Properties of the Low-z NELGs from the VPM Survey

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Abstract. We discuss the properties of the low-redshift narrow-emission line galaxies detected in the framework of a variability-and-proper motion (VPM) search for AGNs. The VPM-NELG sample is obviously not a random selection of normal field galaxies.

1. Introduction

The variability-and-proper motion search (VPM) provides an unconventional, yet powerful technique for efficiently finding AGNs. Presently, we are performing a VPM-QSO survey in two fields, based upon a large number of fully-digitised Schmidt plates with a long time-baseline (see Meusinger et al, this conference). The search in the M 3 field was strictly confined to star-like objects. In the M 92 field, this constraint was relaxed allowing also for candidates with image profiles slightly different from star-like images. Hence, the spectroscopic follow-up observations in this field revealed a substantial number of low-redshift objects ($z < 0.3$), among them one QSO, five Seyfert 1s, 27 narrow-emission line galaxies (NELGs), and three early-type galaxies without emission lines (Meusinger & Brunzendorf 2001). The large fraction of NELGs is surprising.

2. Properties of the NELG Sample

All 27 NELGs were selected because of their high variability indices measured on the Schmidt plates. Redshifts of $z = 0.03 - 0.25$ were derived from the follow-up spectra taken with CAFOS at the 2.2 m telescope of the DSAZ[1] at Calar Alto, Spain. The distribution of the absolute B magnitudes is similar to those of galaxies with dwarf-Seyfert nuclei (Ho et al. 1997) or of galaxies selected for their compact nuclei (Sarajedini et al. 1999). The NELGs are blue ($\langle U - B \rangle \approx -0.3$ in the observer frame) and show strong Hα emission with equivalent widths of up to 1,000Å. Since the quality of the follow-up spectra was insufficient for a clear-cut discrimination between the principal ionisation sources (AGN versus young stars), spectra of higher resolution and higher signal-to-noise ratio were taken in a subsequent observation campaign. On the resulting diagnostic line ratio diagrams (Fig. 1a-c), a substantial fraction of these galaxies is located near the demarcation line between H II galaxies and AGNs.

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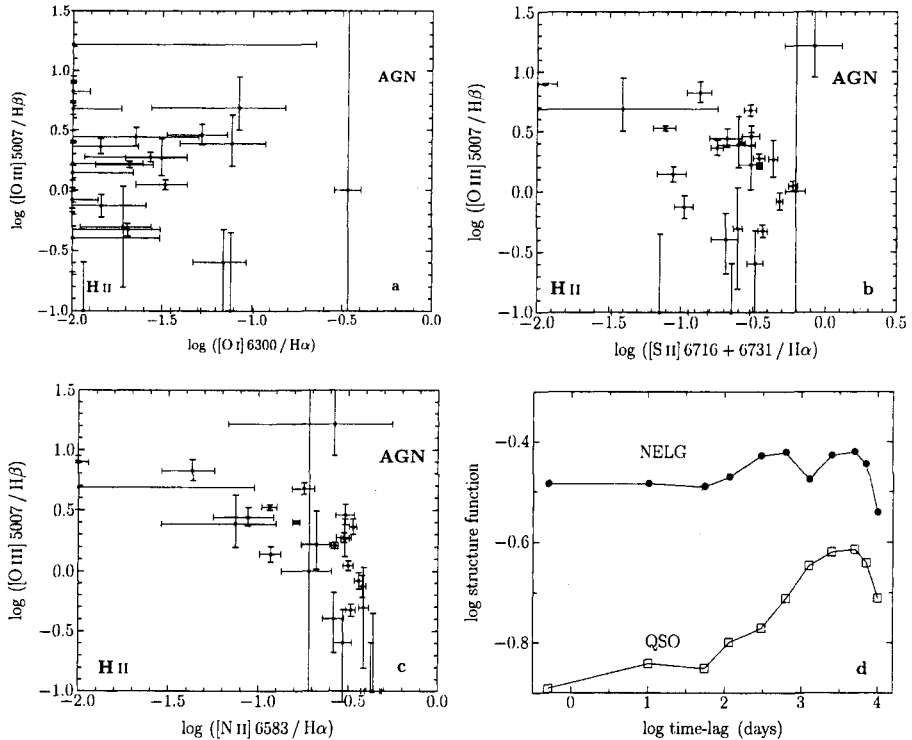
Figure 1.   **a - c** Diagnostic line ratio diagrams of the VPM-NELGs. The demarcation curves were taken from Osterbrock (1989). **d** Sample-averaged structure function from the light-curves of NELGs (upper polygon) and QSOs (lower polygon) in one of the VPM fields.

The sample-averaged structure function (Fig. 1d) reflects the strong variability measured for the NELGs. The flatness of the structure function indicates a remarkable difference compared to the QSO sample from the same database: QSOs show pronounced long-term variability while NELGs do not. We are going to check the reality of this effect as well as the role of photometric errors for the measured variability by means of additional CCD time-series observations.

References

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