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Microstructural Landscape and Vortex Pinning Scenarios in REBCO Coated Conductors Prepared at High Growth Rates

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***Abstract*—High temperature superconducting $REBa_2Cu_3O_7$ (RE=Rare Earth or Yttrium, REBCO) coated conductors (CCs) have emerged as a complex class of materials with exceptional superconducting properties. Understanding the vortex pinning scenarios in correlation with a controlled microstructural landscape is a key objective to design the CCs performance and achieve exceptional values of superconducting properties which enable their integration into devices.**

The microstructural landscapes of CCs may deeply differ depending on the selected growth methodology, the compositional selection and the processing conditions. In order to improve performance together with costs reduction, faster growth methods are now being explored, which raise new vortex physics scenarios. In this presentation, we will discuss the rich vortex pinning microstructure for vapour-solid, solid-solid and liquid-solid growth methods and how it is modified through fast-growth processes. The interplay between vortex physics and defect structure generated at high growth rates will be addressed, as well as the implications of the electronic structure on vortex physics. We will also discuss how irradiation research could help to further understand the influence of the induced defect structure on the observed vortex pinning scenarios and which impact may have on CCs use for fusion magnets.

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