Abstract Submitted
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A Model for the Polar Kerr Effect in the Hidden-Order Phase of URu_2Si_2 LANCE BOYER, VICTOR YAKOVENKO, Univ of Maryland-College Park — We propose an explanation for the recent experiment [1], where an optical polar Kerr effect (PKE) was observed in the otherwise non-magnetic hidden-order phase of URu_2Si_2. In this experiment, a sample was cooled through the hidden-order transition in a strong magnetic field, which was then turned off at low temperature, and the PKE was then observed and measured on warm-up in the absence of magnetic field. We propose an explanation within the framework of a previously developed Ginzburg-Landau theory [2] for a complex order parameter, whose real and imaginary parts correspond to the hidden-order and magnetic states. The former corresponds to the hexadecapole operator as seen in experiment [3], while the latter has ferromagnetic and antiferromagnetic components of z-axis magnetization in a bilayer of URu_2Si_2. Exploring the energy landscape for the three competing states, we find to a metastable ferromagnetic local minimum induced by an external magnetic field and preserved after the field has been turned off, which can explain the observed PKE.

[1] E. Schemm et al., PRB, 91, 140506 (2015)

[2] K. Haule and G. Kotliar, EPL, 89, 57006 (2010)

[3] H. Kung et al., Science, 347, 1259729 (2015)

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