Progress report on the KASINICS observation of High-z QSO candidates

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with
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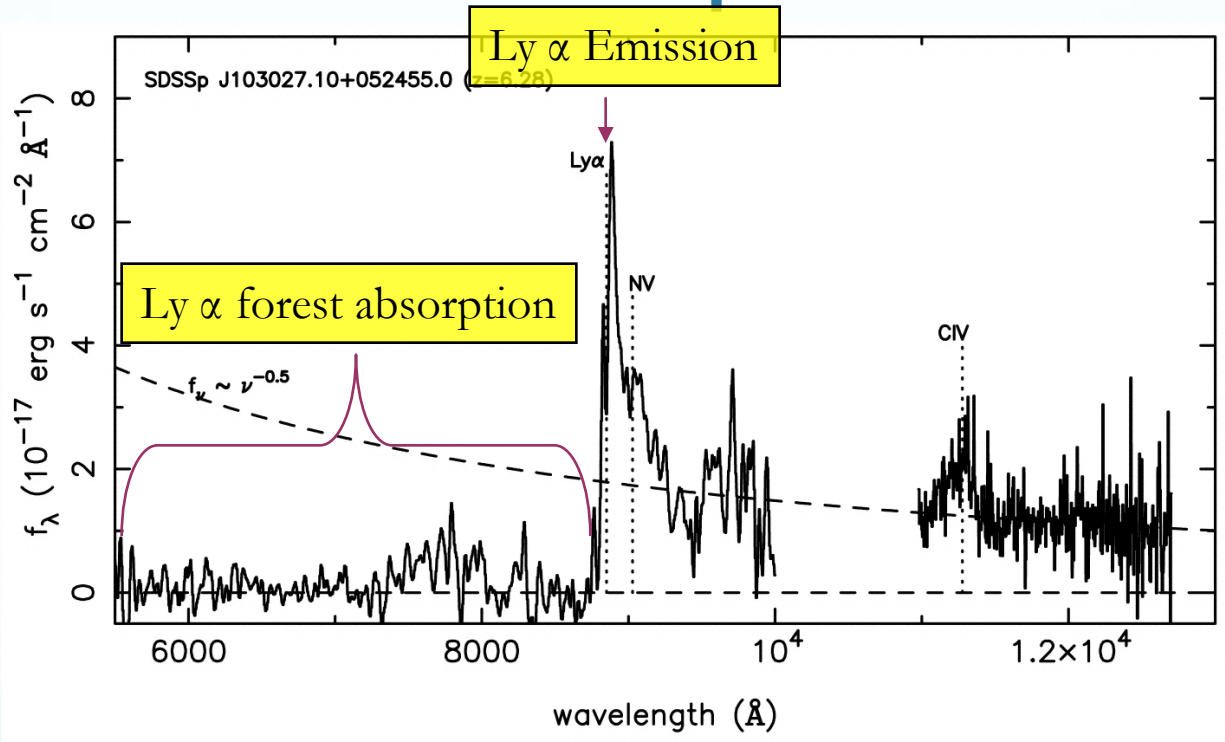
Introduction

- High redshift QSOs :
  - Are one of most distant objects from us
  - Tell us about the nature of early universe during first billion years
    - When the reionization gets complete
  - Tell us about the nature of SMBH in early universe

Introduction

- Goal of the high-z QSO survey
  - To discover more high-z (z>5.7) QSOs
    - More than 25 QSOs have been discovered at z>5.7 (e.g. Jiang et al. 2008), most of which are discovered from SDSS
  - Beyond z=6.43
    - CFHQS J2329-0301 is the currently known most distant (z=6.43) QSO (Willot et al. 2007)

