1. Introduction
   1. Short term variability in UV-IR could be driven by X-ray flux refraction
      1. Larger time scales don’t work out this way, so some variability in the accretion disk is necessary
   2. How do physical properties (black hole mass, Eddington ratio, luminosity, connect to variability properties (characteristic time-scale, variability amplitude)?
      1. Could use this to derive physical properties for large samples of objects in the future with minimal data
   3. Luminosity correlates with UV variability amplitude
   4. Black hole mass might or might not correlate with variability amplitude – this must be tested
      1. Small samples of quasars show a correlation
      2. Some studies found no correlation
      3. Others found a weak correlation
   5. Ensemble analysis found that amplitude of variability correlates:
      1. Positively tor redshift
      2. Negatively with bolometric luminosity
      3. Negatively with rest-frame wavelength
      4. Negatively with Eddington ratio
   6. Seems like we might want to use SDSS data to derive luminosity and mass
      1. You can use SDSS data to estimate black hole mass <https://arxiv.org/pdf/1603.03437.pdf>
         1. This paper is what they used to do spectral fitting
         2. Referred to as MR16
2. Optical imaging/spectroscopic analysis
   1. Spectra are taken from SDSS and corrected by galactic extinction <https://ui.adsabs.harvard.edu/abs/1989ApJ...345..245C/abstract>
3. Variability Analysis/Features
   1. Based off of earlier work by Sanchez <https://arxiv.org/pdf/1710.01306.pdf>
   2. Features:
      1. Pvar – probability that a source is intrinsically variable, based off chi-square test
      2. Intrinsic variability amplitude / σrms
      3. Source is variable if Pvar > 0.95 and σrms – err(σrms) > 0
   3. Damped random walk process
4. Obtaining physical properties from SDSS spectra
5. Sub-samples used in analysis
6. Statistical analysis results to connect variability and physical properties
7. Differences in the AGN zoo
8. Implications and overarching results