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Huge enhancement of superconductivity in the collapsed tetragonal KFe_2As_2 JIANJUN YING, LING-YUN TANG, Center for High Pressure Science and Technology Advanced Research, HO-KWANG MAO, VIKTOR STRUZHKIN, Geophysical Laboratory, Carnegie Institution of Washington, AI-FENG WANG, XIAN-HUI CHEN, University of Science and Technology of China, XIAO-JIA CHEN, Center for High Pressure Science and Technology Advanced Research — Recent work (F. F. Tafti, *et al.* *Nature Phys.***9**, 349 (2013)) on hole-overdoped iron pnictide KFe_2As_2 indicated a paring symmetry change at pressure of around 1.7 GPa. The investigation for the low-pressure region (below 7 GPa) revealed oscillation of T_c with pressure. Here we report results of high-pressure transport and XRD measurements on KFe_2As_2 single crystals at high pressures up to 30 GPa. We map out the phase diagram of KFe_2As_2 and find a huge enhancement of T_c in the collapsed tetragonal phase. The correlation between T_c, electronic and crystal structures is discussed. The strong electronic correlations are proposed to account for such an unexpected T_c enhancement in KFe_2As_2.

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