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High, magnetic field independent critical currents in $Ba_{0.6}K_{0.4}Fe_2As_2$ with composite defects K. KIHLSTROM, MSD, Argonne Nat Lab; Dept of Phys, UIC, L. FANG, Y. JIA, C. CHAPARRO, G. SHEET, H. CLAUS, A. KOSHELEV, U. WELP, MSD, Argonne Nat Lab, G. CRABTREE, MSD, Argonne Nat Lab; Dept of Phys, UIC, W. KWOK, MSD, Argonne Nat Lab, S. ZHU, Phys, Argonne Nat Lab, A. KAYANI, Dept of Phys, WMU, H.F. HU, Dept of Phys, UIUC, J.M. ZUO, Dept of Mat Sci & Eng, UIUC, H.H. WEN, Dept of Phys, Nanjing University, B. SHEN, MSD, Argonne Nat Lab — We investigate the enhancement of vortex pinning by compound defects that are composed of correlated and point defects in $Ba_{0.6}K_{0.4}Fe_2As_2$ crystals with T_c 37.5. Initial irradiation by high-energy heavy ions to a dose matching field of $B = 21$T increases vortex pinning via columnar defects with no degradation of the superconducting transition temperature. Subsequent proton irradiations further enhance the critical current *Jc(H)* by suppressing the motion of vortex kinks between the columnar defects. At a temperature of 5K, we find a critical current density of 5.8 MA/cm^2 that is essentially magnetic field independent in fields up to 7 T. This work supported by the Center for Emergent Superconductivity, an Energy Frontier Research Center funded by the U.S. D.O.E., Office of Science, Office of Basic Energy Sciences and by the D.O.E, Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357. The operation of the ATLAS facility was supported by the U.S. D.O.E., Office of Nuclear Physics, under Contract No. DE-AC02-06CH11357. The work in China was supported by the NSF of China, the MOST of China (2011CBA00102 and 2012CB821403) and PAPD.

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