

Primeval Universe WG

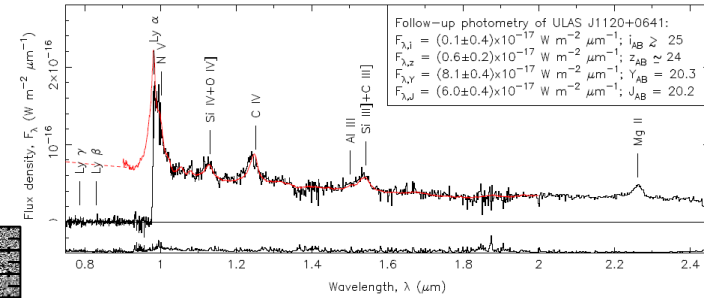
Cuby & Fynbo
WG leads

Work Packages :

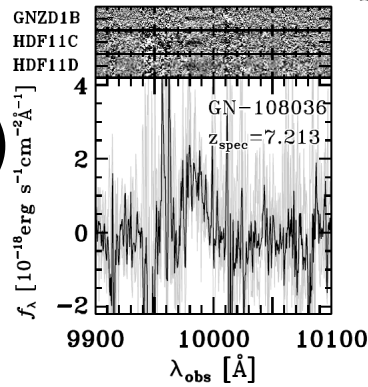
Survey Design (Dunlop), LBGs (McLure), QSOs (Warren, McMahon), IGM (Ferrara), CIRB (Kashlinksy), [lensing](#) (Cooray), [transients](#) (Fynbo)

High-z Universe

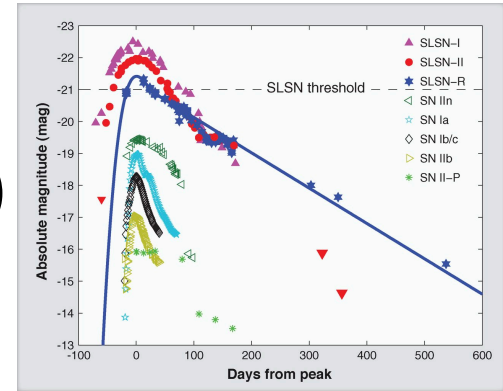
- High-z QSOs (from the Wide)



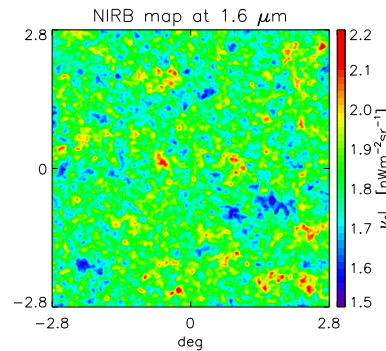
- High-z LBGs (from the Deep)



- High-z SuperLuminous SNe (from the Deep)

