

MECHANICAL & AEROSPACE ENGINEERING SEMINAR ANNOUNCEMENT

Key challenges towards the dream direct current magnetic field of 50 T via superconducting magnets: conductor deformation and heat dissipation

Jeseok Bang, Ph.D.
Research Faculty
Applied Superconductivity Center,
NHMFL FSU

Friday, Sept. 5
11:00 a.m.
AME 106



FAMU-FSU
College of
Engineering

**This event
sponsored by
FAMU-FSU Engineering
Department of Mechanical and Aerospace Engineering**



Jeseok Bang, Ph.D.
Research Faculty
Applied Superconductivity Center
NHMFL, FSU

Dr. Bang is internationally recognized for his work in high-field REBCO magnet technology, with applications in fusion energy, MRI, and cryogenic systems. He holds a Ph.D. from Seoul National University and has received multiple honors, including the Jan Evetts SUST Award and several Best Paper Awards.

Since the first discovery of superconductivity in 1911, magnet scientists and engineers have endeavored to generate higher and higher fields using superconducting magnets. Rare-earth class high-temperature superconductors, also known as rare-earth barium copper oxide (hereafter REBCO), are promising and productive options for this aim. Indeed, one key milestone of using REBCO-coated conductors was the achievement of the record-high direct current magnetic field of 45.5 T using a 14.4 T REBCO insert magnet named 'Little Big Coil' and a 31.1 T resistive magnet in 2017. However, more important than achieving this record at that time was the observation that mechanical conductor damage due to locally amplified electro-magnetic stress degrades the electromagnetic performance, and this conductor damage leads to heat dissipation and eventually limits the magnet performance. We've made a lot of research endeavors to address these mechanical issues over the past few years while still aiming for higher fields, and in the end, we've reached a new record of 48.7 T this August. In this talk, I will share what we have done to address this issue over the past three years, what we found from the 'Little Big Coil' testbed, and what challenges (mostly mechanical issues, not electromagnetic) remain to achieve the dream field of 50T.