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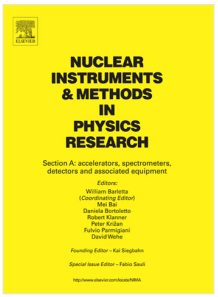

Advances in high gradient normal conducting accelerator structures

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Advances in High Gradient Normal Conducting Accelerator Structures

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Abstract

This paper reviews the current state-of-the-art in understanding the phenomena of ultra-high vacuum radio-frequency (rf) breakdown in accelerating structures and the efforts to improve stable operation of the structures at accelerating gradients above 100 MV/m. Numerous studies have been conducted recently with the goal of understanding the dependence of the achievable accelerating gradients and breakdown rates on the frequency of operations, the geometry of the structure, material and method of fabrication, and operational temperature. Tests have been conducted with single standing wave accelerator cells as well as with the multi-cell traveling wave structures. Notable theoretical effort was directed at understanding the physical mechanisms of the rf breakdown and its statistical behavior. The achievements presented in this paper are the result of the large continuous self-sustaining collaboration of multiple research institutions in the United States and worldwide.

Keywords: normal conducting radio-frequency acceleration, accelerating cavity, inear accelerators

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