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Making a Difference (Image): Transforming Euclid into a Transient Discovery Machine Through Cross-Observatory Synergies

Monday, 9 February 2026 16:00 (20 minutes)

Detecting transients requires repeated imaging of the same region of the sky to search for the presence of a new object in the resulting “difference image”. With the exception of the Euclid Deep Survey (EDS), there is no planned repeated Euclid imaging. As a result, transient searches will not be feasible in the Euclid Wide Survey (EWS), and the same could true of the Roman High Latitude Wide Area Survey (depending on final implementation details). In the foreseeable future, therefore, the widest IR surveys with sufficient depth to detect rare high-z objects (mAB >= 24 in the near-IR) will be the EDS and Roman High Latitude Time Domain Survey, combining for <= 100 degˆ2. While transformative, a larger area is needed to detect the rarest transient phenomena in the Universe. To address this, our program seeks to leverage the EWS to unlock access to rare and powerful high-z transients including pair-instability and Population III SNe, by creating a cross-telescope transient detection pipeline. This will result in the deepest and widest multi-epoch near-IR imaging expected for the foreseeable future, and paves the way to unlocking the potential of a massive Roman–Euclid transient survey that is uniquely sensitive to rare high-z SNe.

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