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Cryogenic Design for C3 Main Linacs

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C3 operates under Liquid Nitrogen (LN) at a temperature of ~ 80 K to improve the electrical conductivity of Cu by a factor of ~ 3 , resulting in an accelerator structure shunt impedance of $\sim 300 \text{ M}\Omega/\text{m}$. Since the accelerator structures are normal conducting, they dissipate ~ 2500 watts each. The structures are cooled by nucleate boiling, and the resulting cold saturated Nitrogen vapor is re-liquified, requiring MW scale refrigerators. The linac organization into CryoModules, Sectors, and SuperSectors will be described, along with the basic cryogenic concepts and challenges.

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