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Euclid Spectroscopic Image Simulations and Reconstruction

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Euclid is a European Space Agency (ESA) mission, designed to investigate the nature of Dark Energy and Dark Matter. It will measure the position and the redshift of billions of galaxies to map the dark matter distribution with unprecedented accuracy. The satellite launch will take place in summer 2023 and the data taking will last for six years covering one-third of the entire sky. Euclid data will strongly constrain cosmological parameters, including the sum of the neutrino masses.

To attain the desired level of precision in parameter estimation, meticulous management of systematic effects is indispensable. These effects have both hardware and astrophysical origins: the former includes detector nonidealities and telescope response; the latter includes cosmic rays, background light, and signal contamination from different sources.

In order to quantify the efficiency in the redshift reconstruction, we have developed the Spectroscopic Pipeline Runner and INput Generator (SPRING) which runs pixel-level simulations and performs the data processing through Euclid spectroscopic pipeline. SPRING is a runner of Euclid official codes suitable for quantifying systematics. It allows us to simulate both realistic images of the sky and non-astrophysical sources to properly evaluate instrumental effects.

Thus, SPRING is a key tool to evaluate the purity and efficiency in the redshift evaluation which has consequences on the matter power spectrum and in the estimation of the total neutrino mass.

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