AGN Science Collaboration
Photo-z Working Group Update

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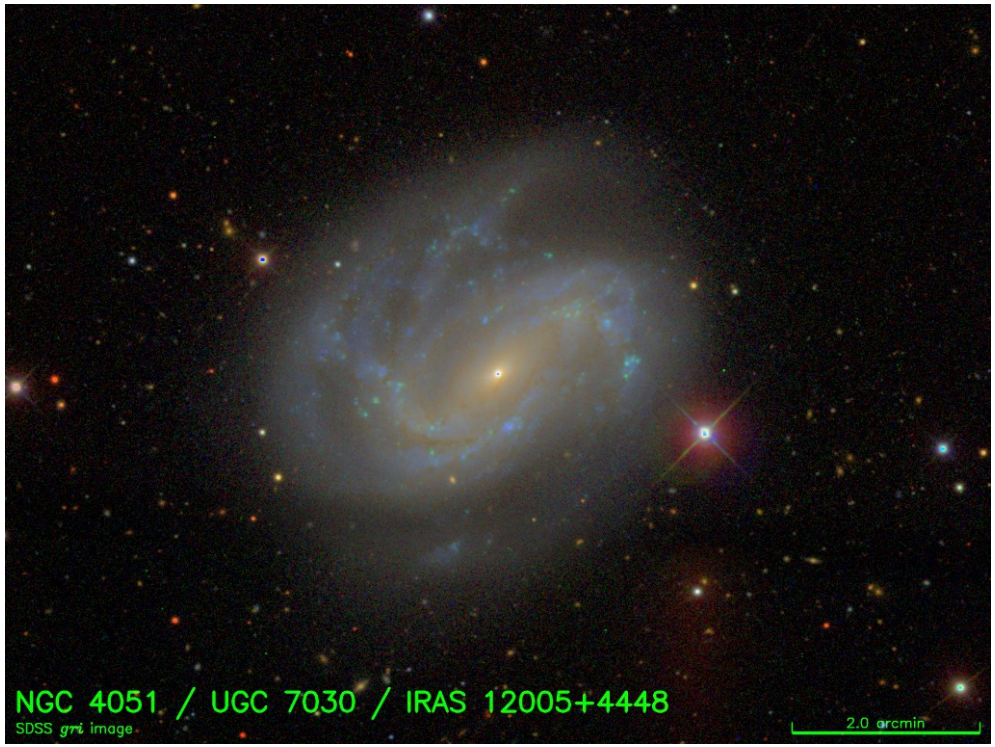
Context

- Many galaxies contain an active nucleus which contributes light and skews the galaxy colors.
- AGN contributions need to be taken into account if you want accurate photometric redshifts.
- These contributions have been modeled in the galaxy simulations with “mixed” results.

AGN dilution by Host Galaxy

- Optical color selection of AGN is:
- bias against AGN in star forming galaxies
- bias against low Eddington ratios



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- Selection bias can be partially overcome by:
- variability (at least with nearby objects)
- X-rays (not as deep as LSST)

