

## Soft X-ray Imaging of Vortex Dynamics in Trilayer Pattered Magnetic Elements

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Soft X-ray microscopy provides element specific magnetic imaging with a spatial resolution down to 15nm. At XM-1, the full-field soft X-ray microscope at the Advanced Light Source in Berkeley, a stroboscopic pump and probe setup has been developed to study fast magnetization dynamics in ferromagnetic elements with a time resolution of 70ps which is set by the width of the X-ray pulses from the synchrotron. Previous studies of patterned permalloy elements have revealed complex magnetization dynamics. Results obtained with a  $2\mu\text{m} \times 4\mu\text{m} \times 45\text{nm}$  rectangular permalloy sample exhibiting a seven domain Landau pattern reveal dynamics up to several nsec after the exciting magnetic field pulse. Domain wall motion, a gyrotropic vortex motion, and a coupling between vortices in the rectangular geometry are observed. On going studies of patterned trilayer elements, composed of magnetic permalloy and cobalt layers separated by a copper spacer layer, will probe the dynamics of the trilayer system. Of particular interest is observing how the coupling between the magnetic layers affects the vortex dynamics.

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