Continuum Lag Investigation of Diverse Quasar Populations, and Contextualization Of The Accretion-Disk Size Problem

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ABSTRACT

The majority of supermassive black hole (SMBH) growth occurs during active periods of mass accretion, at which time these active galactic nuclei (AGN) emits as the most luminous persistent source of radiation in our universe, affecting the growth of the host galaxy through jets and outflows. While AGN growth and emission are governed by accretion, our understanding of accretion-disk structure and emission profile is incomplete. Intensive echo-mapping observations over the last decade have produced conflicting disk sizes with our primary model for understanding accretion-disk size and structure presented in Shakura & Sunyaev (1973, SS73). The SS73 model is supposed to describe accretion-disks of any mass, from stellar to supermassive, and as it doesn't account for well defined quasar properties such as variability, we need to more closely examine accretion processes to produce a new model. The work investigates this accretion-disk size problem a very broad and holistic population of quasars. I intensively explored the g to i lags and properties of the Homayouni et al. (2019) 95 quasar survey, finding a statistical lack of evidence of diffuse BLR contamination, and continuum lags which anti-correlate with luminosity. Additionally, I present 17 diverse quasars with $griz$ lags monitored each over 100 days on a ~ 0.7 day cadence. Their smaller than expected continuum lags contrast with the larger disks of previous works, though possess a similar scatter from the SS73 expectation other large surveys. These results are all presented and discussed in the context of the ever growing hypotheses which pose to solve the accretion-disk size problem, providing insight on where this field will need to look over the next decade.