A Spectral Analysis of Red and Blue Quasars and Their Effect on Galactic Evolution

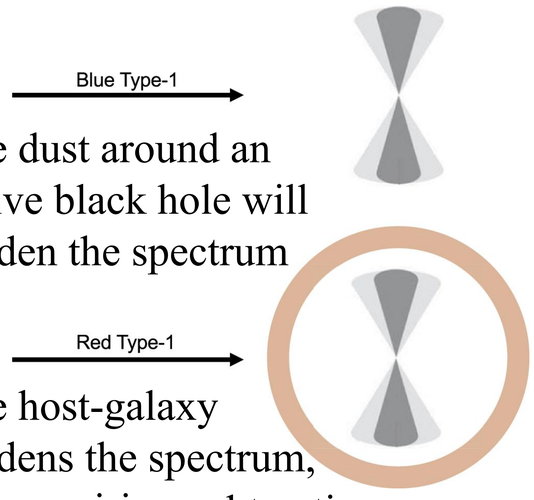
Rachel Langgin (she/her) rachellanggin@gmail.com

Advisors: Eilat Glikman and Karen Masters

HAVERFORD COLLEGE

Middlebury College

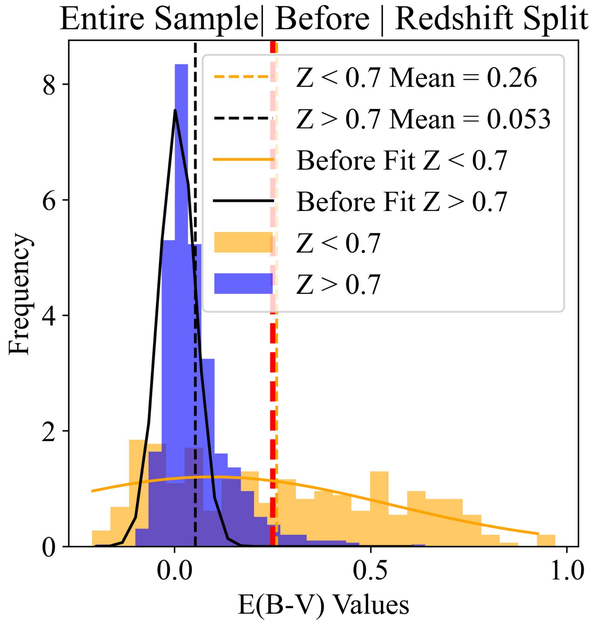
Dust Extinction



The dust around an active black hole will redden the spectrum

The host-galaxy reddens the spectrum, too, requiring subtraction

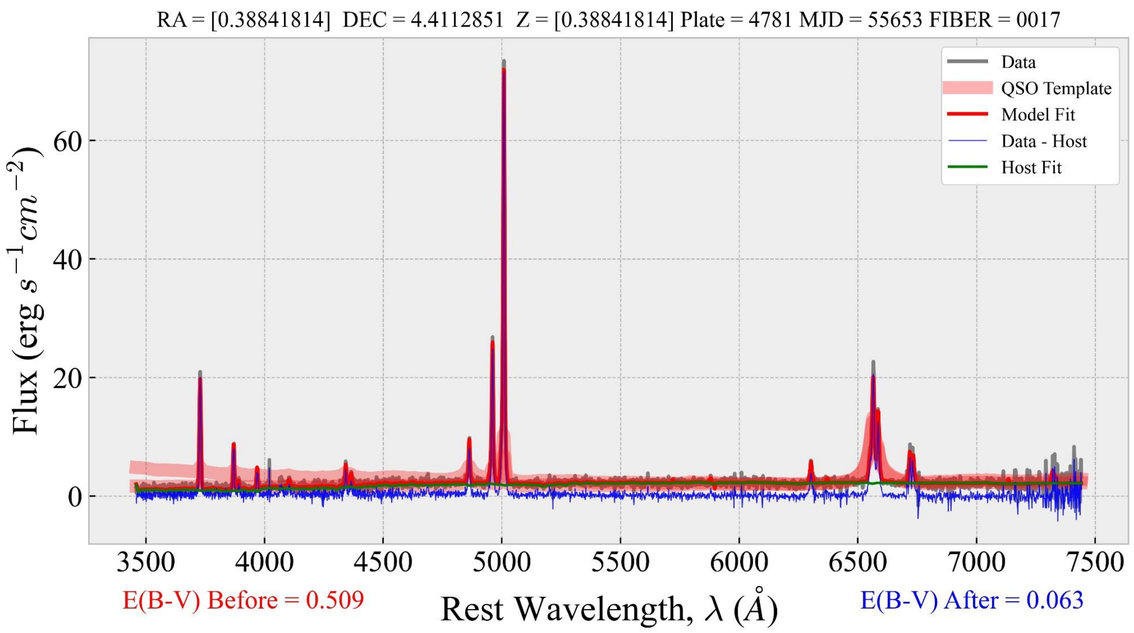
Entire Sample| Before | Redshift Split



Modeling

- ★ We measured the characteristics of a radio, infrared, near-infrared, and optically selected sample of QSOs that serve as the comparison sample to a dust reddened type of these AGN found in the same region
- ★ We use BADASS to complete a full spectroscopic analysis
- ★ We compute dust extinction, E(B-V), to quantify reddening

