QSO host galaxies with HST across cosmic time: Young stars from GEMS and COSMOS

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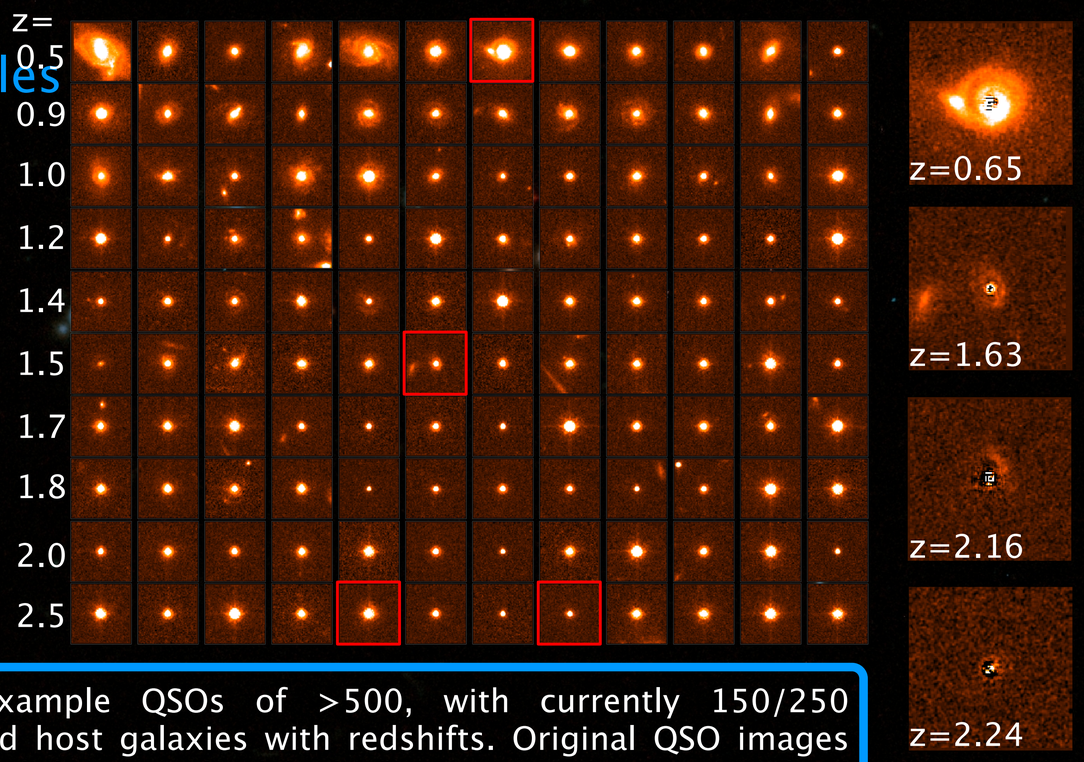
0 summary

We investigate >150 QSO host galaxies out to z=2.8, resolved with the HST – the largest sample ever, coming from a combination of the GEMS and COSMOS surveys. We find a range of stellar ages, from intermediately old to very young, across cosmic time. Interaction might be causing the youngest cases and could be driving AGN activity at the luminous end. Radio-loud QSO host galaxies are at the luminous end of the distribution, but similarly luminous radio-quiet QSO hosts exist as well.

