

Trends and Perspectives in Radiation Damage of HTS

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Abstract—Irradiation of HTS in the past helped to identify efficient pinning centers morphologies and distributions that inspired the development of optimal Artificial Pinning Centers in high performance REBCO tapes. In more recent years, irradiation experiments for pinning optimization were flanked by studies aimed to determine the radiation hardness of coated conductors [1-3] in view of their possible employment in the space environment, accelerator facilities and, especially, compact fusion reactor magnets [4].

These applications are characterized by complicated and extreme radiation fields, so that it is practically impossible to assess the response to the irradiation conditions expected for these applications by one direct experiment.

This difficulty is pushing the scientific community to develop novel irradiation facilities on one side, and to perform irradiation studies with proxies on the other. To aid with both tasks, emerged clearly the need to develop novel computational methods capable to give a comprehensive description of the radiation damage down to the atomic level and to correlate the presence of defects with the macroscopically observed properties.

In this talk I will summarize open challenges, current efforts, and propose possible ways to tackle the obstacles posed by radiation damage to the development of novel technologies enabled by HTS. I will also focus on the fact that several Early Career Researchers are making pivotal contributions to this rapidly expanding field, helping to shape a vibrant scientific community.

Keywords (Index Terms)— REBa₂Cu₃O₇, Fusion, Irradiation, HTS Magnet

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IEEE-CSC, ESAS and CSSJ SUPERCONDUCTIVITY NEWS FORUM (global edition), Issue No. 61, Nov. 2025. Presentation given at EUCAS 2025, Porto, Portugal, Sept. 2025.