

CIF 23-1: Passively Cooled Superconductors in Space

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Activity Type: New Start

Primary STMD Taxonomy: TX03.3.2 Distribution and Transmission

Starting TRL: 3 **End TRL:** 4

Executive Summary: The objective of this project was to determine to what extent (as a function of distance from the Sun) our “Solar White” coatings could passively chill a high temperature superconductor (HTS) and maintain it in a superconducting state. The end goal is to enable the use of superconductors in space for active radiation shielding and highly efficient energy storage and retrieval. The best we were able to demonstrate during this testing was a coating with a solar absorptivity of 2.6%, which is sufficient to keep the superconductor we chose cold enough for these purposes at distances of 1.25 astronomical units (AU) from the Sun. Computations and modeling show that we would need samples with solar absorptivities of less than 1.5% for 1 AU and beyond operation. Our best tile to date was measured as having 1% absorption, which is still an order of magnitude higher than our theoretical limit. This should be achievable once manufacturing consistency is achieved. We are in the process of commercializing production of Solar White, and are hopeful that more consistent and improved results will be achieved within the coming year.