**Predicting Critical Temperature of Superconductors using Machine Learning**

Superconductors are a material that under a certain critical temperature, the material is able to conduct current with zero resistance. This makes superconductors very favorable in certain applications. The most common application is the use of them in fMRI machines used by the healthcare industry, as well as various research facilities, such as the Large Hadron Collider.

Since the discovery of superconductors in 1911 by Heike Kamerlingh Onnes, there have been two main limitations that prevent more abundant use of superconductors. One being that superconductors favorable properties emerge only at very low temperatures making it challenging to keep the material under its critical temperature. The other issue is that there is no current model to predict the critical temperature of superconductors.

The goal of this project is to attempt to apply machine learning methods in order to predict the critical temperature of a superconductor given its chemical formula.

The data will be accessed from the Superconducting Material Database maintained by Japan’s National Institute for Materials Science (NIMS). There are 21,263 superconductor entries with 81variables per entry. These variables will be chemical properties of the material such as atomic mass, thermal conductivity, or number of valance electrons. Various machine learning models will be implemented and evaluated to determine if one is more efficient or accurate than the other. Some models used will include Neural Networks, Regression, and possibly an unsupervised learning model. Each superconductor entry has the associated critical temperature and that will be used to validate the accuracy of the model.