Pilot Survey of MIR-Selected Quasars with Subaru/FMOS

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1. Motivation

- It is considered that reddened quasars are significantly missed by optical quasar survey.
- Reddened quasars may be dominant among the most luminous quasars.
- The longer wavelength selection is necessary for overcome.

2. Mid-IR Selection of Quasars

- Different color from stars. No need of point source.
- Robust against extinction. Expect to discover reddened quasars missed by the optical survey.

3. Our Selection

- WISE data are used.
  Whole sky was covered with 3.4, 4.6, 12 & 22μm photometries.
- SDSS quasars are training set for the selection.

4. FMOS observation

- 2012 June 5th. Low resolution mode (R~500). JH-band.
- 6 FMOS FOVs with 30 min. integ. each.
  85 candidates & 535 non-candidates were observed over 1.3 deg².
- Non-candidates were observed in order to check our criterion’s completeness.

5. Results

- 30 quasars were identified among 85 observed candidates (Fig. 2).
- 10 more quasars are found in SDSS & BOSS in our FOV.
- 40 MIR-selected quasars in total are spectroscopically identified.
- Only six quasars were identified among 573 non-candidates. Our criterion has a good completeness.

6. Discussions

- color vs. redshift (Fig. 4a)
  Point sources tend to be higher redshift sources.
  Extended sources are z < 1.
- Significant number of UKIDSS extended sources.
- differential color distribution (Fig. 4b)
  \( \Delta i-K=(i-K)_\text{typical quasar}@same z \)
  Different from SDSS quasars. Redder quasars are more. Perhaps due to host galaxy contribution or dust-reddened nuclei.

Fig. 1 (a) WISE colors of SDSS DR7 quasars (green dots). The 0 < z < 4 color tracks are drawn from SEDs by Richards et al. (2006) in black, radio-loud and radio-quiet SEDs by Shang et al. (2011) in magenta and in blue, respectively. (b) The 0 < z < 2 color tracks of several types of galaxies are illustrated. The hexagon (dot-dashed line) indicates our MIR color selection for quasars.

This criterion includes 80% SDSS quasars at z < 2.5.

Fig. 2 WISE color of observed targets.

Fig. 3 FMOS spectra of some quasars. They are selected according to red colors of (i-K). See the next section.

Fig. 4 a) (i-K) color vs. redshift of the sample. b) Histogram of differential color of the sample and SDSS DR7 quasars.