Ultra-Deep Spectroscopy of Lyman Break Galaxies at z~6

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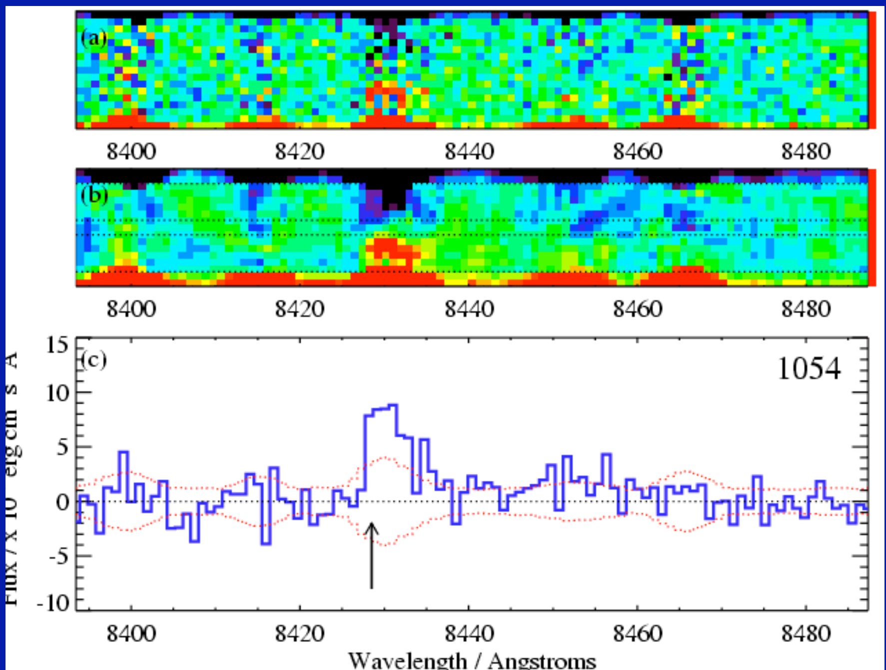
The Status of LBG Spectroscopy at z~6

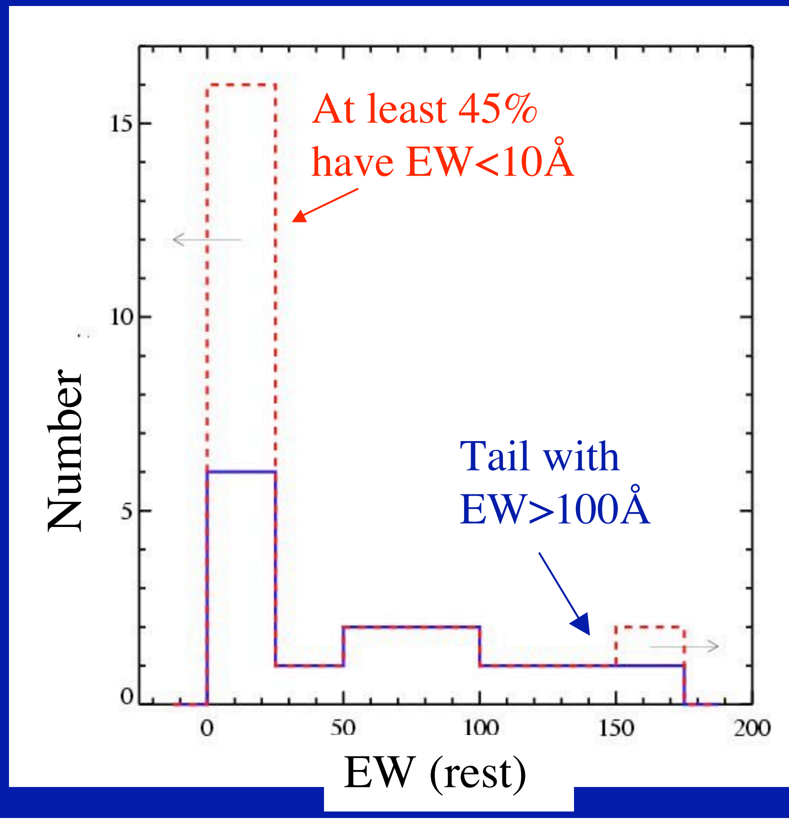
- Challenges
  - Lyman Break Galaxies are much harder to confirm than Lyman-α Emitters
  - LBGs at z~6 are very faint (m^*_{AB}>26)
  - The sky is bright at these wavelengths (OH line emission)
- Fields
  - The majority of spectroscopy has been on public imaging
  - Private fields include CL1252 (Dow-Hygelund et al 07), BDF (Lehnert & Bremer 04), ERGS (Douglas et al 07)
- Instruments
  - Require good red sensitivity
  - Require either good sky subtraction or high resolution
  - Spectrographs used include GMOS, DEIMOS, LRIS, FORS2

