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Iron-based superconductors under heavy compression after destruction of superconductivity XIAOJIA CHEN, Center for High Pressure Science and Technology Advanced Research, Shanghai 201203, China, YONG-HUI ZHOU, JIAN-JUN YING, TAKAKI MURAMATSU, VIKTOR STRUZHKIN, HO-KWANG MAO, Geophysical Laboratory, Carnegie Institution of Washington, Washington, D.C. 20015, USA, ZHU-AN XU, Department of Physics, Zhejiang University, Hangzhou 310027, China, XIAN-HUI CHEN, Department of Physics, University of Science and Technology of China, Hefei, Anhui 230026, China, GUANG-YONG XU, GEN-DA GU, Condensed Matter Physics & Materials Science Department, Brookhaven National Laboratory, Upton, New York 11973, USA — Choosing electron and hole doped $Ba_{1-y}K_yFe_{2-x}A_xAs_2$ (A=Ni,Co) and $Fe_{1+y}Se_{1-x}Te_x$ – typical iron pnictides and chalcogenides, we investigate pressure effects on the physical properties of these superconductors after their superconductivity is completely destroyed. Combining electrical resistance and magnetic susceptibility measurements at pressures above 60 GPa, we establish extended pressure - temperature phase diagrams for these compounds. Contrary to the general belief of the existence of Fermi liquid after the disappearance of superconductivity upon compression, we find an unexpected insulating state in these heavily compressed compounds. Some novel behaviors such as reentrance of superconductivity are also discovered. These results indicate that rich physics is still hidden in iron-based superconductors.

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