



3rd

ICQMT 2025

3rd International Conference on Quantum Materials and Technologies

Scaleup of the HTS Industry to Enable High-Field Magnets for Fusion Energy



**Chief Science Officer
Commonwealth Fusion Systems
Brandon Sorbom**

Brandon Sorbom co-founded CFS with the goal of commercializing fusion energy in time to combat climate change by developing innovative high temperature superconducting (HTS) magnet technology. He currently serves as Chief Science Officer leading the R&D efforts of the company. Under his leadership, CFS is the world's leading buyer of the HTS material that goes into the magnets. A regular scientific presenter and academic speaker, Sorbom earned a BS in Electrical Engineering and Engineering Physics from Loyola Marymount University and a PhD in Nuclear Science and Engineering from MIT. While working on his PhD at MIT, Sorbom was the lead author of the paper that proposed the original design for ARC that inspired the founding of CFS in 2018 and was named a "35 Under 35" Honoree from MIT Technology Review.

**Date and Time:
From 26 April to
3 May 2025, exact
day&time will be
announced later.**

**Lecture Room:
TBD**

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10th

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Abstract

The key performance metrics in magnetically-confined fusion devices called tokamaks scale as the strength of the toroidal magnetic field to the fourth power. The consequence of these scalings is that increasing the magnetic field in a tokamak enables a much smaller device to demonstrate net-energy production, leading to dramatic reductions in cost, timeline, and organizational complexity required to construct and operate the fusion device. Commonwealth Fusion Systems (CFS) is building the SPARC tokamak in Devens, MA, USA, with first plasma planned in 2026. The initial objective of SPARC will be scientific demonstration of $Q>1$ (net fusion energy) in a tokamak, with experiments then shifting to the goal of exploring operating regimes for ARC, the first fusion power plant. Although REBCO HTS material was discovered in 1987, difficulties in manufacturing long lengths of usable superconducting tape precluded the possibility of using HTS to build full-scale fusion magnets until very recently. However, due to the combination of improved thin-film manufacturing techniques and a push to the HTS industry to scale by private fusion companies, the supply base now exists to provide the 1000's of km of REBCO HTS required to build magnets large enough for fusion devices. This talk will explain why high-field REBCO magnets are a game changer for fusion energy and how the REBCO industry can continue to scale up to support the growing demand for the fusion industry.