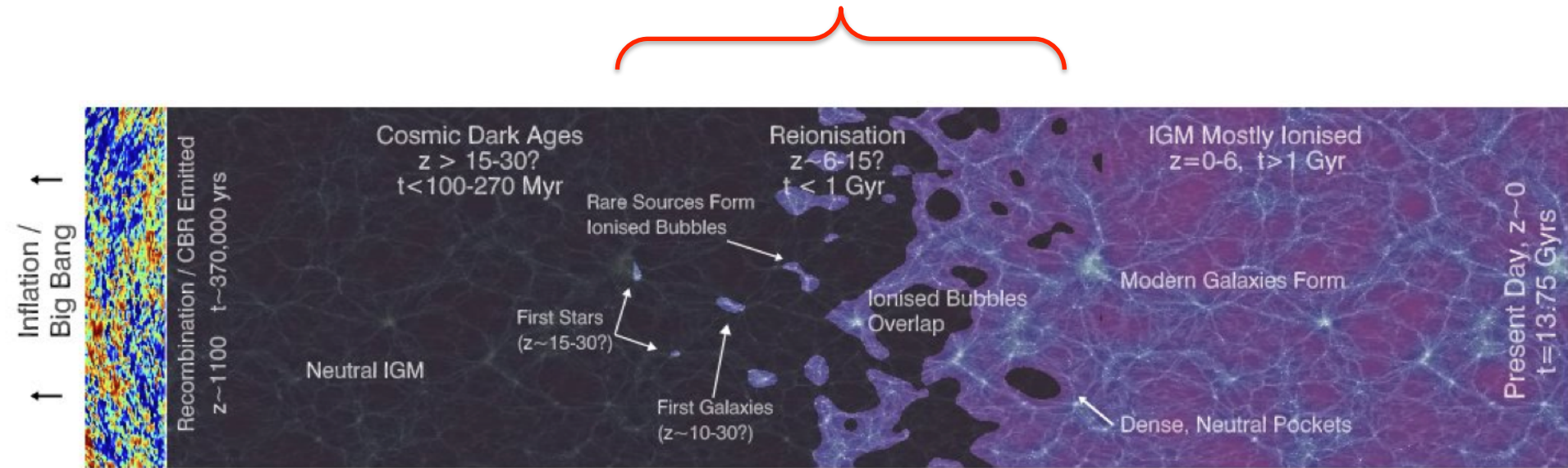


- CIRB



- Role of lensing on number counts and search strategies

High-z Universe

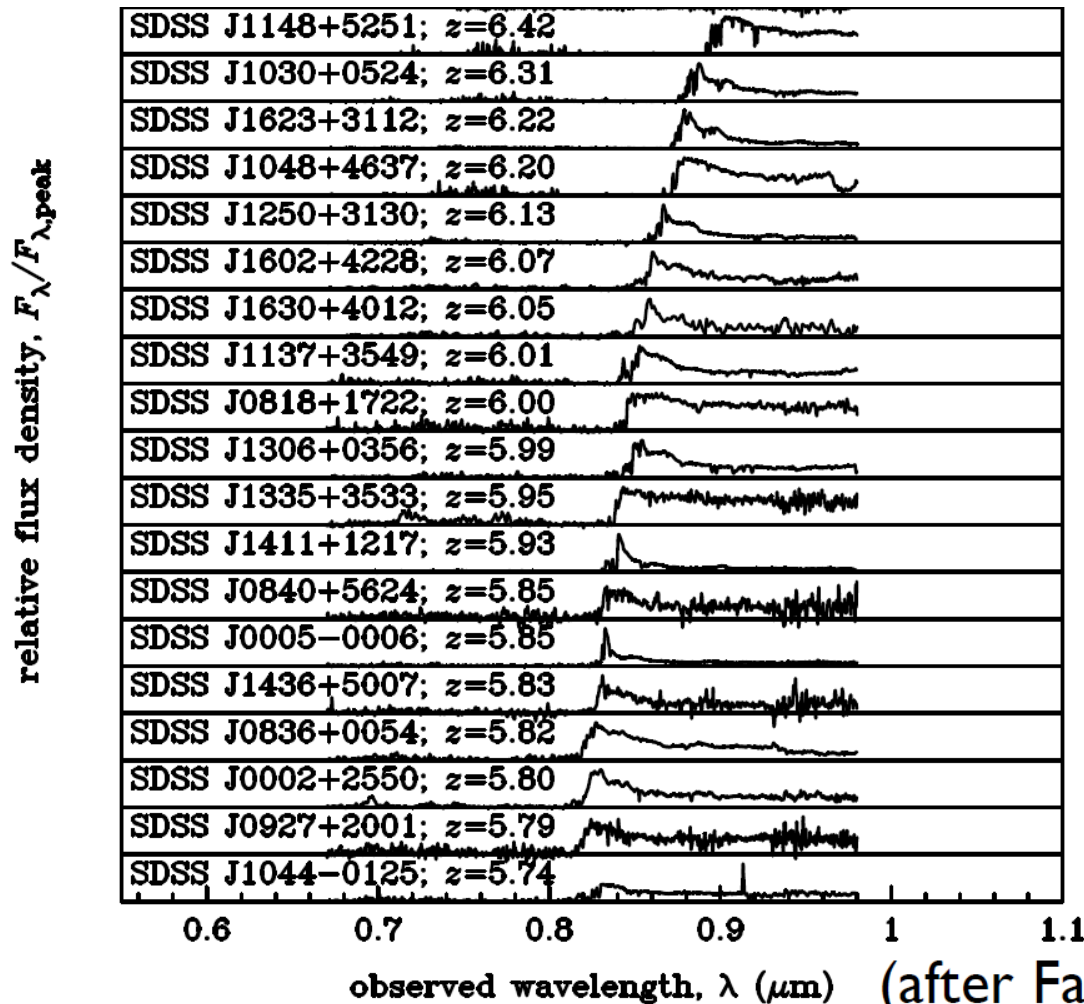


