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**Re-emergent Superconductivity of KFeSe Under Pressure** JASMINE BISHOP, ANNE MARIE SCHAEFFER, FLORENCE DOVAL, SHANTI DEEMYAD, University of Utah, Department of Physics — Studying the pressure dependence of superconducting properties of various materials allows better understanding the mechanism of their superconductivity and provides intuition for designing better superconducting systems with high transition temperature. Extreme high static pressures can be created in laboratory using a device known as diamond anvil cell (DAC). DACs can be used to study the electrical, magnetic and optical properties of a material during an experiment, making DACs an extremely useful experimental tool. Fe-based superconductors are newly discovered class of superconductors that fall outside of behavior explained by conventional BSC theory. A recent study found the re-emergence of superconductivity at significantly higher critical temperatures in some iron chalcogenides above 11.5 GPa; one of the studied compounds was KFeSe (Ref 1). The re-emerging phase of superconductivity here is not associated with a structural phase transition and is an unusual effect. We repeated this experiment with a compound of KFeSe with similar stoichiometry in order further study or verify the possibility of a re-emergence of the superconducting phase. Here I will present our recent experimental results on pressure dependence of superconducting phase diagram of KFeSe in comparison with previous studies on this material and I will discuss the possible origin of the differences found between the two experiments.

[1] Sun, L., Chen, X., Guo, J., Gao, P., Huang, Q., Wang, H.,...Zhao, Z. (2012). Re-emerging superconductivity at 48 kelvin in iron chalcogenides. *Nature*, 483, 67-69. doi: 10.1038/nature10813

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