GLARE: Gemini-GMOS spectroscopy

- Targeted galaxies in GOODS-S and the HUDF
- 22 slits placed on i’-drops, 36hrs of integration with R~1000
- 5 galaxies with secure redshifts, 9 more possible line emitters.
- Tight limits (W_{lim}<10Å) on remaining candidates.

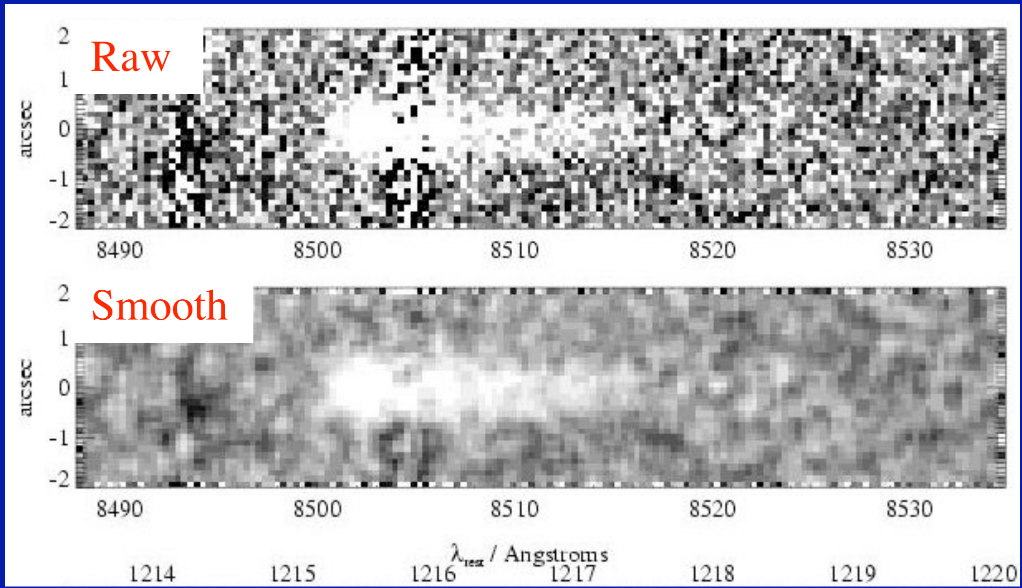


Nod & Shuffle reduction => dipole signal

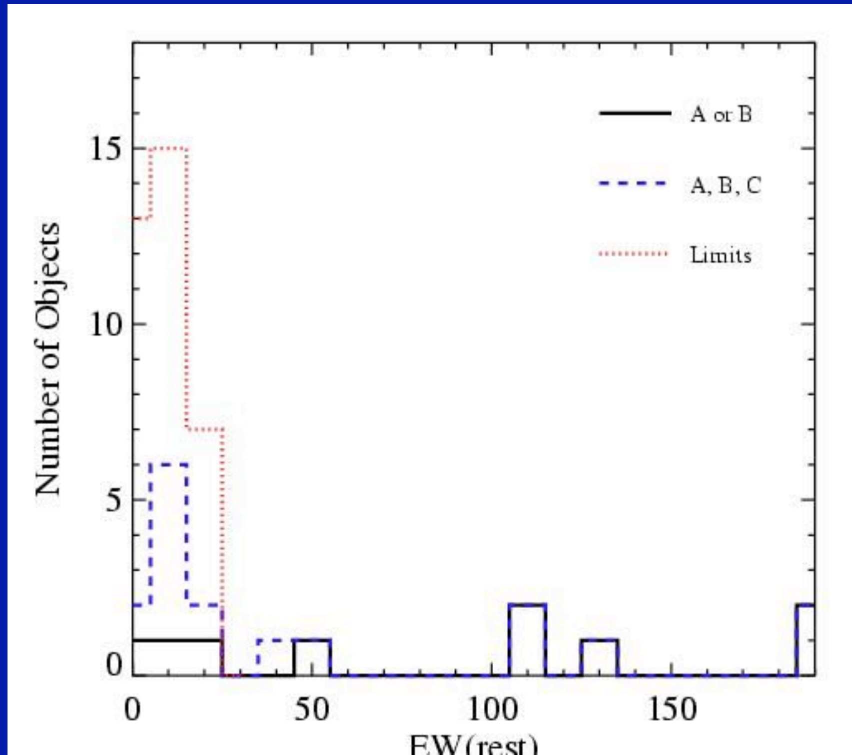


Keck/DEIMOS spectroscopy

- Targeted galaxies in GOODS-S and the HUDF
- 39 slits placed on i'-drops, min 3hrs/mask, R~5000
- 9 galaxies with secure redshifts, 8 more possible line emitters.
- Limits W_{lim}<12Å on GOODS candidates, W_{lim}<10-30Å in HUDF.



