

Abstract Submitted
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Use of High Temperature Superconducting Monoliths for Field Shaping in Stellarators and Tokamaks¹ THOMAS BROWN, PPPL, LESLIE BROMBERG, MIT, ALLEN BOOZER, PHIL HEITZEROEDER, MICHAEL ZARNSTORFF, PPPL, JOSEPH MINERVINI, MIT — Monolithic High Temperature Superconductors (HTS) can be used for field shaping. Design issues relevant to stellarator magnets using single crystal or highly textured YBCO monoliths will be discussed. The excellent properties of YBCO operating at elevated temperatures (> 10 K) will be summarized. High field, cryo-stable, highly complex magnet field topologies can be generated using the techniques discussed in this paper. Engineering constraints, such as stresses in the superconducting monoliths, support, quench protection, superconducting stability of the monoliths and required external support structure will be described. The limitations imposed by different fusion environments on the performance and lifetime of the HTS monoliths will be reviewed, both for near term experiments as well as long term stellarator fusion reactors. Since the HTS monoliths require no insulation or copper for stability/quench protection, some of the irradiation limits on these components are eliminated.

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