In the next 20 years we will find and illuminate the epoch when the first stars, galaxies, supernovae and supermassive black hole formed. EUCLID has the potential to make a crucial contribution to this.

Re-ionization history & formation of supermassive black holes

High-z QSOs

EUCLID



UKIDSS

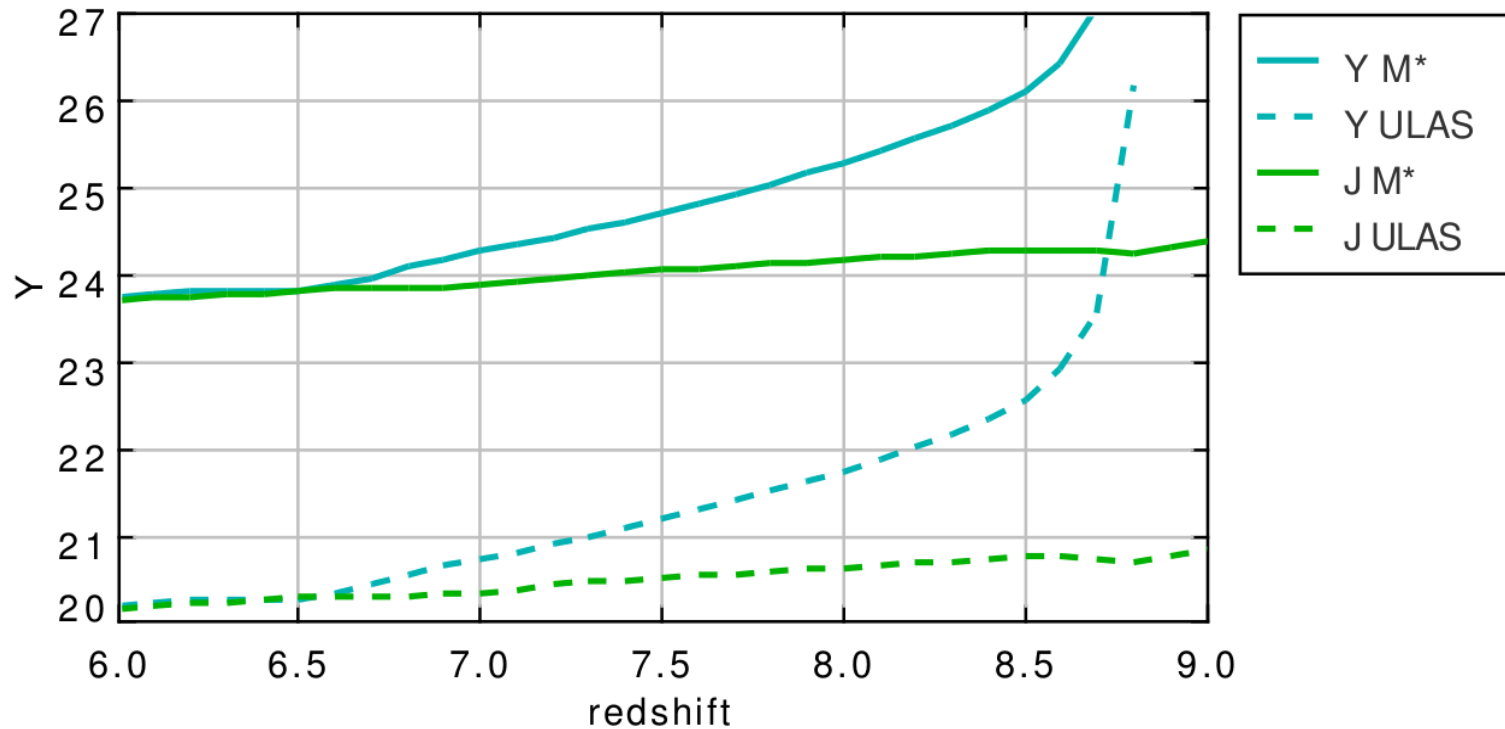
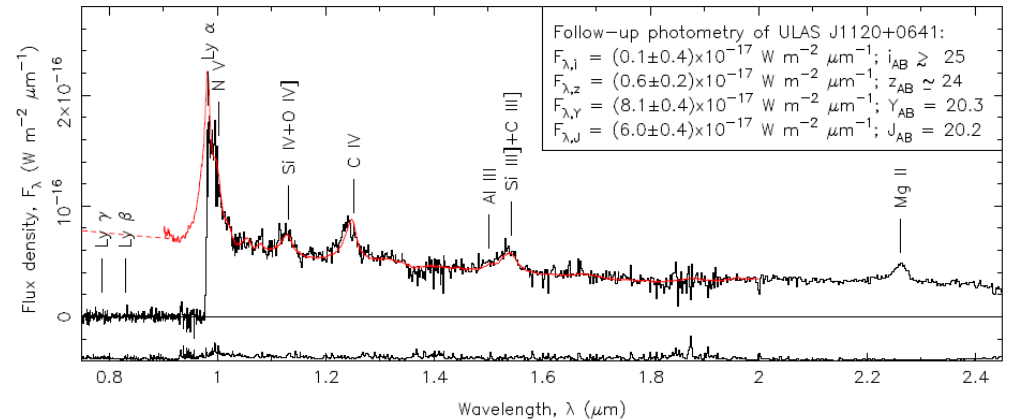
SDSS + CFQS

