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**Making superconducting transition temperature higher in $\mathbf{Bi_2Sr_2Ca_2Cu_3O_{10+\delta}}$**[1] XIAO-JIA CHEN, VIKTOR V. STRUZHKIN, RUSSELL J. HEMLEY, HO-KWANG MAO, Geophysical Laboratory, Carnegie Institution of Washington, Washington, DC 20015, YONG YU, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China, CHENG-TIAN LIN, Max-Planck-Institut für Festkörperforschung, D-70569 Stuttgart, Germany — We report an experimental finding of $Tc$ enhancement in optimally doped $Bi_2Sr_2Ca_2Cu_3O_{10+\delta}$. We found that the generally observed pressure effect on $Tc$, *i.e.*, $Tc$ first increases with pressure and then decreases after passing a maximum at an optimal pressure, is only held below a critical pressure around 24 GPa in this multilayer material. After that $Tc$ enhances remarkably upon further compression, considerably surpassing the first maximum. The critical pressure was then considered as the crossover from antiferromagnetism to superconductivity in the inner $CuO_2$ plane. The afterwards $Tc$ enhancement was suggested through the optimization of two competing energy scales (pairing and phase ordering) of different $CuO_2$ planes. The results have important implications for engineering superconductors with much higher $Tc$'s at ambient conditions.

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