Abstract: Ions and atoms typically interact strongly, which can result in many interesting effects to study in a given atom-ion system. The intermediate-range interactions allow the cooling of the ion, even in systems consisting of molecular ions, which cannot be laser-cooled. Ion-neutral interactions are also fundamental to nature, and the study of their chemistry in the cold-ultracold regime reveals information about the early universe. At the University of Connecticut, we created a hybrid trap which can be used to co-trap and study the interactions of Na and Ca+. Each of our traps allows us control so that we can isolate and measure individual reactions between Na and Ca+ in multiple temperature regimes. In this talk, I will present a discussion on cold physics as well as the physics behind each of the traps. I will also discuss the methods and measurements for the rate constants between Na and Ca+.

Short Bio: Jonathan Kwolek is an NRC postdoctoral researcher at the U.S. Naval Research Laboratory. There, he works in the optical sciences division on cold atomic physics. His current project focuses on the creation of a cold and continuous source of atoms with minimal scattered light. Dr. Kwolek received his Ph.D. at the University of Connecticut in 2018, where he conducted research on cold quantum chemistry in a hybrid atom-ion trap. Before that, he obtained his undergraduate degree at St. Mary’s College of Maryland, where he concurrently worked on cold atomic physics at the Patuxent River Naval Air Station.