Mortlock et al., 2011

(after Fan et al. 2006)

High-z QSOs

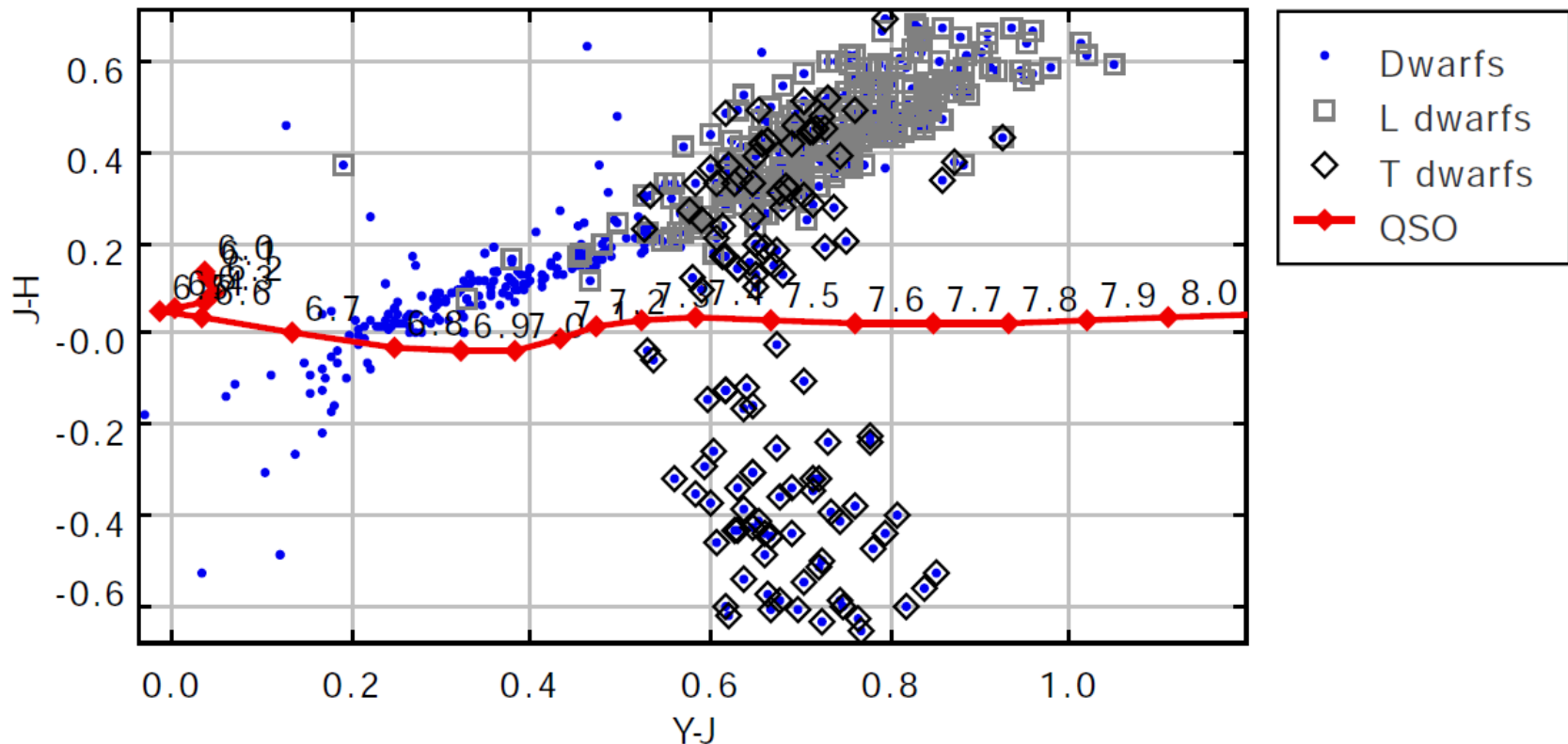
- ULAS J1120+0641
 - $z = 7.08$
 - $AB \sim 20.5$

