Discovery of High Pressure Co-Bi Materials
Catherine Badding¹, Eric Riesel², Alison Altman³, Danna Freedman⁴, James Rondinelli⁵, Danilo Puggioni⁶

¹MIT, ²Massachusetts Institute of Technology, ³Northwestern University, ⁴Northwestern University, ⁵Northwestern University, ⁶Northwestern University
cathykb@mit.edu

The transition metal (TM)-bismuth intermetallic phase spaces host fascinating emergent properties such as permanent magnetism and superconductivity. Yet the phase landscape is underexplored due to the limited TM-Bi reactivity at ambient pressures. It was reported superconducting CoBi₃ forms at 5-10 GPa, a result suggesting further investigation at higher pressures may unveil more compounds with superconducting properties like the Ni-Bi system. Yet Co has one less electron than Ni, opening the possibility of Co-Bi exhibiting permanent magnetism similar to MnBi. Through a combined experimental and computational approach, we explored Co-Bi at pressures greater than 18 GPa and discovered two new phases, CoBi and CoBi₂. Future work aims to determine their persistence down to ambient pressure and measure their physical properties.