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Temperature-dependent proximity magnetism in Pt¹ WENG L. LIM, JOHN C. OWENS, NEEMA EBRAHIM-ZADEH, HILARY G. E. HENTSCHEL, SERGEI URAZH DIN, Department of Physics, Emory University, Atlanta, GA 30322 — We report the observation of a significant magnetic coupling between two ferromagnets (FM) separated by a thin Pt layer. The coupling remains ferromagnetic regardless of the Pt thickness, and exhibits a strong dependence on temperature T . These features of the coupling cannot be explained by the well-known RKKY mechanism of coupling between FM separated by a nonmagnetic spacer. We use a phenomenological model to demonstrate that the observed effects are consistent with the existence of temperature-dependent magnetic ordering induced in Pt in proximity to the interfaces with FM, consistent with a recent report on the ferromagnetic characteristics in Pt films grown on ferromagnetic insulators [1]. The magnetization in Pt decays away from the interfaces with a characteristic length scale that increases with decreasing temperature, and reaches 0.8 nm at $T < 25$ K. Our results suggest that, in Pt/FM heterostructures, the magnetic and spin-dependent transport properties of Pt and FM are mutually affected, opening possibilities for engineering of new magnetoelectronic metamaterials. [1] S. Y. Huang et al, Phys. Rev. Lett. 109, 107204 (2012).

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