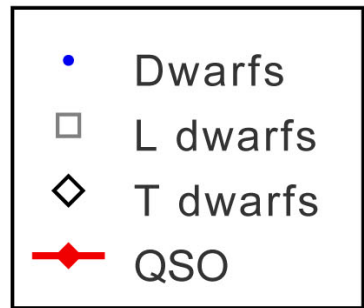
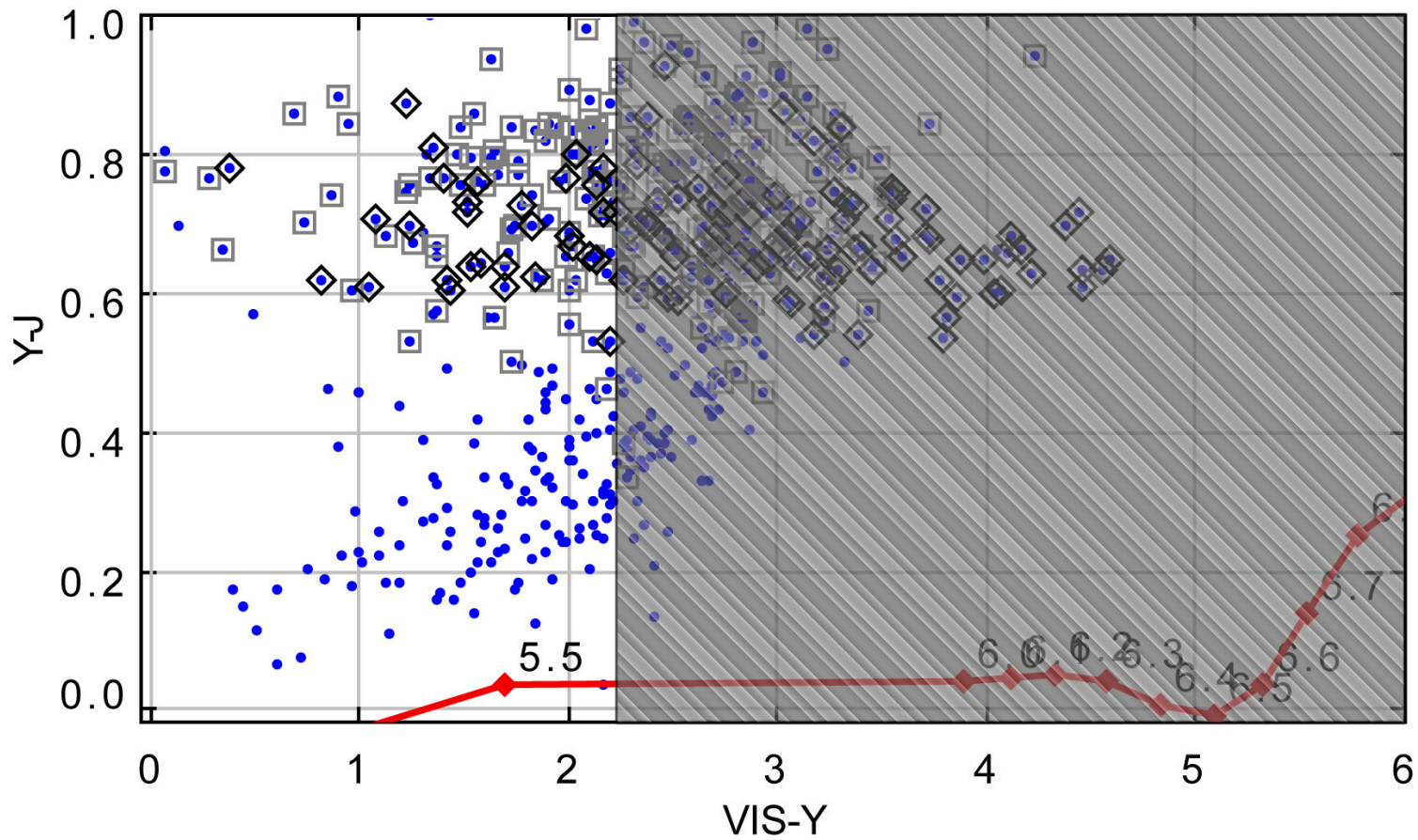


