

Abstract

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“YOLO-CL : Deep Machine Learning for Galaxy Cluster detection with LSST”

Galaxy clusters are powerful and key cosmological probes that trace the evolution of large-scale structures of the universe and inform models of cosmic evolution. The Vera Rubin Legacy Survey of Space and Time (LSST) will provide deep, wide-field optical imaging, enabling the detection of thousands of galaxy clusters up to high redshifts. I am adapting the YOLO-CL convolutional neural network to detect galaxy clusters directly from LSST survey images. YOLO-CL has demonstrated high completeness and purity in both the SDSS and Rubin/LSST DC2 simulated images of individual clusters, outperforming traditional detection methods based on photometric catalogs. Future work will involve optimizing the model's performance under survey-like conditions and ensuring robust cluster selection functions across redshift and mass ranges. This effort aims to contribute a scalable, high-fidelity cluster detection pipeline for next-generation cosmological analyses.