



Contribution ID: 236

Type: **Poster**

X-ray magnetic linear dichroism as a probe for non-collinear magnetic states in a DyCo5 single ferrimagnetic layer

Monday, 17 September 2018 17:45 (15 minutes)

We report on exploiting the X-ray magnetic linear dichroism (XMLD) contrast for probing the non-collinear states in a DyCo5 ferrimagnetic thin film. Utilizing x-ray magnetic circular dichroism which is sensitive to the magnetization of one elemental sublattice, an anomalous 'wing shape' hysteresis loop is observed slightly above its compensation temperature. Based on the hysteresis shape, it is inferred the occurrence of an out-of-plane partial domain wall formation between surface and towards the bulk. By taking advantage of the strong linear dichroism of the Dy element at the M5 absorption edge, the formation of this partial domain wall is directly observed via XMLD contrast as a function of the magnetic field. This demonstrates the occurrence of a non-collinear magnetic transition at high magnetic fields of about 6T for this system. The measurements were performed with the VEKMAG end station at BESSY II (Helmholtz-Zentrum Berlin).

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Session Classification: Poster session 1

Track Classification: P4 Magnetism and quantum phenomena