1 data

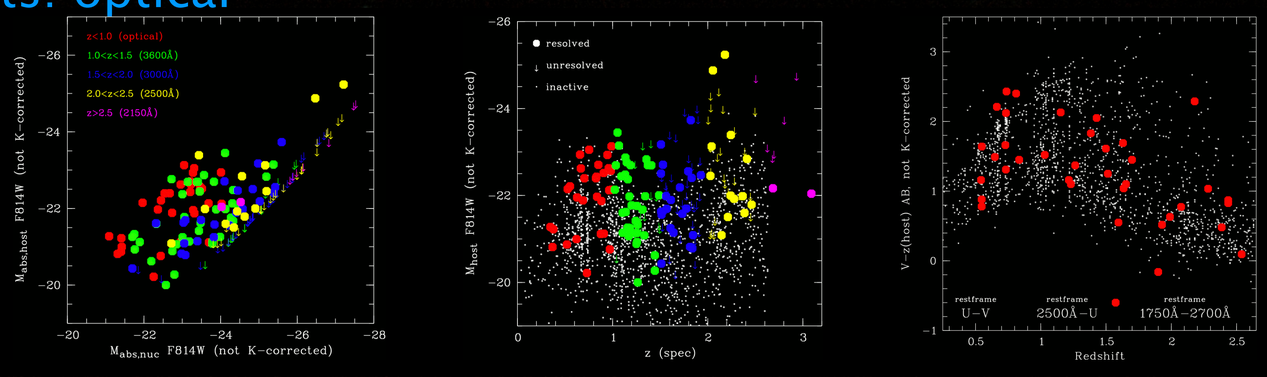
As part of a team effort we are studying the optical properties of all QSO host galaxies in the GEMS and COSMOS surveys, observed with HST/ACS (Rix et al. 2004, Scoville et al. 2007). Current sample size of type 1 QSOs with redshifts is ~80 from GEMS and 170 for COSMOS, increasing in the near future to >500 for the latter. We add radio information from the VLA-COSMOS survey (Schinnerer et al. 2007). Here we only present optical luminosities and colours, as well as radio properties of the QSO. Analysis of BH mass, environment, structure, merger incidence, star formation rates, etc., are in progress.

2 examples



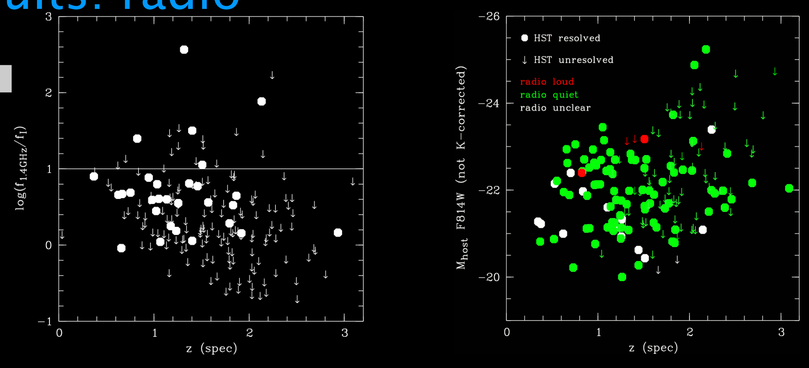
120 example QSOs of >500, with currently 150/250 resolved host galaxies with redshifts. Original QSO images (top) and three resolved (right from top) and one unresolved host galaxy (bottom right) after nucleus removal. Corresponding original images have red frame.

3 results: optical



COSMOS offers the single HST F814W I-band, GEMS the F606W V- and F850LP z-band. Without applying uncertain K-corrections, we sample different rest-frame wavelengths as a function of redshift. Left: Nucleus vs. host galaxy luminosities. The Bulge-mass to BH-mass relation defines a mass envelope, and in luminosity we sample a modification by mass-to-light ratio and specific accretion rate (Eddington ratio). Center: Host luminosities as f(redshift). When comparing the QSO host galaxies (COSMOS, coloured points) to the inactive galaxy population (white dots) host galaxies span a large range. When sampling the UV rest-frame beyond z=1 this translates to a large range in stellar population ages. QSO host galaxies can be among the strongest star-formers. Right: Host colour as f(redshift). This result is strengthened by host colours from GEMS. The youngest stellar ages occur in distorted host galaxies (Jahnke et al. 2004, Sánchez et al. 2004)

4 results: radio



As expected, about ~10% of the QSOs in COSMOS are radio-loud (left). The radio-loud host galaxies (right, red symbols) are predominantly very luminous at all times, even when sampling the UV. However, they are not more luminous than all of their radio-quiet counterparts (green), but there exist a substantial number of equally luminous radio-quiet hosts. At the optically luminous end radio-loud type 1 QSOs do not occur in a random subsample of AGN, but do also not form a disjoint class.

5 references

- Jahnke et al. 2004, ApJ, 614, 568
- Rix et al. 2004, ApJS, 152, 163
- Sánchez et al. 2004, ApJ, 614, 586
- Schinnerer et al. ApJS, COSMOS Special Issue 09/2007, astro-ph/0612314
- Scoville et al. ApJS, COSMOS Special Issue 00/2007, astro-ph/0612305

acknowledgements

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