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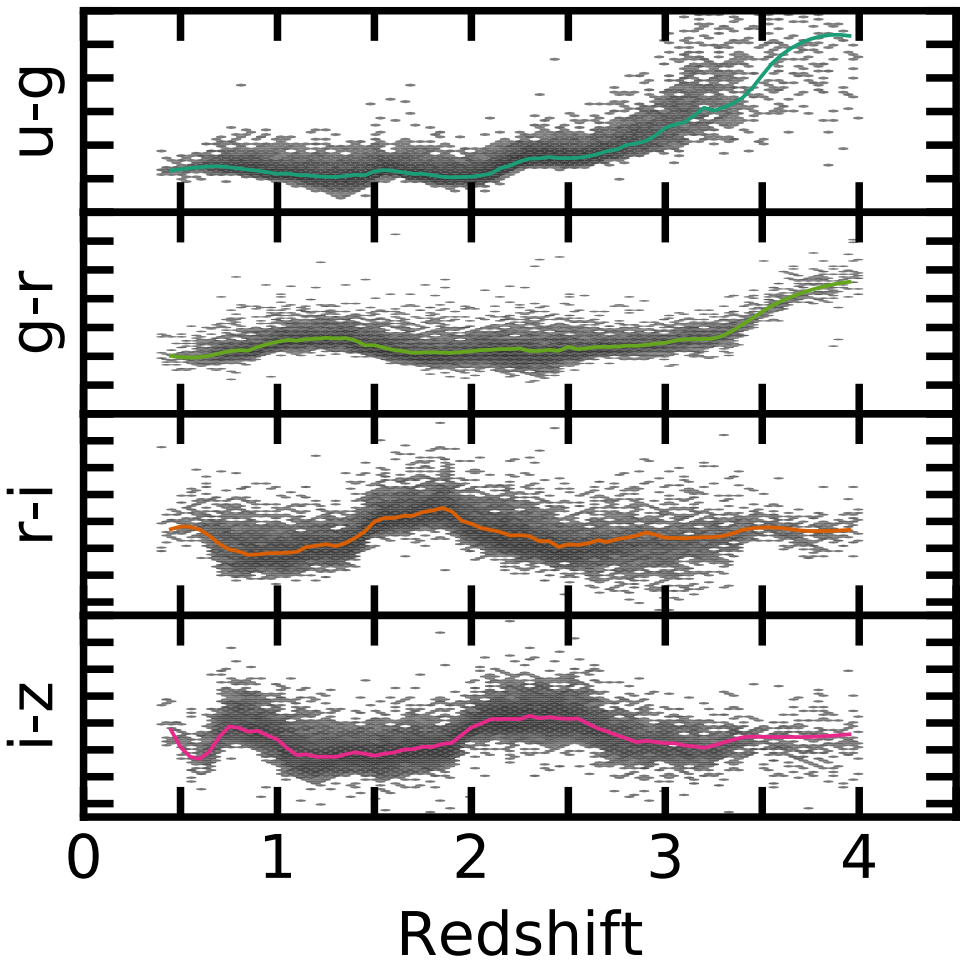
- LSST photometry / depth makes this problem more challenging than previous optical surveys.

Quasar Photometric Redshifts

- Empirical methods work best for luminous quasars that dominate wide, shallow surveys.
- Measure the distance from the median color at all redshifts.
- Normalize to get a p(z).