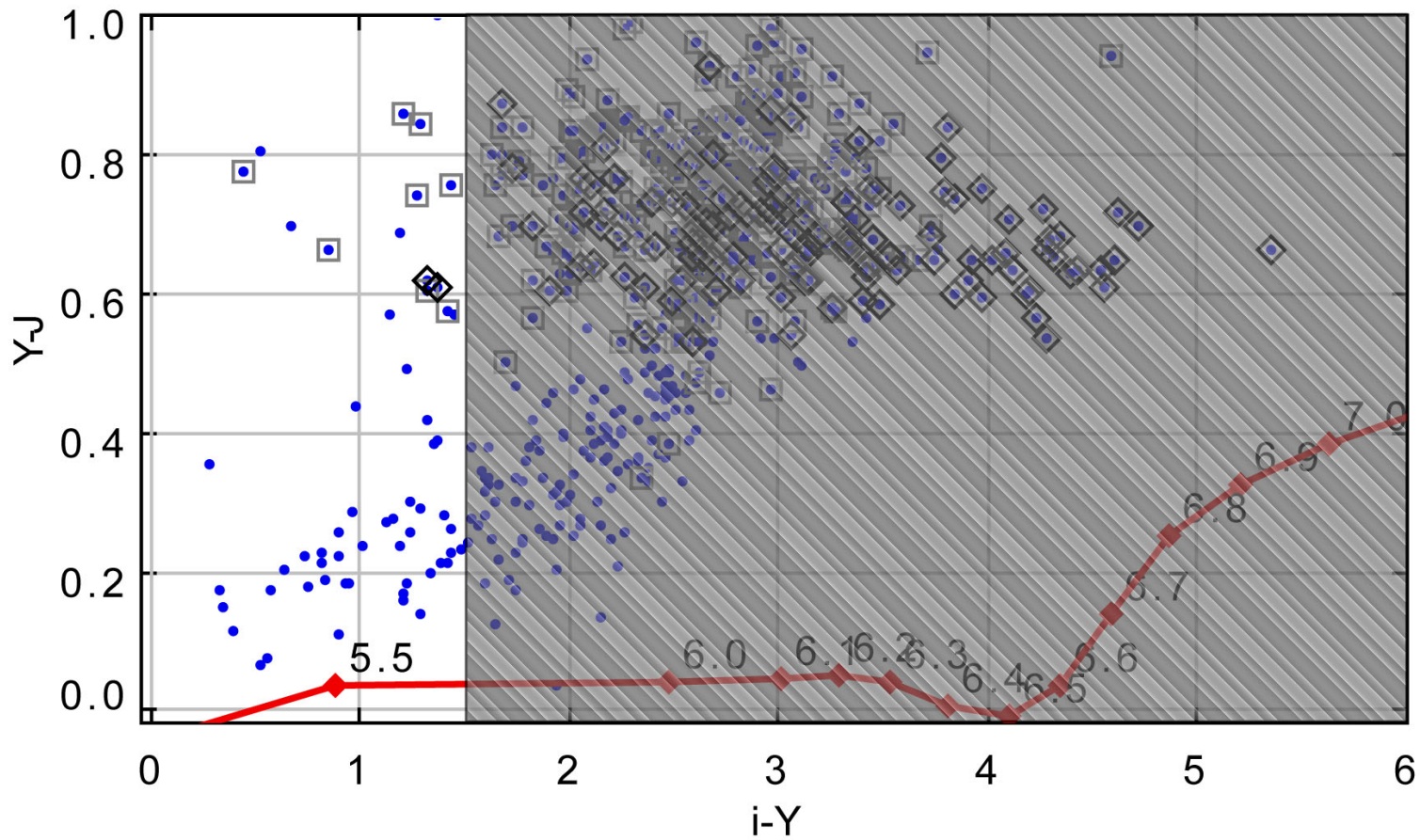
High-z QSOs

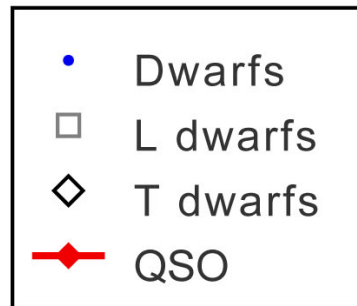
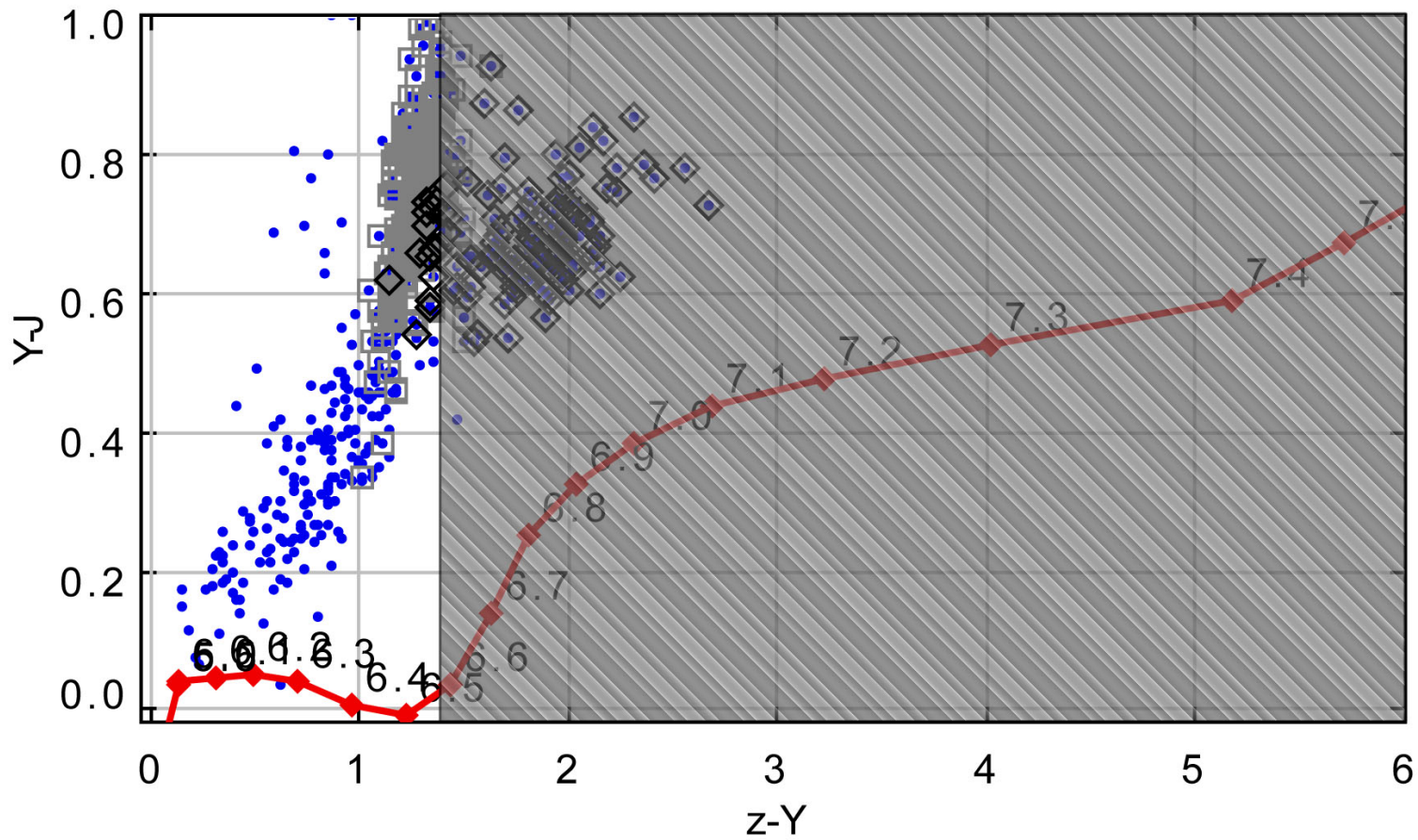
- Euclid (Red Book)

- No QSOs at $7 < z < 8$ due to contamination from Brown Dwarfs
- 10 to 50 QSOs at $z > 8.1$ depending on assumptions on LF evolution and J-band selection limit









Assuming $z=24.3$ (point source, SNR=5)

Comments

- The PU science case requires multi-wavelength data beyond what is required for the core cosmology science (for both the DEEP and the WIDE) for **target selection**
 - z-band data at least as deep as the Euclid IR data is critical
 - In addition to at least r and I-band data
- **Follow-up** capabilities mandatory
 - For high-z confirmation first
 - For the high-z science (re-ionization, SMBH masses, chemical and dynamical evolution of high-z galaxies, etc.)
 - Essentially (near-IR) spectroscopy
- Obviously, the follow-up capabilities and ancillary data need to match (hemisphere-wise)
- Equally obviously, we need visibility from the Southern Hemisphere (no access to 8-10 m telescopes in the North for most of the Euclid consortium and all large facilities in the South ALMA, E-ELT, SKA, etc.)

Comments

- WIDE: DES and LSST OK (z-band in particular), provided that we have data access allowing us to properly select the targets.
- DEEP: open question. Selection of fields, NEP vs. SEP, multi-wavelength data, follow-up facilities (VLT, E-ELT, ALMA, etc.).
- Better to have a few 1000s sq. degrees (WIDE) and 10-20 sq. degrees (DEEP) with adequate data **and** follow up capabilities than 14,000 and 40 sq. degrees respectively with degraded capabilities preventing to do any useful PU science
- Main message: don't forget the legacy science, it also needs (a lot) of observing time for the preparation of the mission, and later for the follow-up.