DEPARTMENT OF PHYSICS
COLLEGE OF ARTS AND SCIENCES

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2027

PROJECT TITLE: Galaxy survey cosmology

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Project Description

The physics behind the dark energy and dark matter that make up 95% of the mass and energy in the Universe represent some of the biggest open questions in physics, and we can work towards characterizing them by analyzing how galaxies trace the distribution of matter in the Universe. We measure galaxies in observational campaigns called galaxy surveys, and we learn about the fundamental physics shaping their distribution by performing statistical analyses. In conducting these inferences, we face a number of challenges related to separating out signals of fundamental physics from uncertainties related to the properties of observed galaxies, as well as finding ways to efficiently test new proposed cosmological models. This project will be in the area of theoretical cosmology (physics, more generally) and will focus on developing theoretical and statistical tools for galaxy survey data analysis. An UPRISE student working on this project will join weekly cosmology group meetings, and will have regular meetings with the faculty mentor. The project will include doing background reading to build understanding of the cosmology and statistical concepts needed for the project, using python code and scientific software to perform calculations. Experience with python programming and statistics would be beneficial for this project, but is not required.