

Abstract Submitted  
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**Highly effective mixed pinning landscape produced by combined proton and heavy-ion irradiations in commercial coated conductors<sup>1</sup>**  
LEONARDO CIVALE, Los Alamos National Laboratory, Los Alamos, NM 87545, USA, MAXIM LEROUX, KAREN KIHLSSTROM, ULRICH WELP, WAI-KWONG KWOK, Argonne National Laboratory, Argonne, IL 60439, USA, MARTY RUPICH, STEVEN FLESHLER, ALEX P. MALOZEMOFF, American Superconductor Corp., Devens, MA 01434, USA, G. GHIGO, Politecnico di Torino, 10129 Torino, Italy, A. KAYANI, Western Michigan Univ., Kalamazoo, MI 49009 — Particle irradiation is a very useful method to enhance the critical current density ( $J_c$ ) in high  $T_c$  superconductors. As the nature of the damage produced under given irradiation conditions is well studied, it also provides a valuable tool to engineer controlled pinning landscapes to improve our understanding of vortex matter. Recently, it has been shown that proton irradiation can produce significant further  $J_c$  increase in commercial coated conductors (CC) with already high  $J_c$ . Here we report a further step towards  $J_c$  design, by combining 4 MeV proton and 250 MeV Au irradiations on the same CC. We show that the  $J_c$  improvement is better than what results from each individual irradiation, with columnar and random defects being dominant at low and high fields, respectively. Flux creep rates provide additional information about the vortex dynamics and depinning mechanisms in different regions of the Temperature-Field-Orientation phase diagram.

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