Evolution of Low-Energy Andreev States under an Applied Supercurrent in YBa$_2$Cu$_3$O$_{7-\delta}$\textsuperscript{1} J. NGAI, P. MORALES, J.Y.T. WEI, Department of Physics, University of Toronto, Toronto ON, Canada — We present scanning tunneling spectroscopy measurements on current-carrying YBa$_2$Cu$_3$O$_{7-\delta}$ thin-film strips at 4.2K, showing the evolution of the phase-sensitive low-energy Andreev states. In the low-current regime, well below the Landau depairing limit, the Andreev states are anomalously suppressed, suggesting nanoscale dephasing of the $d$-wave order parameter. Measurements are also made at higher applied current levels to probe possible local chiral states in the pairing symmetry. These results will be discussed in the context of order parameter non-rigidity in the high-$T_c$ cuprates.

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