Robert C. Duckworth

Robert Duckworth has been working in the fields of cryogenics and superconductivity for the past twenty years. This work started in the cryogenics group at the University of Wisconsin-Madison where he worked under Dr. John Pfotenhauer on a variety of cryogenic and superconducting materials projects. After earning his M.S. and Ph.D. in nuclear engineering and engineering physics, he joined the Applied Superconductivity Group at Oak Ridge National Laboratory in 2001 to work primarily on high temperature superconducting applications such as power cables, transformers, and motors for the electric grid. This work contributed to greater understanding of ac loss and conductor stability of 1G and 2G HTS conductors and representative, full-scale prototypes and their consequences to demonstration projects with companies like American Superconductor, Southwire, and SPx (formerly Waukesha Electric). Specifically, he was a key member of the teams that performed critical research and development on the 250-m, 13.8 kV distribution level Southwire/AEP Bixby triaxial superconducting cable as well as qualification testing of Resilient Electric Grid Project Hydra fault-current limiting superconducting cable.

In 2011, Robert transitioned into the Plasma Technology and Applications Group in the Fusion Materials and Nuclear System Division to work on cryogenic and vacuum R&D in support of plasma fueling and disruption mitigation for the fusion demonstrations with an emphasis on support of ITER as well as other fusion reactors. He has been involved in the development and performance testing of a SCHe-cooled cryo-viscous compressor with ITER (U.S. & IO) from sub-scale prototype to full-scale demonstration that separates mixed deuterium/helium gas flows from the ITER reactor vacuum vessel. He also leads the superconducting magnet and cryogenic systems design in support of the Material Plasma Exposure eXperiment, which is a proposed facility where the performance of plasma materials for divertors and other structural elements could be tested under plasma conditions that are relevant to fusion reactors.

In addition to cryogenics, Robert also works in the area of cable dielectrics and high voltage R&D. Through collaborations across multiple organizations and universities, current work ranges from conventional cable aging in radiation environments for current and next-generation nuclear reactors to resilience of grid components to short duration high rise time EMPs.