

# Beyond UVJ: Color Selection of Galaxies at $z > 3$

DC

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We calibrate and validate different methods of rest-frame color-color selection to identify galaxies in active star-forming and quiescent stages of their evolution. Our method is similar to the widely-used UVJ color-color diagram, which is an effective way to distinguish between quiescent and star-forming galaxies using their rest-frame U-V and V-J colors. UVJ colors suffer known systematics, and at  $z > 4$  the method must be extrapolated because the rest-frame J-band moves beyond the coverage of the deepest bandpasses (typically IRAC 4.5  $\mu\text{m}$ ). This leads to biases: for example, spectroscopic campaigns have shown that UVJ-quiescent samples include ~10-30% contamination from galaxies with significant amounts of star formation. Alternative selection methods will be important not just to mitigate these biases, but also in the JWST era where NIRCam coverage is also limited to ~5  $\mu\text{m}$ . In this poster, we present calibrations of alternative rest-frame filter combinations that are applicable for galaxies at redshifts  $z = 4 - 6$ . We apply our method to a stellar mass-limited sample of galaxies at  $4 < z < 6$  from the FLAMINGOS-2 Extragalactic Near-Infrared K-Split (FENIKS) survey. FENIKS is a deep (23.1 - 24.5 AB mag) survey employing two novel filters which split the Ks band ( $\lambda_c = 2.2 \mu\text{m}$ ) K-blue and K-red filters ( $\lambda_c = 1.9$  and  $2.3 \mu\text{m}$ , respectively), allowing for finer sampling of the Balmer/4000  $\text{\AA}$  break of galaxies with evolved populations. We quantify the improvement in the selection of quiescent and star-forming galaxies using the alternative color-color selection methods. Furthermore, we investigate correlations between galaxy properties and their rest-frame colors, in particular examining purity and completeness of these selection methods. Finally, we explore the above for a wide range of synthetic filter combinations to inform accurate selections of various galaxy populations and rule out unphysical areas of parameter space for these populations.

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