

## **NASSP 2019 Honours and MSc Project Proposal**

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Title of Research Project: Searching for Parity Violating Non-Gaussianity in the Planck Data

Level of Research Project: Honours and MSc

Description of Research Project:

Most models for the new physics in the Early Universe assume that parity is conserved. However, we know that parity is violated in the Electroweak Standard Model of Weinberg and Salam. The theorists TD Lee and CN Yang explained in the 1950s that the assumption that parity is a good symmetry might not hold, and moreover indicated how parity symmetry could be tested experimentally. In 1956 CS Wu showed that the beta decay of polarized cobalt-60 did not respect parity. In 1957 Lee and Yang were awarded the Nobel Physics prize. While today the details of the electroweak model have been well established, the same is not true for the physics beyond the standard model at play in the early universe.

This project will test for parity violation in the bispectrum of the cosmic microwave background using publicly available data from the ESA Planck mission. The first part of the project will be devoted to creating mock data and an estimator and validating this estimator on the mock data. The next part will involve studying how to deal with various non-idealities in the actual data, and finally an analysis of the actual data will be carried out.