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Multiwavelength Luminosity Correlations in Quasars and Their Potential as Standard Candles

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Quasars are among the most luminous and distant sources in the Universe, offering great potential as standard candles for cosmology. However, the diversity in their spectral energy distributions (SEDs) and the dependence of luminosity on physical parameters introduce significant challenges. In this work, we present a statistical analysis of quasar luminosities across multiple spectral bands, from optical to X-rays, aimed at identifying robust correlations and scaling relations that could serve as distance indicators. Using a compiled dataset with well-defined redshifts and multiwavelength fluxes, we test the stability of these relations and their dependence on intrinsic and environmental factors. Preliminary results suggest that certain luminosity ratios display low dispersion and may provide a viable path toward standardization. This analysis contributes to the broader effort of establishing quasars as complementary cosmological probes beyond Type Ia supernovae.

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