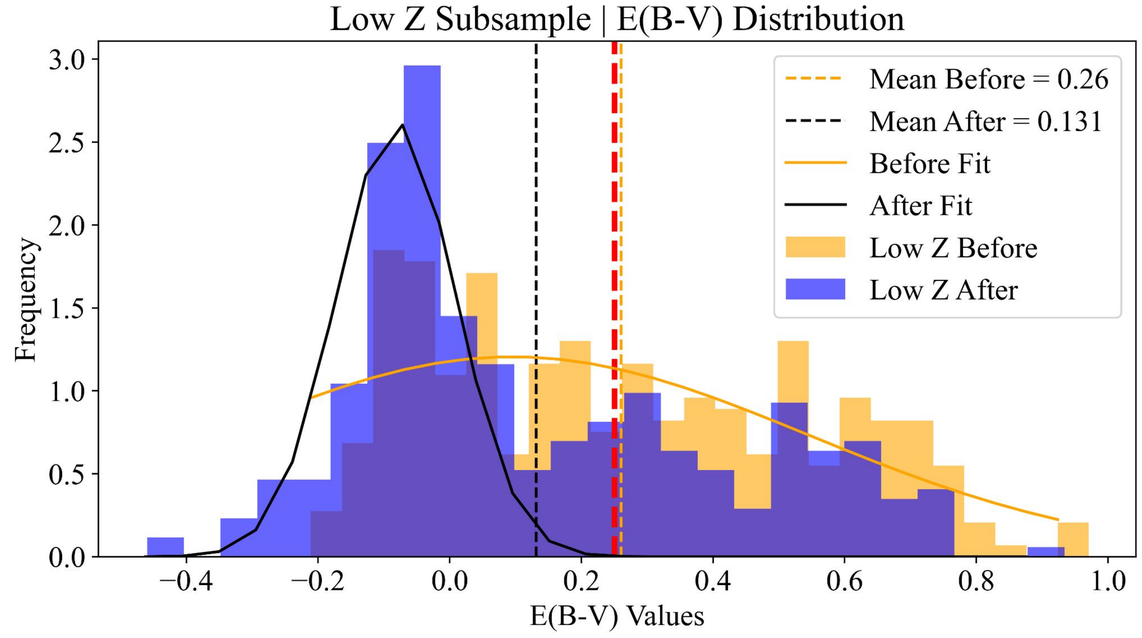
Host-Galaxy Subtraction



We follow Section 2.3 from Glikman et al. 2022 and subtract the host-galaxy's fit from the model fit to remove the host galaxy's emission from the low redshift spectra. E(B - V) is derived to both the SDSS data and the removed host galaxy data fit. This leaves behind the sought-after unobscured blue QSO. The host-galaxy spectrum in high-redshift sources is negligible.

Subtracting host galaxy light from Active Galactic Nuclei (AGN) spectra dereddens 68% of the low-redshift (z < 0.7) population

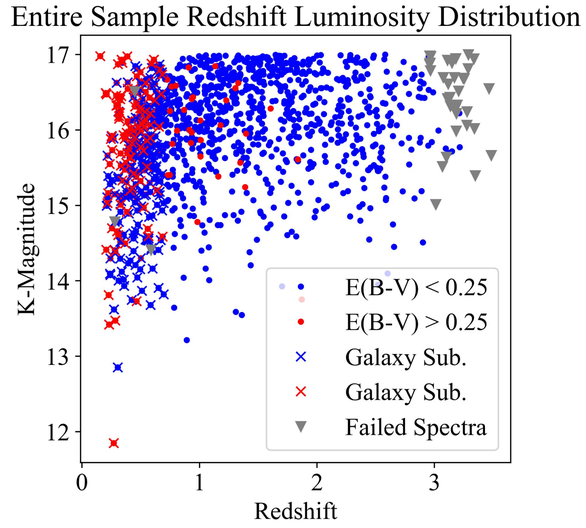
Low Z Subsample | E(B-V) Distribution



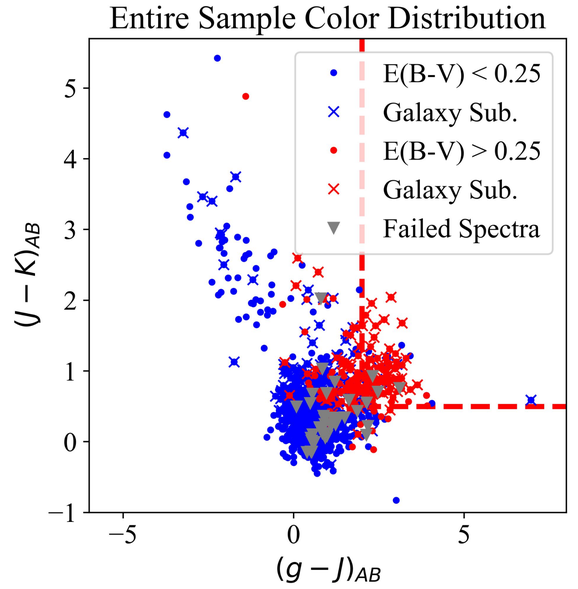
Quasar Evolution

- ★ There is a scarcity of red QSOs at high redshifts (z > 1.0), 2% or 15 sources, pointing to an evolutionary explanation

Entire Sample Redshift Luminosity Distribution



Entire Sample Color Distribution



Conclusion

- ★ We find, for z < 0.7 after host-galaxy subtraction, the fraction of red quasars is 32%
- ★ This radio-dependent selection method may bias the population to be redder after host-galaxy subtraction as dusty AGN driven winds obscure radio-loud QSOs