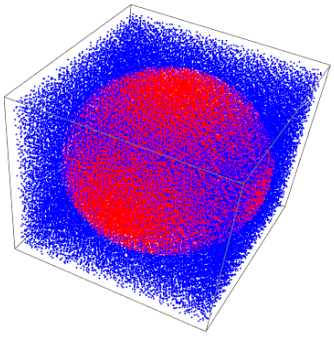
Fundamentals of Scientific Computing (SciComp 101)

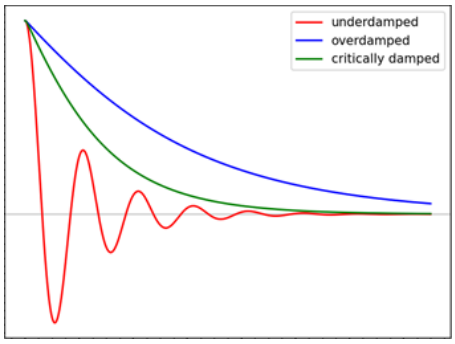
Brookhaven National Laboratory (BNL)

Modern science and engineering opportunities require students who can write code to help solve real-world technical problems. Scientific computing (SciComp) differs from traditional computer science (CompSci) because it focuses specifically on science and engineering topics.

Over the course of **20 remote sessions**, students will learn the basics of programming Python by investigating modern science and engineering challenges. This workshop requires **no prior programming experience** and familiarity only with introductory algebra.



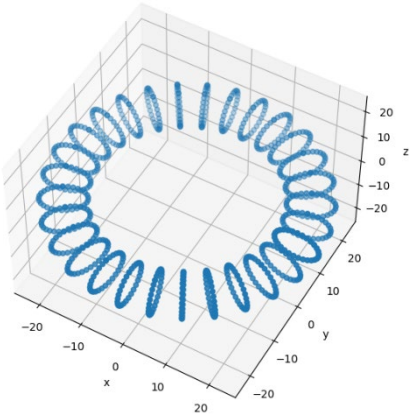
During each **two-hour** session, students will write code to visualize data and perform simulations to predict future outcomes. Python is used in many scientific, engineering, mathematical, and computing fields. The workshop labs can run on all major personal computer platforms. All software used during the workshop is **100% open source and free** of cost.



Students with foundational scientific computing skills possess a unique competitive advantage when applying for STEM-based internships across the United States Department of Energy and other world-class research organizations.

BNL staff provides the training for the students. Students who successfully complete this workshop will be awarded a formal certificate attesting to their newly acquired skills in scientific computing. These SciComp programming skills are crucially needed in all domains of science and remain in very high demand throughout the job market.

The **science topics** include biology (analyzing gene sequences and epidemiology), chemistry (ideal gas law, balancing ionic equations, and simulating nuclear decay), as well as physics (kinematics, dimensional analysis, harmonic motion, and wave mechanics)



The **math topics** include probability and statistics, numerical methods, polynomial interpolation, frequency analysis, Monte Carlo estimation, and combinatorics. The **computer science topics** include algorithm design & efficiency, generating random numbers, code timing, 2D and 3D graphics, and machine learning.

The ideal participant would be a determined student still assessing their computer programming aptitude but having a sincere interest in science research or engineering careers.