**RESEARCH:**
Riley’s lab focuses on finding new material applications for the protein cage (P22) derived from bacteriophage-22. Some of these applications have included influenza vaccines, enzyme encapsulation for energy production and kinetics study, as well as building higher ordered structures. Riley is working on a project focused on creating T₁-enhanced Magnetic Resonance Imaging contrast agents utilizing this protein cage as well as bacteria ferritin. He experiments with manganese porphyrins and the ability to load them in the P22 as well as other protein cages. He has experimented with P22 where the internal space has been polymerized. This polymerized internal space has many more sites to bind porphyrins than simply binding them to the capsid proteins. When experimenting with proto porphyrins, his lab discovered that the T₁ relaxivity was not as strong as expected. It is hypothesized that this is due to aggregation and limiting water access to the metal site. They have begun experimentation with different porphyrins in an attempt to find other molecules that can increase the T₁ relaxivity when loaded in the polymerized P22 capsid.

**OUTREACH:**
Riley’s outreach project utilized scientific inquiry to encourage students to discover properties of everyday materials and discuss what other applications there are for these and similar materials. Riley had the opportunity to work with two classrooms in the Manhattan and Belgrade Middle Schools. The first activity, called Geckos, involved hanging washers from Post-it® notes in self-directed experiments as the students discovered the properties of Vander Walls forces. In the second activity, called Goo, students handled and made qualitative observations of different fluids to discover the behavior of non-Newtonian fluids. In the final activity, students experimented with the iodine clock reaction to discover different aspects of reaction kinetics.