta > 0$. Only 217 objects out of 955 have SDSS DR10 spectra.

Table 1. Results of the spectral classification of ROSAT sources based on SDSS spectra.

Active galaxies	**Number**	**Stars**	**Number**
Quasars	5	subdwarfs (sd)	1
S1.2	2	white dwarfs (WD)	4
S1.5	15	cataclysmic variables (CV)	7
NLS1.5	12	carbon (C) stars	3
S1.8	8	Other (bright) stars	26
S1.9	6		
HII regions	29		
AGN without definite type	5		
Emission-line galaxies (ELG)	12		
Total number	95	Total number	42

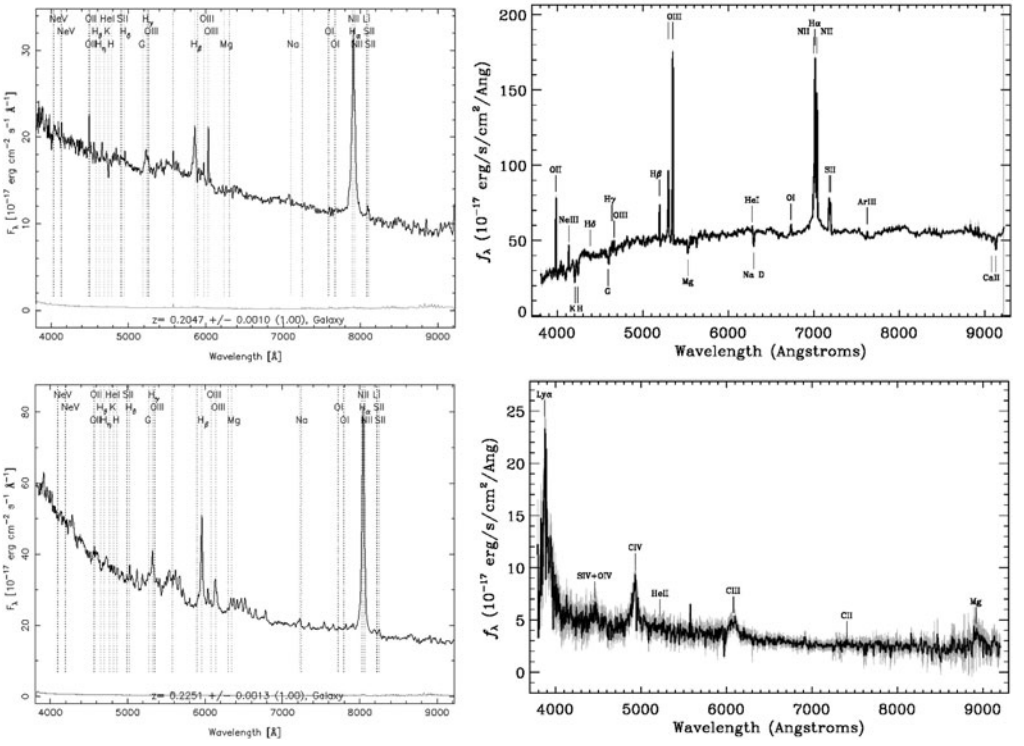

Figure 1. Examples of SDSS spectra classified as AGN: S1.2 (top left), S1.9 (top right), NLS1.5 (bottom left), and QSO (bottom right).

The classification led to the following results: 95 genuine AGN, 71 absorption-line galaxies, 42 stars, and 9 unclassified objects.

Examples of SDSS spectra classified as AGN: S1.2 (top left), S1.9 (top right), NLS1.5 (bottom left), and QSO (bottom right) are given in Fig. 1. The results of the spectral classification for all SDSS DR10 spectra are given in Table 1.

We are going also to carry out detailed studies of other 738 sources using their multi-wavelength data in order to be able to confirm their AGN nature, which will help us to use this method to reveal new AGN candidates.

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