SMCAS General Meeting and Presentation on Friday March 6, 2020

Dr. Micah Buuck

Post Doctoral Research Associate, SLAC National Laboratory

Neutrinos: The Ghosts of the Standard Model of Particle Physics

Friday, March 6, 2020 , College of San Mateo, Building 36
SMCAS General meeting at 7:00 p.m. ISC Room, room 110
Presentation at 8:00 p.m. Planetarium
Free and open to the public, free parking.

Neutrinos are the lightest massive particles ever observed. For many decades it was unclear whether neutrinos were completely massless or instead just had a very small mass, but the results of several large experiments at the end of the 20th century convincingly proved that they do have a very small nonzero mass. That mass is also an important parameter in modern cosmological models, which now provide arguably the best constraints on its value.

Neutrinos are also the only candidates in the Standard Model of particle physics to be a type of particle -- known as a Majorana fermion -- that is its own antiparticle. As a graduate student at the University of Washington, Dr. Buuck worked on an experiment called the MAJORANA DEMONSTRATOR which looked for a process called neutrinoless double-beta decay that would prove neutrinos are Majorana fermions. This experiment is one of several around the world looking for evidence of this process, the discovery of which could help explain why the universe contains more matter than antimatter, and how neutrinos get their mass. Although no one has yet observed neutrinoless double-beta decay, it is an active area of research in particle and nuclear physics and the prospects for discovering it remain promising.

Micah Buuck is a Postdoctoral Research Associate at SLAC National Accelerator Laboratory, where he works on the LUX-ZEPLIN experiment trying to directly detect dark matter. He obtained his PhD in Physics from the University of Washington in August 2019, with a dissertation focused on creating a model of the radiogenic backgrounds of the MAJORANA DEMONSTRATOR neutrinoless double-beta decay experiment. Both experiments are located in the Sanford Underground Research Facility in Lead, South Dakota, with the MAJORANA DEMONSTRATOR taking data since 2016 and LUX-ZEPLIN currently under construction.