The Quasar ESO UVES Advanced Data Products (EUADP)

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PLAN

1. Context
2. The EUADP Sample
3. Science Results
4. Issues & Strengths
5. Future Prospects
The Universe Constituents

- only 10% of baryons in stars
The Baryon Cycle

Davé 2001, Rasera & Teyssier 2006

Keres, 2005
The Data

- ESO UVES Advanced Data Products
- 250 quasar spectra, 1500 hrs of VLT time
- 150 DLAs/sub-DLAs
Neutral Hydrogen Gas Mass

- 10% of gas forming stars
- cosmic coincidence

Zafar, CP+13b
Neutral Gas HI

Neutral hydrogen HI

IGM = ionised hydrogen

Accretion

Molecular hydrogen H2

Star formation

= CONSTANT
Neutral Gas HI

star formation

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accretion

molecular hydrogen H2

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neutral hydrogen HI
Neutral Gas HI

star formation

IGM = ionised hydrogen

accretion

molecular hydrogen H2

neutral hydrogen HI

= CONSTANT
Nitrogen & Argon

Zafar, Centurion, CP+14a; Zafar, Vladilo, CP+14b
Metallicity Distribution

- hints for bimodality

sub-DLAs at mean z~2

Quiret, CP+15
Future Prospects

• Mass fct incl. sub-DLAs => UVES+XSH archives
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- z>4 but blending => VLT/ESPRESSO
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- z>4 but blending => VLT/ESPRESSO
- E-ELT/HIRES => think ahead
Issues

- **nature of objects unknown**
- preview on-line (available on HST/Sloan archives)
- add non-standard settings?
- no vacuum helio-centric correction
- combine different spectra of same object?
- measure continuum, redshift, flux in emission lines? (catalogues for photometry?)
- link to other data/products?

=> value-added products
Sloan Spectro-z

1. Fit conti: fifth-order polynomial, with iterative rejection

2. Emission lines Redshift:
   - lines found by carrying out a wavelet transform
   - matched against list of common em lines
   - method calibrated on manual inspection

3. Cross-correlation Redshift:
   - stellar, emission-line galaxy, and quasar template spectra

=> choose 1 of 2 z based on confidence level

http://classic.sdss.org/dr7/algorithms/redshift_type.html#specBS
Sloan Type Determination

1. Spectral classification above

2. Principal Component Analysis (PCA), using cross-correlation with eigentemplates constructed from Sloan spectra

3. small percentage spectra inspected manually
Success

• Note: nothing alike at Keck (but similar effort KODIAQ)

• Results presented here would have NOT be possible without the ADP archives

• Some PI-data not published by any of initial co-proposers => data “seconde life”

• Real change of paradigm: new generation of observers are data mining experts (SDSS/ESO-Survey generation)

• New science parameter-space

• Important future prospects
Summary

1. Neutral gas is constant across cosmic time: evidence for accretion on global scales

2. ESO archive is a "treasure"