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TRACING SUPER MASSIVE BLACK HOLE CANDIDATES VIA THE MAIN SEQUENCE OF QUASARS

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The Main Sequence (MS) of quasars, characterized by well-defined correlations among emission line properties, Eddington ratios, and spectral features, offers a robust framework for identifying outliers that may harbor supermassive binary black holes (SMBBHs). In this study, we explore the use of quasar MS diagnostics, particularly deviations in line shifts, widths, and ionization indicators, as potential signatures of binary systems embedded in active galactic nuclei (AGN). SMBBHs can perturb the dynamics of the broad-line region (BLR). Ultimately, this method can refine our understanding of BLR structure in complex AGN systems and provide a pre-selection strategy for follow-up observations and gravitational wave precursor studies. Although SMBBHs are widely predicted as natural outcomes of galaxy mergers and play a crucial role in galaxy evolution, gravitational wave generation, and accretion physics, electromagnetic observational confirmation remains challenging. To date, only a limited number of robust candidates have been identified. In this work, we present effective observational strategies and key astrophysical environments conducive to the detection of SMBBHs, with a particular emphasis on diagnostic features in broad Balmer emission lines. We also introduce an initial analysis of a flux-limited sample of quasars exhibiting evolved spectral properties within the quasar main sequence, focusing on sources belonging to the B1 population, where SMBBH related signatures may be more prominent or dynamically amplified.