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RADIO-AGN IN THE AKARI-NEP FIELD AND THEIR ROLE IN THE EVOLUTION OF GALAXIES

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ABSTRACT

Radio-loud active galaxies have been found to exhibit a close connection to galactic mergers and host galaxy star-formation quenching. We present preliminary results of an optical spectroscopic investigation of the AKARI NEP field. We focus on the population of radio-loud AGN and use photometric and spectroscopic information to study both their star-formation and nuclear activity components. Preliminary results show that radio-AGN are associated with early type, massive galaxies with relatively old stellar populations.

Key words: infrared: telescope; conferences: proceedings

1. INTRODUCTION

In the context of galaxy evolution in the Universe, the role of nuclear activity, in particular radio-loud active galactic nuclei (AGN), is still under debate. Are radio-AGN a phase of a galaxy's evolution? How are they triggered and what is their effect on their host galaxy? We identify radio-AGN within the AKARI-NEP field and study their host galaxy properties in terms of an hierarchical evolutionary scheme.

2. CROSS-IDENTIFICATION

We cross-identify all AKARI-NEP (wide and deep) sources detected in the N2 band of AKARI with the sources from the WSRT catalog at 1.5 GHz ([WH10]), following [DO86] (also see [WH12]). In total 401 and 168 radio sources are matched for NEP-wide and -deep, respectively. Photo-z for NEP-deep cross matched sources range between 0.37 and 2.2, with most sources having z between 0.37 and 1.

We also cross-identify 1.5 GHz WSRT sources with the optical spectroscopy catalogs available (Shim et al., Takagi et al., private communication). For a matching radius of 3 arcsec, 48 radio sources are matched (spec-z between 0.03 and 4, with a few above 1). Radio-samples are defined in Table 1.

Table 1.
Radio Samples Selection Criteria

Sample	Description	Selection
(1)	All	-
(2)	Luminosity	$L_{1.5GHz} > 10^{23}$W/Hz*
(3)	Flat-spectrum	$\alpha_{radio} < 0.5$**

*limit definition following [CO92][MA07]
**α_{radio} calculated using 2 or 3 bands

3. OPTICAL SPECTROSCOPY

We are in the process of analyzing all the available optical spectra using IDL routines (emission line fluxes, equivalent widths, 4,000 Å break, etc.). Using the BPT emission line classification diagram (Fig. 1) we find 10 AGN/LINERs and 21 transitional objects in a total of 84 sources. 3 radio-sources are classified as AGN/LINERs and 3 as transitional.

4. OPTICAL COLORS AND STELLAR AGES

We find that luminosity-selected AGN are predominantly associated with elliptical galaxies (u-r > 2.22;[ST01]), with a similar trend for our flat-spectrum sample. A two-sample KS test gives a 99.8%

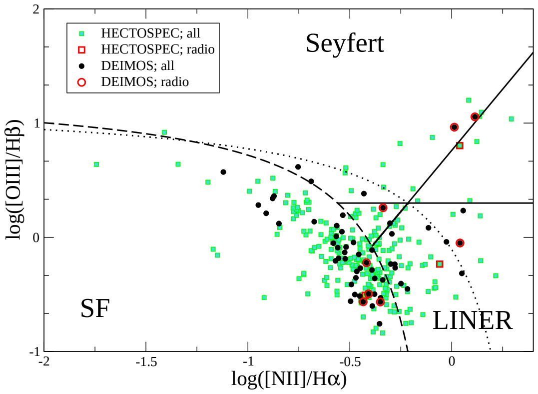

Fig. 1. Baldwin-Phillips-Terlevich (BPT) emission line ratios diagnostic diagram to separate star-forming galaxies from active AGN and LINERs. The dashed line is from [n], the dotted line from [l], and the continuous lines are from [m] (horizontal) and [n] (diagonal). They separate star-forming galaxies, LINERs, and Seyferts, respectively.

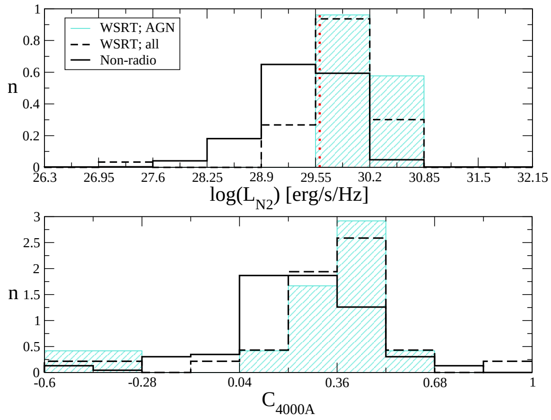

Fig. 2. Normalized distributions of the 4000A break index C4000A and rest-frame N2 luminosity for all non-radio sources (black), all radio sources (dashed black), and luminosity-selected radio-AGN (shaded turquoise). Only sources with spectroscopic redshifts are included here. The dotted line denotes the L_*.

probability that sample (2) is drawn from a different population than its parent sample. For the comparison with sample (3) the KS test does not provide a significant result. Both samples (1) and (2) show $C_{4000\mathring{A}}$ characteristic of old stellar populations and early-type galaxies (e.g.,[GA05]). A small fraction of sample (2) shows low values of C4000 indicative of a strong power-law non-thermal continuum (Fig. 2). Assuming that rest-frame N2 luminosity is a good proxy for the stellar mass of a galaxy, both samples (1) and (2) inhabit more massive galaxies compared to the non-radio sample.

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