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Nematic-driven anisotropic electronic properties of underdoped detwinned $Ba(Fe_{1-x}Co_x)_2As_2$ revealed by optical spectroscopy[1] L. DEGIORGI, ETH Zurich — We collect optical reflectivity data as a function of temperature across the structural tetragonal-to-orthorhombic phase transition at T_s on $Ba(Fe_{1-x}Co_x)_2As_2$ 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 an 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 orthorhombicity but contrary to the non-monotonic behavior 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.

[1]Work in collaboration with: A. Dusza, C. Mirri, S. Bastelberger, A. Lucarelli (ETH Zurich) and J.H. Chu, H.H. Kuo, I.R. Fisher (Stanford University)

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