Spin-reorientation transition in exchange-coupled (Pt/Co)$_n$/Sm-Co multilayers JIAN ZHOU, RALPH SKOMSKI, DAVID SELLMYER, Department of Physics and Astronomy and Center for Materials Research and Analysis, University of Nebraska, Lincoln, NE 68588 — Exchange coupling through Pauli-paramagnetic spacer layers is a scientifically interesting phenomenon with applications in sensors and magnetic recording. We have investigated the interplay between interlayer exchange and competing anisotropies. Due to interface anisotropy, the (Pt/Co)$_n$ multilayer exhibits an out-of-plane easy axis (perpendicular anisotropy). The Sm-Co layer has in-plane anisotropy. The exchange between the (Pt/Co)$_n$ and Sm-Co layers is tuned by varying the thickness of the Pt spacer layer. In the (Pt5Å/Co4Å)$_n$/Sm-Co40Å system, we observe a spin-reorientation transition at a spacer-layer thickness of somewhat less than 5 Å. Above this threshold, the Pt/Co retains its out-of-plane anisotropy, and a low-temperature coercivity of 3 kOe is obtained. Below the threshold, the Pt-Co film is exchange-coupled to the Sm-Co layer and the spin structure of (Pt/Co)$_4$ changes, with a low-temperature coercivity of 200 Oe. The transition is also seen in the hysteresis-loop shape. The samples exhibit a low-temperature loop shift after field cooling, which is not observed after zero-field-cooling. The behavior of the film is modeled and discussed as a function of the Pt/Co bilayer period $n$ and of the spacer-layer thickness. This research is supported by DOE, ARO, the W. M. Keck Foundation, INSIC, and CMRA.