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Elucidating the driving force of superconductivity increase in compressed optimally doped $Bi_2Sr_2CaCu_2O_{8+x}$ XIAO-JIA CHEN, Center for High Pressure Science and Technology Advanced Research, Shanghai 201203, China, VIKTOR STRUZHKIN, Geophysical Laboratory, Carnegie Institution of Washington, Washington, DC 20015, JIAN-BO ZHANG, Center for High Pressure Science and Technology Advanced Research, Shanghai 201203, China, ALEXANDER GAVRILIUK, Institute of Crystallography, Russian Academy of Sciences, Moscow 119333, Russia, ALEXANDER GONCHAROV, HO-KWANG MAO, Geophysical Laboratory, Carnegie Institution of Washington, Washington, DC 20015, HAI-QING LIN, Beijing Computational Science Research Center, Beijing 100089, China, GENDA GU, Brookhaven National Laboratory, NY 11973 — An optimally doped cuprate $Bi_2Sr_2CaCu_2O_{8+x}$ is as a perfect model system to explore the mechanism of superconductivity by applying pressure as one can avoid complicated competing orders in the underdoped regime and explore pure intrinsic effects rather than secondary effects related to change in the carrier concentration. Here, by carefully examining the collected high-pressure Raman spectra at low temperatures, we have observed an enhanced two-magnon mode and connected this to the observed 10 K increase in T_c (reaching more than 100 K for the first time) in the optimally doped $Bi_2Sr_2CaCu_2O_{8+x}$ upon compression clearly delineating the effect of pressure-induced charge transfer that must suppress T_c for this optimally doped sample. Our finely designed experiments offer the direct and convincing evidence for identifying the magnetic fluctuations as the pairing interaction in cuprate superconductors.

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