High Resolution Polar Kerr Effect Measurements of High-Temperature Superconductors: Evidence for Broken Time Reversal Symmetry Below the Pseudogap temperature\textsuperscript{1} ELIZABETH SCHEMM, JING XIA, WOLTER SIEMONS, GERTJAN KOSTER, MARTIN M. FEJER, AHARON KAPITULNIK, Stanford University — High resolution Polar Kerr Effect (PKE) measurements were performed on YBa\textsubscript{2}Cu\textsubscript{3}O\textsubscript{7−δ} as a function of temperature for variety of doping levels. In order be able to measure effects beyond our old search for anyon superconductivity, we devised a new technique based on a fiber Sagnac interferometer with a zero-area Sagnac loop. With this technique we show a shotnoise-limited sensitivity of 100 nanorad/$\sqrt{Hz}$ with incident photon power of $\sim 10 \mu$-Watt, in a wide temperature range from 0.3 K to room temperature. Our results indicate that a Time Reversal Symmetry Breaking (TRSB) signal appears in all underdoped YBa\textsubscript{2}Cu\textsubscript{3}O\textsubscript{7−δ} samples below the doping dependent pseudogap temperature. The effect increases with decreasing temperature and seems to saturate at a lower temperature close to $T_c$. The saturated size of the effect increases with increasing $\delta$. We will discuss possible origins of this effect and its presence in other high-Tc superconductors.

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