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AGILE: an empirical simulation pipeline to provide realistic LSST catalog-level data including AGN, galaxies and stars

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Realistic photometric catalogs including AGN, galaxies and stars are essential tools in assessing the performance and systematics of a large-scale survey such as LSST. Up to now the DP0 database is massively used as training sample to forecast future LSST observations, but does not include a realistic population of AGN.

I will present AGILE (AGN In the LSST Era), a large-scale empirical LSST end-to-end simulation pipeline we have developed as one of the INAF Italian in-kind contributions. The goal is to provide a mass-complete, large-scale realistic LSST photometric catalog including galaxies, stars and AGN up to high redshift (z ~ 5), low stellar mass (logM/Msun ~9) and down to a magnitude limit of r < 30, ~1.5mag deeper than what is expected from COSMOS DDF 10 years co-added images.

The pipeline consists of the creation of the underlying truth catalog, the image simulation and the photometric extraction. In detail, the truth catalog has been created by starting with a population of galaxies equipped with realistic distribution in redshifts, stellar masses, star-formation rates, spectral energy distributions and morphologies. The galaxies are then populated with X-ray AGN according to the most up-to-date measurements of the AGN distribution functions and to each AGN we assigned optical AGN SEDs and lightcurves based on observationally motivated models. The truth catalog generated in this way is then fed to the image simulation pipeline taking into account the observational conditions as well as the cadence of the LSST survey, and the generated single-epoch images are analyzed using the official LSST Science Pipelines in order to create realistic photometric catalogs of AGN, galaxies and stars.

The simulated images and the extracted photometric catalogs, together with the documentations, will be released to the LSST community as part of the INAF in-kind contribution.

Funding request, please specify

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