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Synthesizing new, high-temperature superconductors[1] CLAIRE WEAVER, Hofstra University, MEIGAN ARONSON, Brookhaven National Laboratory and Stony Brook University — Currently, there is no accepted theory behind type-II, high-temperature superconductors, but there is a distinct relationship between anti-ferromagnetism and superconductivity. Our research focuses on synthesizing new superconducting materials by observing the link between atomic structure and magnetic moments of anti-ferromagnetic compounds and attempting to reproduce the molecular physics of these known materials in new compounds. Consider the square-planar arrangement of the transition metal Fe in the Fe-pnictide superconductors of the ZrCuSiAs "11 11" and the $ThCr_2Si_2$ "122" structure types. We believe that the physics behind this superconductor, where Fe has d^6 valence electrons, contributes to the superconducting state, not the presence of Fe itself. For this reason, we are synthesizing materials containing neighboring transition metals, like Mn and Co, combined with other elements in similar crystal lattice arrangements, having ionization properties that hopefully impose d^6 valence electrons on the transition metals.

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