Neutron Irradiation: Introduced Defects and Effects on Various Superconductors

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Abstract **– Irradiation techniques offer the unique possibility to create pinning centers in a superconductor and to investigate the resulting changes in the superconducting properties of the very same sample. In particular, neutron irradiation introduces various defects ranging from single displaced atoms to nanometer-sized defects. The resulting defect structure depends on the irradiated material and the neutron energy distribution. The influence of neutron irradiation on the superconducting properties in various materials will be compared. Pinning is only moderately enhanced in MgB_2 because of its comparably large coherence length. The largest effect is obtained, if the coherence length matches the defect size, such as in the iron or cuprate superconductors, where about 3-5% of the de-pairing current density can be achieved. However, also small defects can contribute to pinning quite efficiently as observed in Nb_3Sn wires or Gd-123 coated conductors. The results will be discussed in terms of defect size and density.**

Acknowledgments **- This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the Euratom research and training programme 2014-2018 and 2019-2020 under grant agreement No 633053. The views and opinions expressed herein do not necessarily reflect those of the European Commission.**

Keywords (Index Terms) **– Neutron irradiation, critical currents, flux pinning, anisotropy, fishtail effect, degeneration.**

IEEE CSC & ESAS SUPERCONDUCTIVITY NEWS FORUM (global edition), November 2019.
Received October 21, 2019; selected October 24, 2019. Reference STP659; Category 5.
Invited presentation 3-MO-FP4-01I given at EUCAS, 01 - 05 September 2019, Glasgow, (UK).