RevMexAA (Serie de Conferencias), **29**, 176–176 (2007)

ACTIVE GALACTIC NUCLEI SURVEYS WITH GOYA ON THE GTC

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Active Galactic Nuclei candidates can be identified in deep, multi-wavelength surveys using a variety of techniques. Here we discuss some of these methods, recent results from the Groth Survey Strip AGN survey, and the application of these techniques to the selection of AGN candidates for the GOYA survey with EMIR on the GTC.

A primary goal of the AGN survey within GOYA will be to study the coupled evolution of AGN, supermassive blackholes, and their host galaxy environments. This program will aim to make new contributions by 1) applying standard visible emission line diagnostics to AGN at z = 1-3.5, 2) emphasizing unexplored populations of faint, red/obscured, and young AGNs at these redshifts, 3) comparing the AGN properties to key parameters of the host galaxy such as luminosity, mass, age, and clustering, and 4) examining the SMBH-host galaxy mass relationship in this sample (see contribution from F. Hamann, this proceedings).

In this poster, we present the results of a program to identify AGN in the Groth Survey Strip (GSS) via the independent and complementary selection techniques of optical spectroscopy and photometric variability (Sarajedini et al. 2006). Deep X-ray observations also identify AGN candidates (Nandra et al. 2005; Miyaji et al. 2004) and are used with the optical data to identify targets for further investigation with the GOYA near-IR spectroscopic survey.

To identify AGNs via optical variability, we analyzed two epochs of HST images obtained for a portion of the GSS separated by 7 years. Photometry was measured within small apertures to isolate variability from unresolved nuclear components. About 5000 galaxies were included in the analysis and 26 were identified as significant variables (triangles in Figure 1). Correcting for incompleteness, we estimate that 4.5±1.4% of GSS galaxies to V_{gal}=24 contain variable nuclei. Six of the 26 variables have high quality spectroscopic data from the DEEP1 spectroscopic survey (Koo et al. 1996; Weiner et al. 2005) and 4 of these show evidence of AGN (3 Type 1 and 1 Type 2). The majority were either not targeted in the survey or were failed targets due to their faint magnitudes. About 40% of the variables without spectra have photometric redshifts which indicate they lie in the range between z = 1.2 and 1.6. These are excellent candidates for the GOYA survey since many of the emission lines necessary for spectroscopic identification will lie in the near-IR.

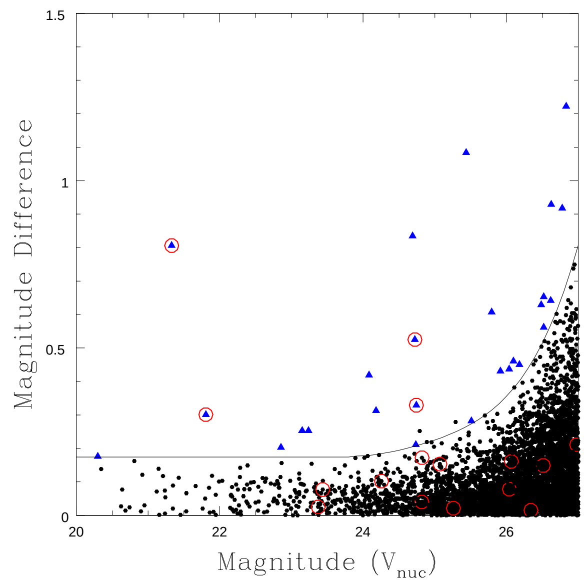

Fig. 1. Nuclear magnitude vs. magnitude difference over 7 years. The solid line is the 3.2-sigma significance threshold for variability. Triangles indicate the variable galaxies. Encircled points are X-ray sources.

Two-thirds of the GSS has been observed with X-ray telescopes and 25% of the X-ray sources appear as significant variables (circles in Figure 1). Ten of the X-ray sources have follow-up optical spectroscopy and 5 of these show AGN signatures (4 BLAGNs and 1 with NeV). Extending the spectroscopic survey into the near-IR, via GOYA, will allow for additional AGN confirmations and will help to uncover the true nature of many X-ray sources.

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