Joint DESY and University of Hamburg Accelerator Physics Seminar

Wednesday, 30.03.2022 16:00

special ZOOM video seminar (needs version 5.8+)

Cryogenics for Superconducting 3D Qubits
and the Colossus Project in SQMS

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Abstract

Many quantum computing technologies rely on cryogenics of some form, frequently for control of noise sources or to take advantage of superconducting phenomena. One of the most challenging technologies from a cryogenics standpoint is that of three dimensional qubits, in which a two dimensional qubit is coupled to a superconducting cavity to produce a multi-level quantum system. Operation of any experiment at millikelvin temperatures is a challenge, particularly when it is necessary to cool large objects or superconducting materials due to the limited cooling capacity in even modern dilution refrigerators. As part of the Superconducting Quantum Material and Systems Center program, as well as developing the three dimensional qubit technologies, we are constructing a large cryogenic platform capable of cooling arrays of superconducting cavities. Known as Colossus, the platform is ultimately planned to offer ten times the cooling capacity and thirty times the cooled volume of the current state-of-the-art commercial refrigerators.

This talk will review the cooling technologies used for superconducting qubit technologies, and discuss the design and current status of the Colossus project with particular emphasis on the cryogenic challenges associated with the platform.

NOTE THE UNUSUAL DATE

M.Wenskat (Univ. HH), W.Hillert, (Univ. HH), I.Agapov (MPY) and M.Vogt (MFL).