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## Operation of copper cavities at cryogenic temperatures

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This work is focused on the anomalous skin effect in copper and how it affects the efficiency of copper-cavities in the temperature range 40-50 K. The quality factor  $Q$  of three coaxial cavities was measured over the temperature range from 10 K to room temperature in the experiment. The three coaxial cavities have the same structure, but different lengths, which correspond to resonant frequencies: around 100 MHz, 220 MHz and 340 MHz. Furthermore, the effects of copper-plating and additional baking in the vacuum oven on the quality factor  $Q$  are studied in the experiment.

A “geometric model” based on a spherical Fermi - surface and using the equivalent skin layer model is presented in the paper to calculate the surface resistance which is relevant for the RF power losses in the cavity walls. Finally, Cavity cooling process about the pulsed heat transport from the surface into the bulk copper is simulated.

The motivation is to check the feasibility of an efficient, pulsed, ion linac, operated at cryogenic temperatures.

### Funding Agency

### Footnotes

### I have read and accept the Privacy Policy Statement

Yes

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