

International Conference and Exhibition on **Mesoscopic & Condensed Matter Physics**

June 22-24, 2015 Boston, USA

Nematic-driven anisotropic electronic properties of underdoped detwinned Ba(Fe_{1-x}Cox) 2As₂ revealed by optical spectroscopy

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We collect optical reflectivity data as a function of temperature across the structural tetragonal-to-orthorhombic phase transition at T_S on Ba(Fe_{1-x}Cox)2As₂ for $x = 0, 2.5\%$ and 4.5% , with uniaxial and *in-situ* tunable applied pressure in order to detwin the sample and to exert on it an external symmetry breaking field. At $T < T_S$, we discover a remarkable optical anisotropy as a function of the applied pressure at energies far away from the Fermi level and very much reminiscent of a hysteretic-like behavior. Such anisotropy turns into a reversible linear pressure dependence at $T \geq T_S$. Moreover, the optical anisotropy gets progressively depleted with increasing Co content in the underdoped regime, consistent with the doping dependence of the ortho rhombicity but contrary to the non-monotonic behaviour observed for the dc anisotropy. Our findings bear testimony for an important anisotropy of the electronic structure and thus underscore an electronic polarization upon (pressure) inducing and entering the nematic phase.

Biography

L Degiorgi was awarded the title of Professor at ETH Zurich in 2005. He is Coordinator (Delegierter), Department of Physics, and he is head of the Optical Spectroscopy Group at the Laboratory for Solid State Physics. Magneto-optical investigation of strongly correlated systems and of novel materials with peculiar ground states is the main topic of his research activity.

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