Abstract Submitted
for the OSF19 Meeting of
The American Physical Society

Observation of two superconducting phase transitions in NbNi2-xCuxSn Heusler alloys BRANDON REESE, MAHMUD KHAN, Department of Physics, Miami University, Oxford OH 45056 — Superconductivity is one of the many exotic properties exhibited by Heusler alloys. Currently, Ni-based Heusler alloys are of great interest since Ni is ferromagnetic. NbNi2Sn is a Heusler alloy which has 29 valence electrons per formula unit, 7.25 valence electrons per atom, and exhibits a superconducting phase transition at TC = 3.4 K. The BCS type II superconductivity in NbNi2Sn and other Heusler compounds are believed to be associated with the van Hove singularities observed in the electronic structure of the materials. It is well established that the electronic and magnetic properties of Heusler compounds can be controlled by manipulating the constituent elements of the respective compounds, particularly by elemental doping. Recent research has shown that the superconducting properties of selected Heulser compounds can be systematically controlled by elemental doping. Motivated by these observations we have performed an experimental study on the superconducting properties of partially Cu doped Ni2-xCuxNbSn materials. Characterization involves the study of various structural, magnetic, and electrical properties associated with the compounds. All compounds exhibited an L21 Heusler cubic structure. Interestingly, two superconducting transitions were observed in all compounds (including Ni2NbSn) at temperatures near TC1 = 17.8 K, and TC2 = 3.4 K. Magnetization data has confirmed type-II superconductivity for each sample at both transition temperatures.

Brandon Reese
Department of Physics, Miami University, Oxford OH 45056

Date submitted: 21 Sep 2019 Electronic form version 1.4