How to find a high-z QSO? : i-dropout

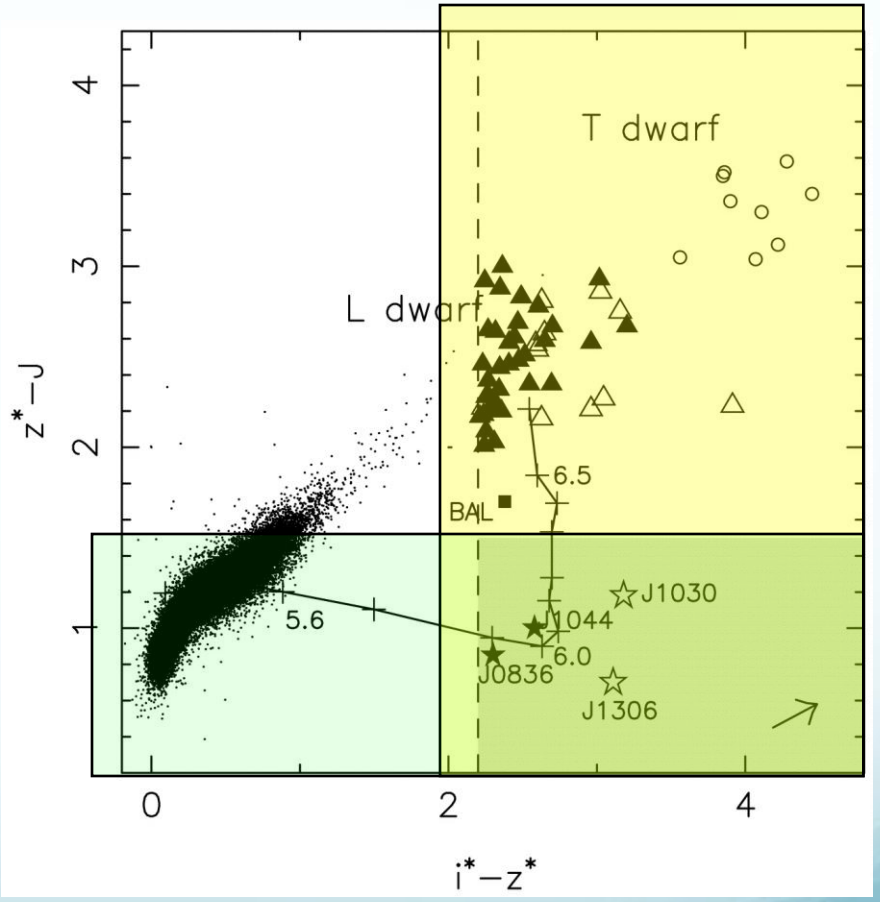


(Fan et al. 2001)

- Lyα emission of z > 5.7 QSO is getting out of SDSS i band → (i – z) getting larger(redder).
- Blueward of Lyα is not visible in bluer filters (SDSS u, g, r)

Separation of QSOs from Brown Dwarfs

- Brown dwarfs have similar (i-z) colors
- (z-J) color can separate QSOs from L/T dwarfs



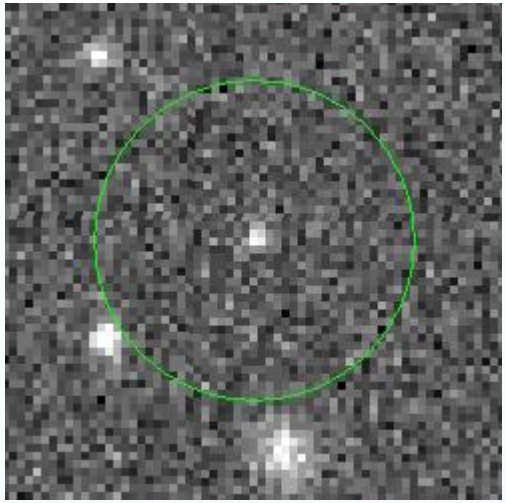
(Fan et al. 2001)

