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Identification of White Dwarf–Main Sequence Binary Candidates Using GALEX and Gaia Photometric Data

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Abstract

White dwarf–main sequence (WD–MS) binaries provide important constraints on stellar and binary evolution. In this work, we present a photometric approach to identify WD–MS binary candidates using ultraviolet data from GALEX GR6+7 and optical data from Gaia DR3. We apply color–magnitude and color–color selection methods to isolate sources with ultraviolet excess, which typically indicates the presence of a hot white dwarf companion. The selected candidates are cross-matched with additional photometric catalogs including 2MASS, WISE, APASS, and Pan-STARRS to construct broad-band spectral energy distributions (SEDs). Using the VOSA tool, we perform SED fitting to derive basic stellar parameters and confirm the composite nature of these systems. This study demonstrates the potential of multi-band photometry in identifying and characterizing unresolved binary systems relevant to compact object populations and transient source progenitors.