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Linking dynamic and thermodynamic properties of cuprates: An angle-resolved photoemission study of $(Ca_xLa_{1-x})(Ba_{1.75-x}La_{0.25+x})Cu_3O_y$ (x=0.1 and 0.4 GIL DRACHUCK, Technion - Israel Institute of Technology, ELIA RAZZOLI, Université de Fribourg Suisse, RINAT OFER, GALINA BAZALITSKY, Technion - Israel Institute of Technology, R.S. DHAKA, Paul Scherrer Institute, AMIT KANIGEL, Technion - Israel Institute of Technology, MING SHI, Paul Scherrer Institute, AMIT KEREN, Technion - Israel Institute of Technology, ISRAELI-SWISS TEAM — We report angle-resolved photoemission spectroscopy (ARPES) on two families of high temperature superconductors $(Ca_xLa_{1-x})(Ba_{1.75-x}La_{0.25+x})Cu_3O_y$ with $x = 0.1$ ($T_c^{max} = 56$ K) and $x = 0.4$ ($T_c^{max} = 82$ K). The Fermi surface (FS) is found to be independent of x or y, and its size indicates extreme sample-surface overdoping. This universal FS allowes the comparison of dynamical properties between superconductors of similar structure and identical doping, but different T_c^{max}. We find that the high-energy ($|E| > 50$ meV) nodal velocity in the $x = 0.4$ family is higher than in the $x = 0.1$ family. The implied correlation between T_c^{max} and the hopping rate t supports the notion of kinetic energy driven superconductivity in the cuprates. We also find that the antinodal gap is higher for the $x = 0.4$ family.

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