QSO candidate Selection

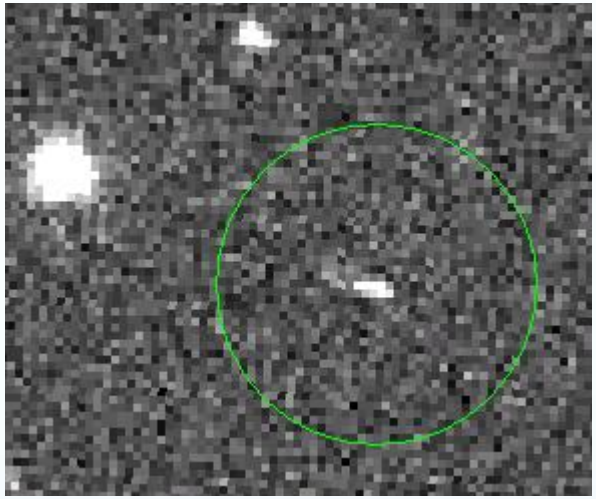
- Selection from SEGUE catalog
  - |b| > 20deg to avoid extremely reddened objects
  - RA = 21h ~ 12h for observation in winter season
- Photometric selection criteria
  - (i - z) > 2.2
  - (u - z), (r - z), (g - z) > 2.2
    - QSO must not be visible on u, g, r frame
  - z <= 20.2, Err(z) < 0.1
  - Use photoflags to cull out the spurious detection by

