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Deep learning for slit-less Spectroscopic Redshift survey Simulator (DISPERS)

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Since the discovery of the acceleration of the expansion of the Universe, the concordence model describes the Universe as spatially flat curvature with about 5 % of baryonic matter, 26 % of cold dark matter and 68 % of Dark Energy. However, understanding the nature of both, the dark matter and dark energy components remains unknown this puzzle is one of the greatest challenges in contemporary physics. The forthcoming massive wide and deep galaxy surveys which are designed to map the observable Universe in large redshift range will put stringent constraints on theories that describe dark energy, dark matter, as well as modified general relativity.
In order to prepare those future mission as well as to validate pipelines, from the data reduction to the cosmological analyses, simulations of realistic sky images are of fundamental importance. However, to fullfill their purposes, massive number of sky images need to be simulated under different conditions (different instrument parameters, different cosmologies), consuming a massive amount of computation power, difficult to achieve on reasonable timescale.
Our proposal aims at taking advantage of the latest machine learning technics to develop a sky image simulator relying on physical and realistic instrument response. Indeed, the uses of machine learning methods could greatly enhance computing capability without loosing on precision. It also bring the possibility for recurrent approaches that may improve instrument calibration and subsequently cosmological parameters inference. This project focus on simulation of sky images of slit-less spectroscopy observation for the NISP instrument of the future Euclid space mission. However it is an innovative project that could bring new way to simulate galaxy redshift survey as, to our knowledge, the uses of machine learning technics for simulating slit-less spectroscopic dataset has never been done.

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Classification de Session: Wed morning

Classification de thématique: 3 ML for simulation and surrogate model : Application of Machine Learning to simulation or other cases where it is deemed to replace an existing complex model