SURVEYS OF ULTRAVIOLET EXCESS QUASAR CANDIDATES IN THREE LARGE FIELDS

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Abstract : A general description is given of the surveys performed in the fields around NGC 450 and NGC 520, and in the ESO field n° 300 with the aim of detecting ultraviolet excess quasar candidates.

INTRODUCTION

In order to give further evidence for or against the location of quasars in superclusters, in the vicinity of irregular galaxies or nearby the companions thereof (cf. e.g. a review by Arp, 1983), we initiated a long term program for collecting new and extensive observing material on the background density, distribution and luminosity function of quasars in fields near bright galaxies as well as far from them. A first report was given for the field of NGC 5334 (Surdej *et al*, 1982) where we reported on spectroscopic observations of 13 optically selected QSOs in a large ($\simeq$ 25 deg^2) field around that SB galaxy. In the present paper we describe some results concerning the fields of NGC 450 (see a preliminary report in Swings *et al*, 1983) and NGC 520, and in the ESO field n° 300 ($\alpha \sim 3$ h , $\delta \sim -40°$) void of any particularly bright or "active" galaxy. Statistical methods applied to these results are briefly sketched in Gosset, Surdej and Swings (1988; Gosset *et al.*, these proceedings).

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OBSERVATIONS : Search for QSO candidates

The first goal consisted in the detection of ultraviolet excess objects on dual exposure Schmidt plates obtained for our searches at both the Palomar 1.2 m and ESO La Silla 1 m Schmidt telescopes : the ultraviolet exposure was performed behind a UG 1 filter, and the blue one, offset by several arc seconds from the former, was obtained on the same emulsion behind a GG 13 filter. By visual inspection of the double image of a single object, quasar-candidates were chosen on the basis of their U-B color index. In this selection, we expect the ultraviolet threshold to be around U-B = - 0.4, and the limiting magnitude B ≃ 20.0 mag.

The large field (≃ 25 deg^2) plates were scanned twice, slowly, systematically (and tediously !) by two persons on an X-Y machine built for that purpose in Liège : lists of primary and secondary candidates were then drawn for those objects that are common to the two independent double surveys. Our aim was to minimize any bias in the selection of the candidates, so that the latter could subsequently be used for the statistical programs developed by Gosset (1987) and that are briefly described by Gosset *et al.* (1988). It is only at the time of the spectroscopic observations that some subjective selection may take place : brightness of the object, association of targets, proximity to an interesting object, ...

The equatorial coordinates, accurate to about 1-2 arcsec, were measured on the Uccle-Liège digitized Zeiss "Blink" comparator. Direct plates of the field were also used either for coordinate measurements, or for finding chart purposes.

OBSERVATIONS : Spectroscopy of QSO candidates

The bulk of the spectroscopic data has been gathered at the Shectograph (Boller and Chivens spectrograph + intensified Reticon) attached to the Cassegrain focus of the Irénée Dupont 2.55 m telescope (Las Campanas, Chile) : with an entrance slot of 2 x 2 arcsec, and a dispersion of 114 A mm^{-1}, the resolution is of order 3 A. Additional data have been obtained at the :

(i) Palomar 5 m Hale telescope, with either a photon counting system or the "2 D-Frutti" double spectrograph;

(ii) ESO 3.6 m telescope, with an Image Dissector Scanner (entrance slot 4 x 4", 224 or 171 A mm^{-1}, resolution $\lesssim$ 12 A);

(iii) ESO Max PLanck 2.2 m telescope, with a Reticon Photon Counting System, giving about 10 A resolution at 220 A mm^{-1}.

PHOTOMETRIC OBSERVATIONS

Photometry in areas of the different fields has been performed in the U, B, V bands at the Las Campanas 2.5 m and ESO 1 m telescopes, and CCD frames have been obtained at the 1.5 m danish telescope at La Silla as well. Once reduced, the data will lead to accurate limiting magnitudes, which in turn will enable us to derive meaningful values of quasar densities (in a specific redshift range).

SOME RESULTS

A brief summary of the presently available results is given below, in tabular form :

TABLE 1 : Summary of the survey results

Field	Candidates		Objects observed spectroscopically	Number of QSOs	Notes
NGC 450	primary	95	91	59 + 3 assim.	1
	secondary	45	1	(Seyf. or HII)	
NGC 520	primary	86	86	58	
	secondary	59			
3 H, - 40°	primary	~ 450	35	21	2
	secondary	~ 400			

Notes : 1 : see Gosset (1987) for list of objects, spectra, line identifications and values of equivalent widths, redshifts, etc.
2 : deeper plate from ESO Schmidt.

It is to be remembered that the redshift range of the QSOs detected here is located between 0.0 and 2.25.

Some associations of objects have been analyzed in more detail, and have led to individual publications, e.g. Q 0107-025 A, B and 3 "nearby" quasars (Surdej *et al.*, 1986), Q 0118-031 A, B, C (Robertson *et al.*, 1986) in the field of NGC 450.

A few results from the statistical tests applied to the objects of our surveys are :

(i) clustering on a scale of about 10 arc minutes has been detected in the fields of NGC 450 and NGC 520 (see e.g. Gosset, 1987; Gosset *et al.*, 1986, 1988);

(ii) a lack of any meaningful alignment of quasars near NGC 520 has been clearly demonstrated on the basis of our sample (Gosset *et al.*, 1987).

CONCLUDING REMARKS

On the basis of UV excess objects detected on dual exposure plates it appears that two thirds of the primary candidates turn out to be quasars (in the redshift range $0 < z < 2.2$). Statistical tests applied to the candidates and/or to the QSOs, and their results concerning clustering(s) of objects are presented in Gosset *et al.* (1988, these proceedings).

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