Contribution ID: **22** Type: **not specified**

Autonomous real-time science-driven follow-up of survey transients

Wednesday, 5 October 2022 17:00 (15 minutes)

Astronomical surveys continue to provide unprecedented insights into the time-variable Universe and will remain the source of groundbreaking discoveries for years to come. However, their data throughput has overwhelmed the ability to manually synthesize alerts for devising and coordinating necessary follow-up with limited resources. The advent of Rubin Observatory, with alert volumes an order of magnitude higher at otherwise sparse cadence, presents an urgent need to overhaul existing human-centered protocols in favor of machine-directed infrastructure for conducting science inference and optimally planning expensive follow-up observations. We present the first implementation of autonomous real-time science-driven follow-up using value iteration to perform sequential experiment design. We demonstrate it for strategizing photometric augmentation of Zwicky Transient Facility Type Ia supernova light-curves given the goal of minimizing SALT2 parameter uncertainties. We find a median improvement of 2-6% for SALT2 parameters and 3-11% for photometric redshift with 2-7 additional data points in g, r and/or i compared to random augmentation. The augmentations are automatically strategized to complete gaps and for resolving phases with high constraining power (e.g. around peaks). We suggest that such a technique can deliver higher impact during the era of Rubin Observatory for precision cosmology at high redshift and can serve as the foundation for the development of general-purpose resource allocation systems.

Primary authors: Dr FREMLING, Christoffer (Caltech); Prof. GRAHAM, Matthew (California Institute of Technology); COUGHLIN, Michael (University of Minnesota); SRAVAN, Niharika

Presenter: SRAVAN, Niharika

Session Classification: Contributed Talks