z=5.99, *z'*=26.93, W_0>250Å



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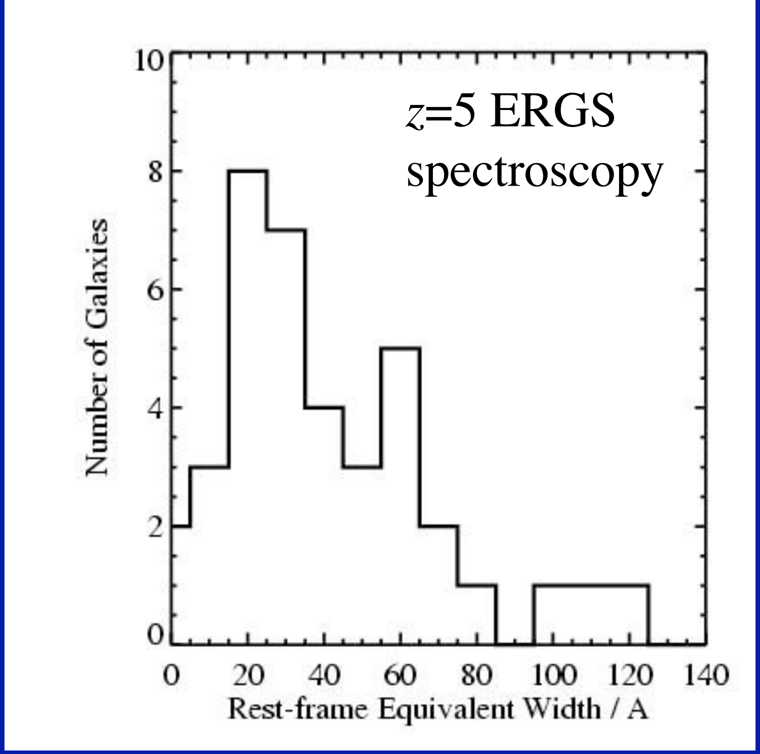
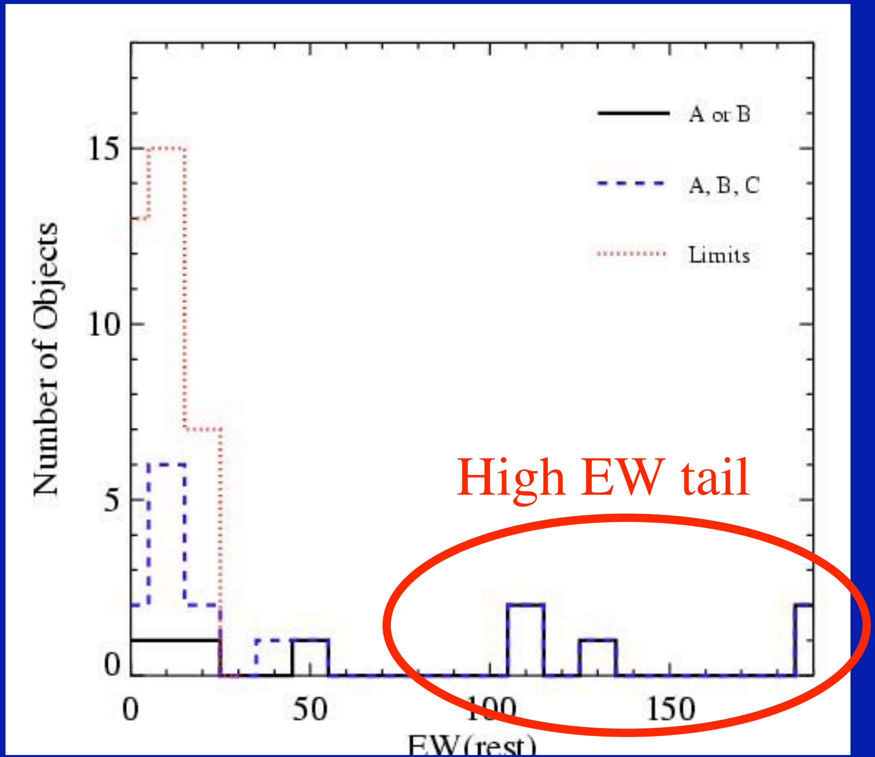
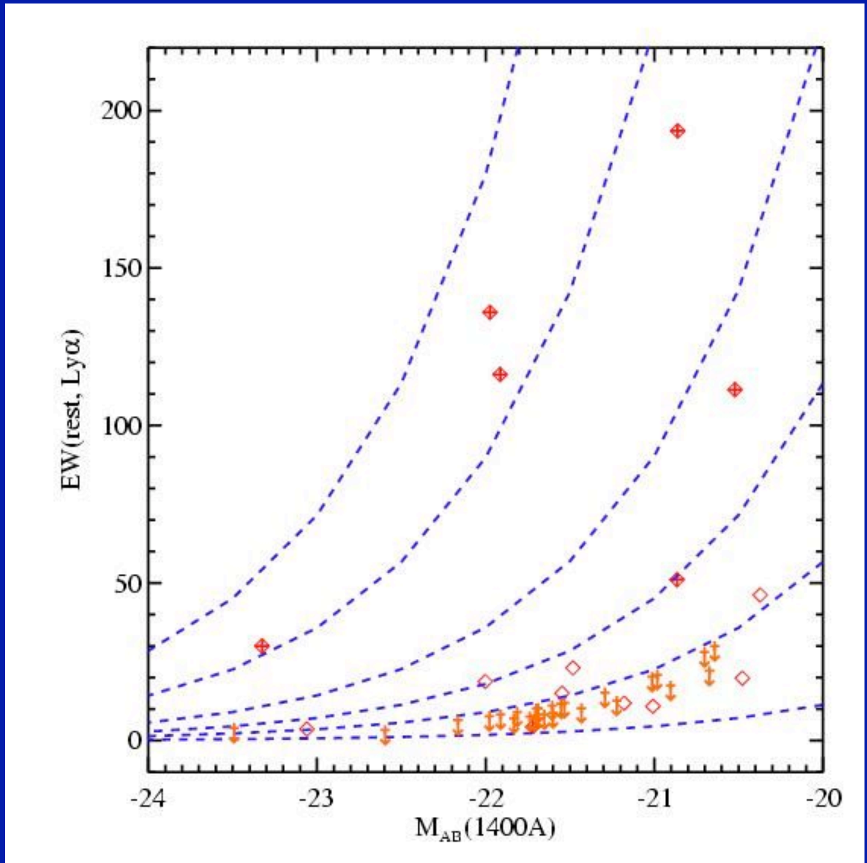
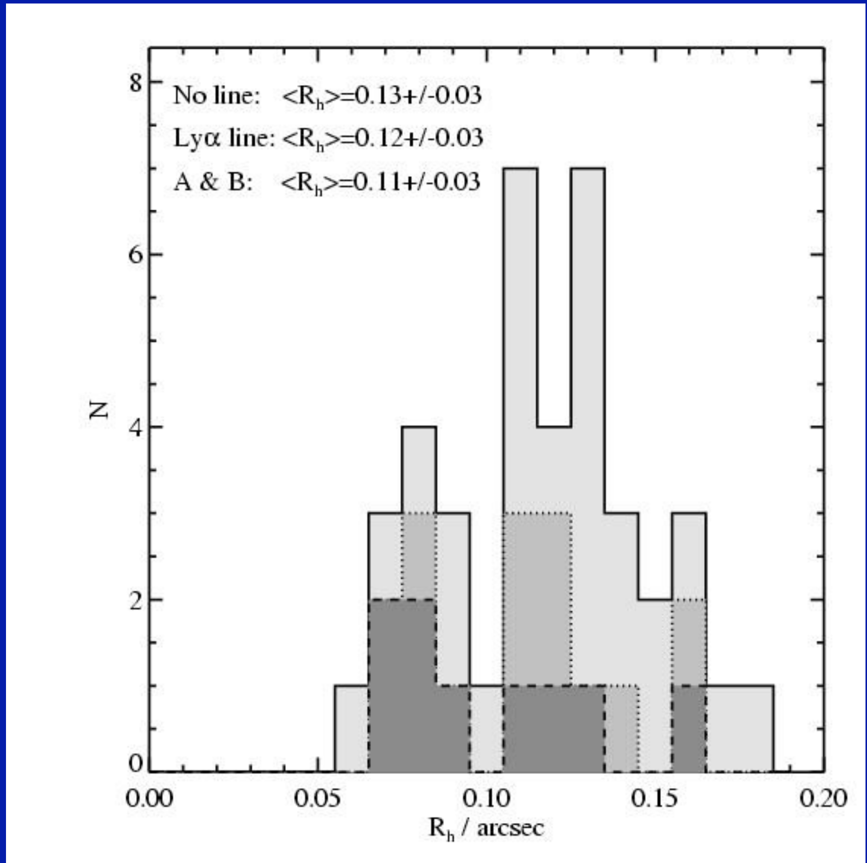




z=6 LBGs in a Cosmological Context





We see galaxies with large EW at both bright and faint magnitudes => top heavy IMF? Metallicity evolution? Age evolution?

We see no evidence for a difference in size between emitters and non-emitters, BUT have small number statistics

Conclusions

• Spectroscopy of LBGs at z=6 has benefited from enormous investment of telescope time in recent years

• The sample of confirmed galaxies is nevertheless small compared with those at z=5 and below

• But the EW distribution is quantifiably different to that at lower redshifts (with a high EW tail).

• This sample is HUDF dominated and therefore

a) intrinsically fainter and b) slightly more distant

$\Rightarrow$LBGs at z=6 are younger sources?