Title of the internship: Searching for the Unknown – a first look to Rubin alerts in an ever changing sky

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Summary :

After releasing a first few incredible images demonstrating its capability, the Rubin Observatory is scheduled to start its regular survey at the end of the 2025 year. This unprecedented project will repeatedly scan the southern sky in search of everything that changes in the Universe, be it asteroids, stars variability, cosmic explosions, or other extreme phenomena. With its expected 10 million new alerts released every night, Rubin will left behind any other facility in the world. However, finding the objects of interest in this data deluge is a daunting challenge; this is where the Fink broker comes into play. This system will receive, enrich and select the alerts for subsequent analysis.

The main goal of this M2 internship is to use Fink in order to have a first look to Rubin alerts. Employing state of the art machine learning algorithms tuned to anomaly detection, the expected outcome of the internship is two-fold. First, a list of instrumental failure modes will be established, whose aim is to improve data quality. The second expected outcome is a classification of the events that stand out in the data stream, with a particular interest for transients (events that will occur only once, such as supernovae or other explosive events), if possible rare and if luckily yet of an unknown class.

The successful candidate should be proficient with numerical and statistical tools, as well as be fluent in programming and using scientific libraries. A solid background in astrophysics or cosmology is also expected and familiarity with modern coding environment will be a plus. The candidate is also expected to report their work to an international audience as well as the University interdisciplinary working group on Artificial Intelligence. This subject naturally opens up for a possible continuation in PhD.