Oct 5th, 2:20 PM - 2:30 PM

Modeling and Detectability of Gravitational Wave Waveform Memory from Core Collapse Supernovae

Pedro Jesus Quinonez
Embry-Riddle Aeronautical University, quinonep@my.erau.edu

Emily Grimes
Embry-Riddle Aeronautical University, grimese2@my.erau.edu

Quinonez, Pedro Jesus and Grimes, Emily, "Modeling and Detectability of Gravitational Wave Waveform Memory from Core Collapse Supernovae" (2018). *Undergraduate Research Symposium - Prescott*. 6.
https://commons.erau.edu/pr-undergraduate-research-symposium/2018/presentations/6

Students' Names

Pedro Jesus Quiñonez, Department of Physics, College of Arts and Science

Emily Grimes, Department of Aerospace Engineering, College of Engineering

Mentor's Name

Dr Michele Zanolin, Department of Physics, College of Arts and Science

Title

Modeling and Detectability of Gravitational Wave Waveform Memory from Core Collapse Supernovae

Abstract

Ever since the discovery of gravitational waves by LIGO, studying these waves have become of utmost importance. This is because gravitational waves have the potential to carry information that have remain unseen by physicist in the past. For example, take the case of a core collapse supernovae. Any information transferred through electromagnetic waves that attempts to escape the inner core of a dying star is blocked out by the intense radiation of its outer shell. For this reason, astronomers have been unable to truly study what goes in the core. However, this is not the case for gravitational waves, which would be able to retain information from the core as it leaves the dying star. There is a particular part of the gravitational wave from a core collapse supernovae that contains useful information of the dying star and is the focus of our research: the gravitational wave memory. Memory is the low frequency, non-oscillating addition to the amplitude of gravitational waves. The memory of gravitational waves from core collapse supernovae can give information about the degree of asymmetry of the dying star. The purpose of our research is to derive equations that can predict the energy of the memory component and compare these calculations to simulations of gravitational waves of core collapse supernovae that contain memory. Future research involves developing better methods to isolate memory from current simulations and further researching into the energy of memory.