Median SDSS colors

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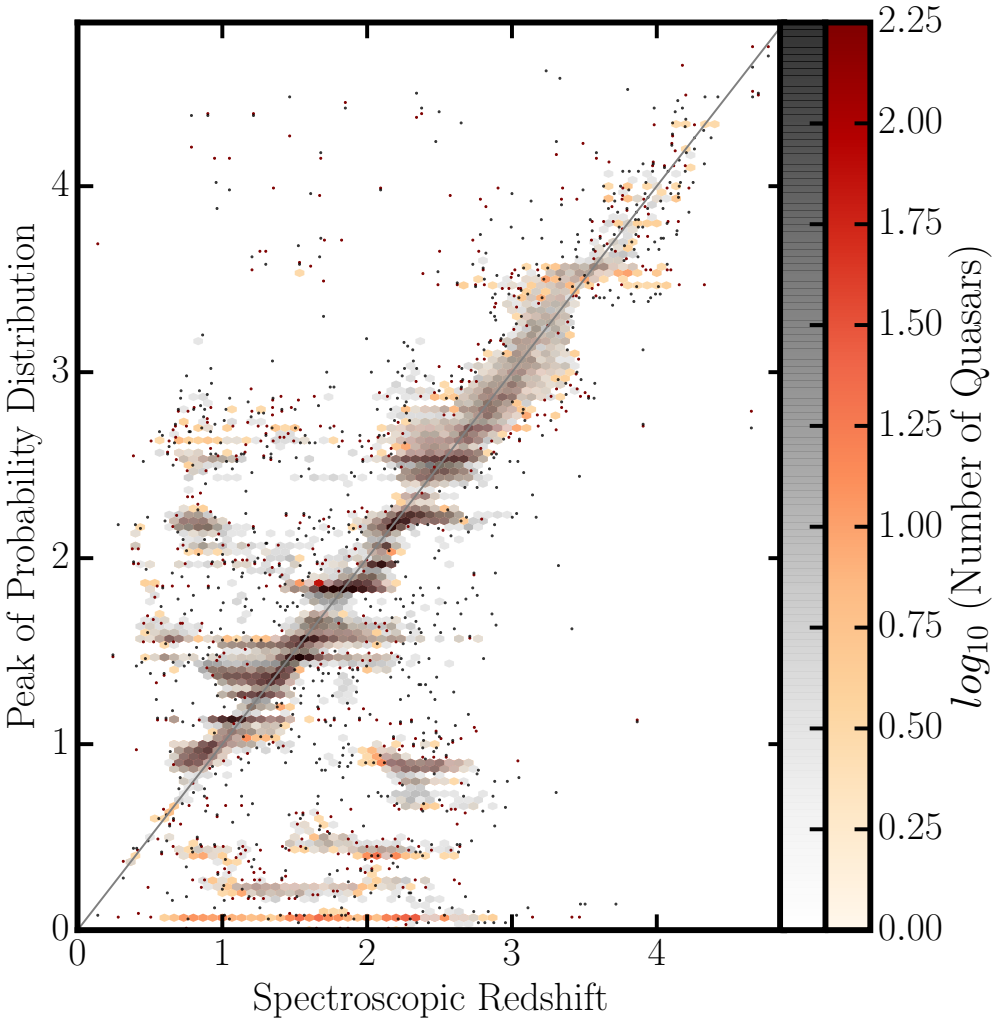
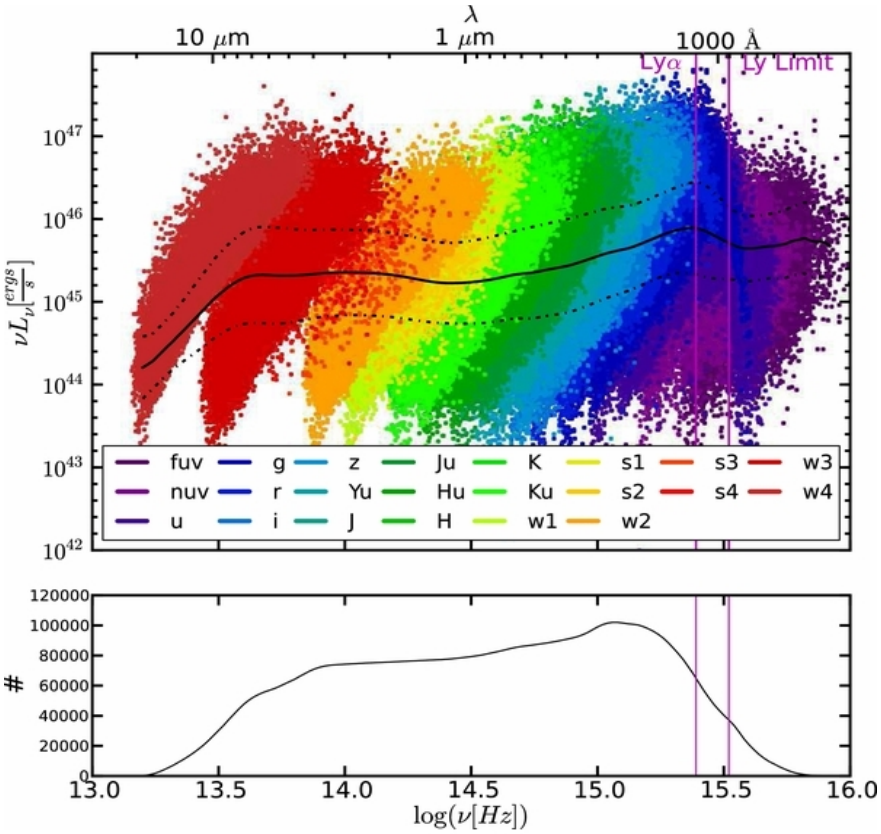


p(z) using SDSS colors

Quasar SEDs

- SED shape is influenced by:
  - Accretion rate
  - Dust covering fraction
  - Disc winds
  - Blackhole mass
- A single AGN template is not sufficient.
- Finding the best fit is hard with only optical photometry. (x-ray, radio, IR can help)



Mean Quasar SED
Krawczyk et al. 2013

Summary

- Photons from AGN should be a concern when doing galaxy photozs.
- Photons from host galaxies should be a concern when doing AGN photozs.
- Empirical methods best for luminous quasars that dominate wide, shallow surveys.
- Template methods best for AGNs that dominate deep, narrow surveys.
- LSST is both wide and deep and its "sweet spot" will be AGNs in the middle and will need hybrid approaches for photoz.

Summary

- Further work needed on:
  - Testing possible AGN SEDs in templates.
  - Understanding the effects of contaminant light in photozs: what systematics will this introduce?
  - Calculate AGN photozs based on difference images to remove galaxy.
  - Improvement in AGN photozs from incorporating DCR effect data.

LSST AGN Science Collaboration

More info: agn.science.lsst.org

First meeting was at AAS meeting January 2017. (Slides are here: agn.science.lsst.org/meetings)

Currently developing a roadmap - so continued discussion between the two groups is more than welcome.

AGN SC Photoz WG is being organized.