



ACCELERATOR SCIENCE SEMINAR

**RADIO - FREQUENCY
SUPERCONDUCTIVITY R&D AT
FERMILAB FOR ACCELERATORS
AND QUANTUM APPLICATIONS**

**Daniel Bafia,
FNAL**

Mon
Nov

15

3:30 PM

MCP 201

Michelson Center for Physics
933 E 56th Street



THE UNIVERSITY OF
CHICAGO

Niobium superconducting radio-frequency (SRF) cavities are the highest quality factor resonators ever created and are an enabling technology for highly efficient particle acceleration, ultra-sensitive detectors for new physics searches, and the longest coherence microwave superconducting quantum systems. Whether utilized in 10 km long particle accelerators or in 10 cm quantum architectures, the performance of these outstanding resonators is dictated by superconducting and material properties roughly 100 nm from the inner RF surface within the oxide/metal interface. This talk will present R & D at Fermilab geared toward improving SRF cavity performance at two different energy regimes: i) the high energy regime relevant for particle acceleration and ii) the low energy regime relevant for quantum computing applications. Both thrusts of research investigate microscopic material and superconducting properties of niobium and other relevant materials to identify possible sources of dissipation. Such knowledge of decay channels gives insights that guide the development of mitigation techniques and treatments that further improve SRF cavity performance.