1322 targets from photometric criteria

Visual Inspection



Good

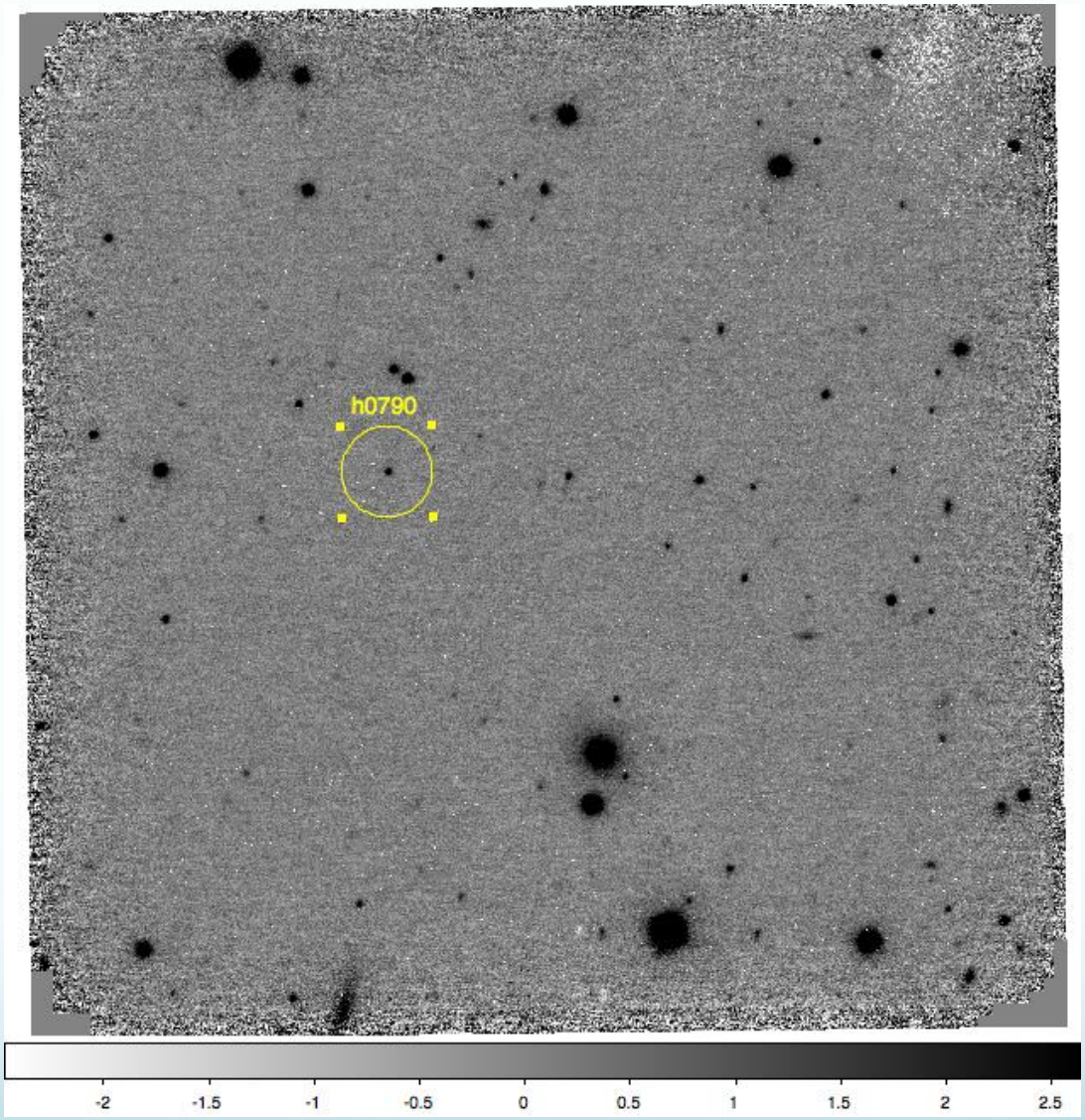


Bad

94 targets after visual inspection

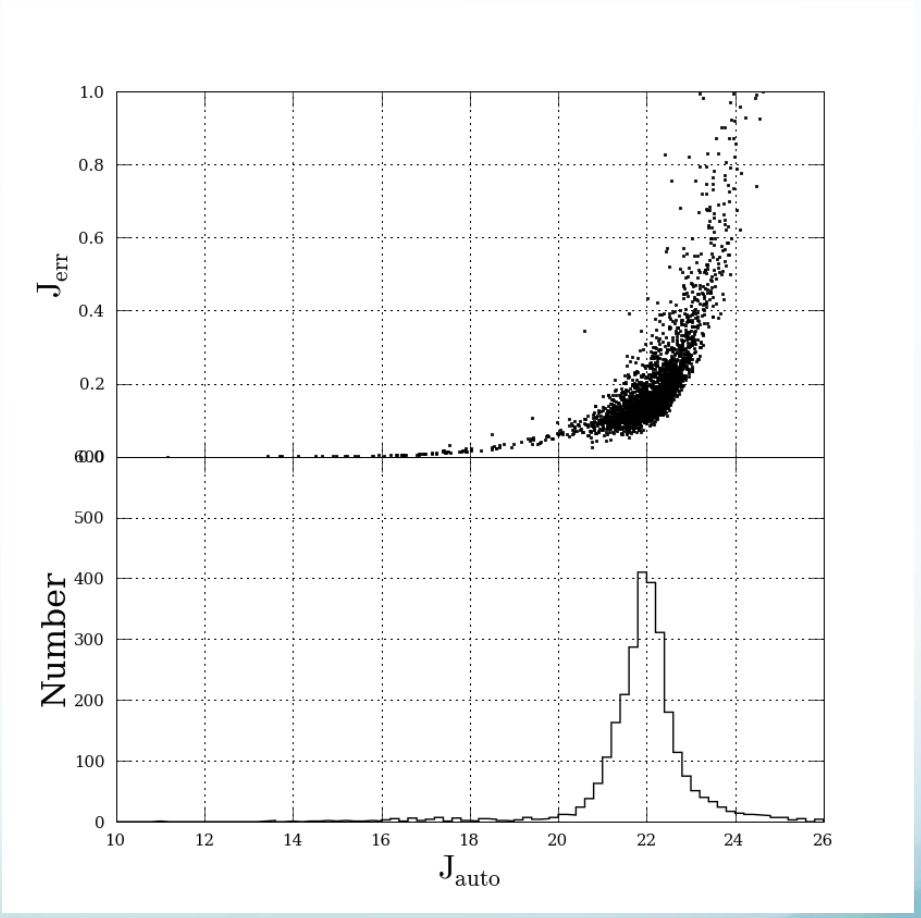
NIR Observation

- KASINICS + BOAO 1.8m Telescope
  - 34 targets observed in Nov. & Dec. 2008 runs
- Target observation
  - 120sec*27 exposures in J-band
- Preprocessing with IRAF
  - All images are median combined to obtain blank sky frame for flattening
  - Images stacked with XDIMSUM/IRAF

