From exchange coupling to magnetic memory: how domains remembers at nanoscale KARINE CHESNEL, JOSEPH NELSON, BRIAN WILCKEN, BYU, STEVE KEVAN, U Oregon, MATTHEW CAREY, ERIC FULLERTON, Hitachi GST — Magnetic memory, the ability of a material to remember its magnetic domain configuration throughout magnetization, offers potential technological interest for the data storage industry. One way to quantify the magnetic memory is to use Coherent X-ray Resonant Magnetic Scattering (XRMS) tools, at synchrotron facilities. The light is tuned to resonant edges of magnetic element to optimize the magneto-optical contrast. When illuminated by coherent beam, the sample produces speckle patterns. Our approach is to cross-correlate patterns recorded at different field values throughout the magnetization cycle, and at different temperatures. We have studied the return point memory (RPM) that characterizes the memory after a full cycle, and developed a q-selective correlation analysis to study the spatial dependency of the memory. We will give here an overview of different type of memory behaviors, first showing disorder induced memory in thin CoPt films and influence of roughness, then demonstrating the ability to control the magnetic memory by inducing exchange bias [1]. We will see how the local exchange couplings pin the magnetic domain in the ferromagnetic layer and lead the large memory enhancement at different spatial scales.
[1] K.Chesnel et al, PRB **78**, 132409 (2008)

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