

Professional References

1. Prof. Ben Kain, Department of Physics, College of the Holy Cross
bkain@holycross.edu, (508) 793 2440

I have worked extensively with Prof. Kain over the last year on research, and have had numerous classes with him over the last three years. I performed research with Prof. Kain full time during Summer 2021 as a research assistant at the College of the Holy Cross, and Prof. Kain has advised my thesis this academic year.

2. Prof. Matthew Koss, Department of Physics, College of the Holy Cross
mkoss@holycross.edu, (508) 793 2406

During Spring 2021, I was a teaching assistant under Prof. Koss for an introductory physics course. Prof. Koss has also acted as my academic advisor since my sophomore year.

3. Prof. Kevin Walsh, Department of Math and Computer Science, College of the Holy Cross
kwalsh@holycross.edu, (508) 793 3943

I have taken two courses with Prof. Walsh: Introduction to Programming and Computer Systems and Organization. While I have not worked with Prof. Walsh outside my courses with him, I believe that he can speak to my work within the Computer Science department and my abilities as a student and programmer.

4. Michael Poire, Lakes Region Casino, Belmont, NH
(603) 387 6409

I have worked under Mr. Poire at the Lakes Region Casino as a part-time poker dealer since Summer 2018. Mr. Poire works as the floor manager.

Presentation Abstract

“Analysis of Equations of State for Neutron Star Modeling and Simulation”

Neutron stars are complex physical objects often modelled as a hydrodynamical system. Within these models, the two parameters energy density and pressure are related by an equation known as the “equation of state.” The equation of state is important because it encodes information about interactions between the fundamental particles within the star. Furthermore, as neutron stars are extreme examples of gravitation, and not directly observable on Earth, the physics within neutron stars are still not well known. By postulating and analyzing different interactions within a neutron star, and therefore different equations of state, we can simulate the observable characteristics of the resulting star and compare them to empirical data to help better understand the fundamental behavior of neutron stars. In this presentation, the derivation and computation of an equation of state will be analyzed, as well as the predictions of

observable properties of physical neutron stars made by various equations of state and the role of equations of state in temporal neutron star simulations.

Bio

Joseph (Joe) Nyhan is a senior at the College of the Holy Cross studying physics and computer science. At the college, he participated in physics research during the summers of 2020 and 2021 and wrote an Honors thesis in the physics department. After doing extended numerical and computational work for research in Summer 2021, he became interested in computer science and became a computer science minor entering his senior year. From Concord, NH, Joe lives with his parents and two younger sisters. Outside of academics, Joe enjoys fly fishing, playing the violin, and hobby woodworking.