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A magnetic analog of the isotope effect in cuprates RINAT OFER, GALINA BAZALITSKY, AMIT KANIGEL, AMIT KEREN, ASSA AUERBACH, Technion - Israel Institute of Technology, JAMES LORD, Rutherford Appleton Laboratory, UK, ALEX AMATO, Paul Scherrer Institute, Switzerland — Since the discovery of superconductivity in the cuprates, it has been speculated that their pairing mechanism is due to magnetic interactions. However, this was never proven. Such a proof would require an experiment similar to the isotope effect in metallic superconductors, namely, a measurement of T_c versus the in-plane superexchange J, with no other structural changes. We have done this experiment using the $(Ca_xLa_{1-x})(Ba_{1.75-x}La_{0.25+x})Cu_3O_y$ system with its 4 different families having different T_c^{max}. For each family, we measured the Néel Temperature T_N, the anisotropies of the magnetic interactions, the spin glass temperature T_g of underdoped samples, and, of course, T_c from under to overdoped compounds. These properties were determined using the zero field muon spin resonance (μSR) technique, where one injects polarized muons into the sample and measures the time evolution of their spin polarization. Our measurements allow us to demonstrate that $T_c^{max}J_f^{-1}$=const where f is a family index, and to prove experimentally that pairing in the cuprates stems from magnetic interactions.

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