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Angular Dependence of Superconductivity in Superconductor / Spin Valve Heterostructures ALEJANDRO JARA, CHRISTOPHER SAFRANSKI, ILYA KRIVOROTOV, Univ of California - Irvine, CHIEN-TE WU, ORIOL VALLS, University of Minnesota, Minneapolis — The superconducting condensate in superconductor / ferromagnet (S/F) multilayers consists of singlet and triplet components. For a non-collinear state of magnetization of the multilayer, all three spin components $S_z = (0, \pm 1)$ of the triplet condensate are generally non-zero, which can result in a long range proximity effect in S/F multilayers. Indeed, the $S_z = \pm 1$ triplet components of the condensate are immune to pair breaking by the exchange field and, unlike the singlet and the $S_z = 0$ triplet components, they can penetrate deep into the ferromagnetic layers. Here we report measurements demonstrating magnetic control of the triplet component amplitude in Nb/Co/Cu/Co/CoOx superconducting spin valves. We find that for all values of the layer thicknesses employed in the experiment, Tc shows non-monotonic angular dependence with a minimum near perpendicular orientation of the Co layers. This drop in Tc is evidence of the enhanced long-range triplet amplitude in the maximally non-collinear configuration of the spin valve. We will present detailed measurements of the magnitude of this effect as a function of thicknesses of both Co and Cu layers of the spin valve. We will also compare our data to theoretical predictions of the angular dependence of Tc for this system.

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