**Title :** Misclassified Low-Mass Stars: How Many Are Mistaken for High-Redshift Galaxies?

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## ABSTRACT

The identification of high-redshift galaxies in extragalactic surveys is often complicated by contamination from ultra-cool dwarfs (UCDs), including M-type, L-type, and T-type stars. In this study, we examine UCD contamination in high-redshift galaxy candidates. Specifically, we simulated UCDs from Aganze et al. (2002a), which are based on the Hubble Legacy Fields (HLF) catalog and the 3D-HST catalog, according to the signal-to-noise ratios of the SuperBoRG extragalactic survey data. We then analyzed how these simulated UCDs can be classified as high-redshift galaxies when selected with color-color selection techniques and the EAZY photometric redshift selection technique, including how the number of contaminants changes with brightness, and how different UCD types contribute to contamination. We found that the contamination primarily depends on the initial distribution of the UCDs relative to the selection criteria in the color-color selection diagram. M-type stars, which dominate our UCD samples, are found to significantly influence overall contamination. The Bayesian Information Criterion (BIC) effectively minimizes contamination when comparing the goodness of fit between high-redshift and stellar templates. The misclassification rates remain close to zero at all magnitudes. However, when Chi-square values are used instead to evaluate the goodness of fit, the misclassification rates range from 25-75%. These discrepancies are attributed to differences in the number of filters and survey fields, highlighting the impact of dataset characteristics on selection efficiency. Future

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work will focus on refining contamination estimates by quantifying contamination as a function of galactic coordinate (l and b) or sky position in Right Ascension (RA) and Declination (DEC), expanding the UCD sample using synthetic low-mass star catalogs and further investigating statistical differences between surveys beyond SuperBoRG. These insights are expected to improve the accuracy of high-redshift galaxy classification and high-redshift luminosity functions, enhancing the reliability of future extragalactic studies.

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