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High temperature superconducting RF cavity

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High Q cavities are an essential component for RF pulse compression. We are interested in developing compact superconducting cavities that operate at high temperature (liquid nitrogen, 80 K). We are designing an RF cavity at 11.424 GHz operating in the TM₀₁₁ mode using eight facets with flat inner faces. These flat faces will be covered with High Temperature Superconductor (HTS) tapes. The cavity fill time (one exponential step) must be 1 microsecond. That sets loaded Q at 143,558. The external Q was selected to provide this loaded Q given the high ohmic Q. Cavity beta is 39.6. The cavity is fed by a TE₁₀ to TM₀₁ mode converter. Wall current is completely axial, so wall current does not cross the gaps between HTS tapes. Cavity tuning is accomplished by changing the separation between cavity facets using wedges.

Footnotes

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