RF-Focused Spoke Resonator

A. Garnett, Los Alamos National Laboratory

We will discuss the feasibility of using finger-like structures added to a spoke resonator cavity to superimpose a modest amount of electric quadrupole focusing onto the high axial accelerating field. The motivation for this idea is to possibly eliminate the need for magnetic focusing elements such as solenoids between the spoke cavities in a cryomodule at very-low beam velocities. This greatly improves the real-estate accelerating gradient by increasing the longitudinal packing factor. So far, proposed linac designs using spoke resonators at low- have not been able to take full advantage of the high gradients available in these superconducting structures due to the high longitudinal phase advance per period resulting from long focusing periods caused by engineering constraints. The resulting reduction in drift distances between accelerating cavities reduces the longitudinal phase advance per period and allows the use of higher accelerating gradients. Preliminary results of cavity modeling and analytical calculations for the proposed structure will be discussed.

This work is supported by the U. S. Department of Energy Contract W-7405-ENG-36.