



Performance simulations tools for Space Telescopes applied to Ariel space mission.

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Since the very early phases of designing and developing space instruments, we need fast and reliable tools to validate and optimise the projects. In the framework of the Ariel Space Mission, we developed novel, versatile tools to estimate space instruments performance.

ExoSim, a transiting exoplanet observation simulator, is a time domain simulator for space telescopes, that has been developed inside the Ariel framework, but already adapted to both HST and JWST, proving its versatility and its capability to accurately predict science products. It can be used to develop the data reduction pipeline, and to optimise systematics removal techniques.

ArielRad, the Ariel radiometric model, is a simulator able to accurately predict the telescope performance in observing a candidate target for all the mission photometric and spectroscopic channels. The software inputs are a target description and a parameterization of the payload, allowing the investigation of different design performance. The software is also able to simulate entire target lists, predicting the observing time and the resulting SNR vs wavelength. Analysing 1000 candidate targets in a 20 minutes time scale, it allows the validation of different observational strategies. The software architecture is based on ExoRad 2, that is publicly available and can be easily adapted to perform the same tasks for other future space missions.