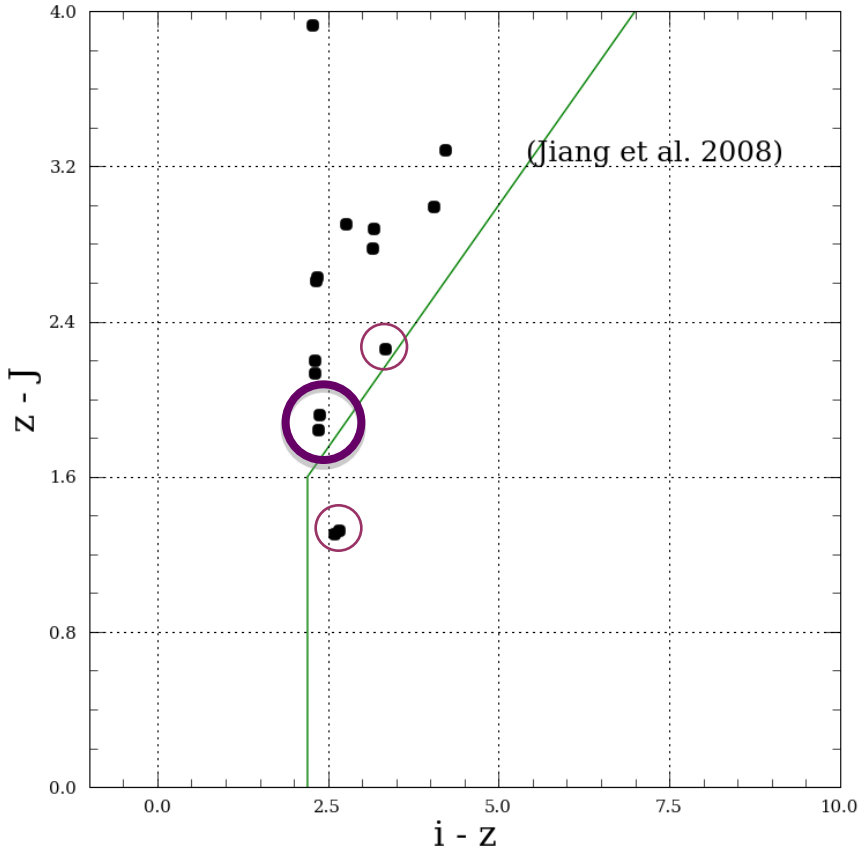

h0790
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

NIR Observation

- Photometry with SExtractor
  - J_{limit} = 20.1 with 5σ level
- Calibration
  - with 2MASS PSC
- J mag. obtained for 25 objects



Result



- 8 objects are located in QSO domain (Jiang et al. 2008)
  - Most of them turned out to be artifacts
- 2 possible QSO candidates after visual checks
  - Maybe 3 more QSOs in long shots?

Summary

- 94 QSO candidates were selected from SEGUE using i-dropout technique and visual inspection
- J photometry of 25 QSO candidates were obtained with KASINICS camera at BOAO 1.8m telescope
- 2 possible (and 3 more?) QSO candidates are selected for spectroscopic observation

Future Work

- J-band observation for more targets
  - Also z (or y) band observation to secure reliable optical photometry at LOAO or Maidanak observatory

- Spectroscopic observation will be carried out for the targets selected with J-band photometry

Thank you