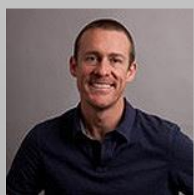
STUDIES ON THE SPECTRAL VARIATION OF QUASARS WITH MULTI-EPOCH ANALYSES



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Quasars are supermassive black holes known to drive galaxy formation. They can have masses up to 10^9 solar masses and are the most luminous known objects in the sky, making them very important trackers of cosmic evolution. Given the large amount of research already surrounding quasar astrophysics, there still remains a great deal of uncertainty in the modeling of spectra, origins of diversity, and spectroscopic signature of variability. Much of this uncertainty is associated with technical challenges in decoupling the effects of separate physical parameters, namely luminosity, mass accretion rate, black hole mass, and orientation. This research uses multiple epochs of observed spectra of single quasars to explore spectral variation of quasars with respect to luminosity (and thus the mass accretion rate) at a fixed redshift, orientation, and black hole mass.

Using approximately ~50 epochs of 328 different quasars from the Sloan Digital Sky Survey Reverberation Mapping Project, we generate a high signal-to-noise composite differential spectrum to represent the partial derivative of flux with respect to luminosity averaged over the full sample.

The well-known anti-correlation between equivalent width of emission lines and luminosity is confirmed, but results unveil a surprising intrinsic flux relationship with spectral index that does not exist across the global population.

A more thorough description and interpretation of this research can be found in the University of Utah Honors College's compilation of 2017 graduates' theses. Jamie Dyer is currently collaborating with Kyle Dawson and others associated with the Sloan Digital Sky Survey Quasar Science Working Group to turn this research into a journal article, with a goal for publication by the end of 2017.