



EURISOL DS Project

Task 8: SC cavity development

Deliverable D5


Spoke cavity cold test

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Two spoke cavity prototypes have been tested at cold temperature. Both cavities have been tested at 4.2 K (normal pressure bath) and 2K (depressed bath).

The cavities have been tested in the IPN Orsay vertical cryostat (Fig. 1), after a careful preparation: buffered chemical polishing (Fig. 2) to remove 120 μm , and high pressure rinsing and assembly in a clean room (Fig. 3).



Fig 1 : Spoke cavity mounted on the vertical cryostat insert before testing

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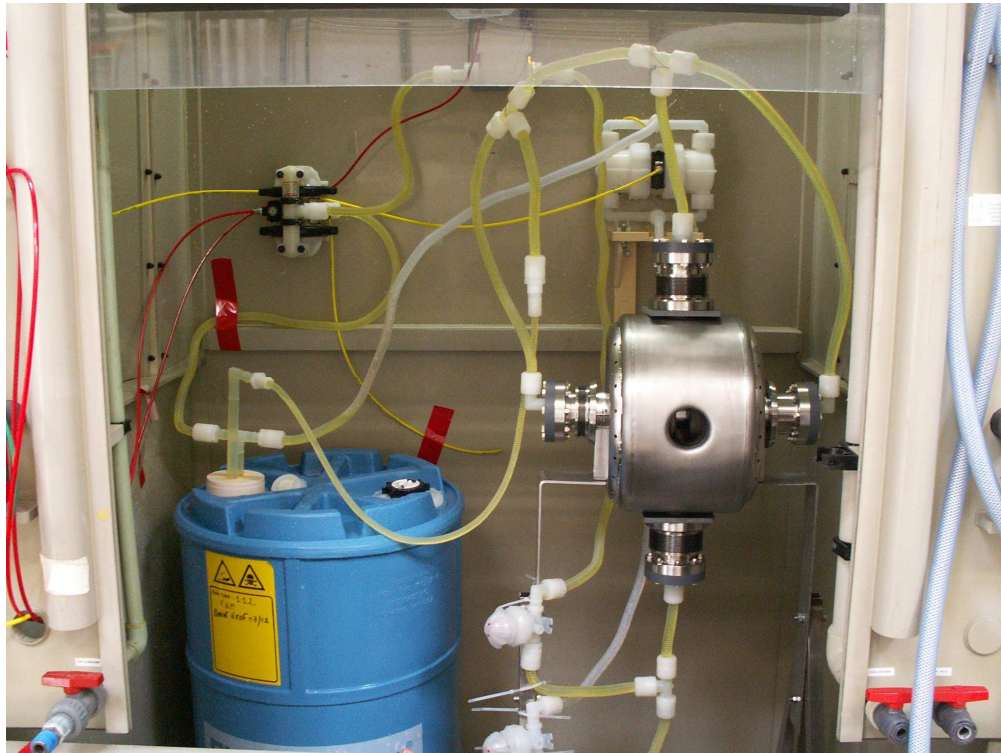


Fig 2 : Spoke cavity during the chemical etching process

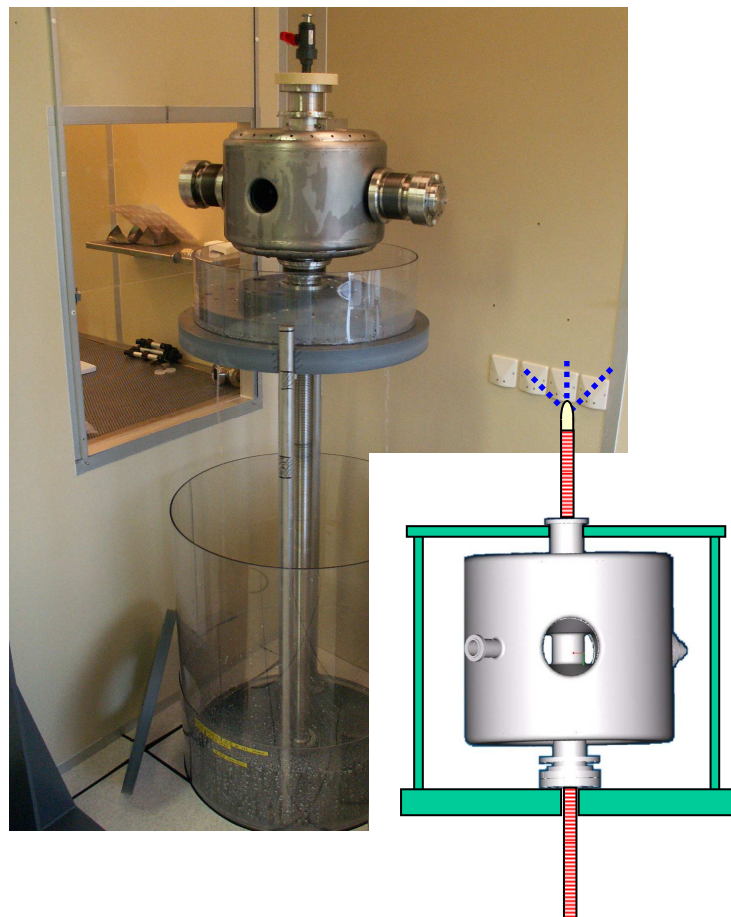



Fig 3 : Spoke cavity during the high pressure water rinsing in the clean room

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The test results are shown in figures 4 and 5. The high beta cavity reached a high accelerating field (12.5 MV/m at 4.2 K) and the performance of low beta one was acceptable but a little bit disappointing as compared to the first cavity (9.6 MV/m at 4.2 K). Note that these values refers to the iris to iris accelerating length definition.

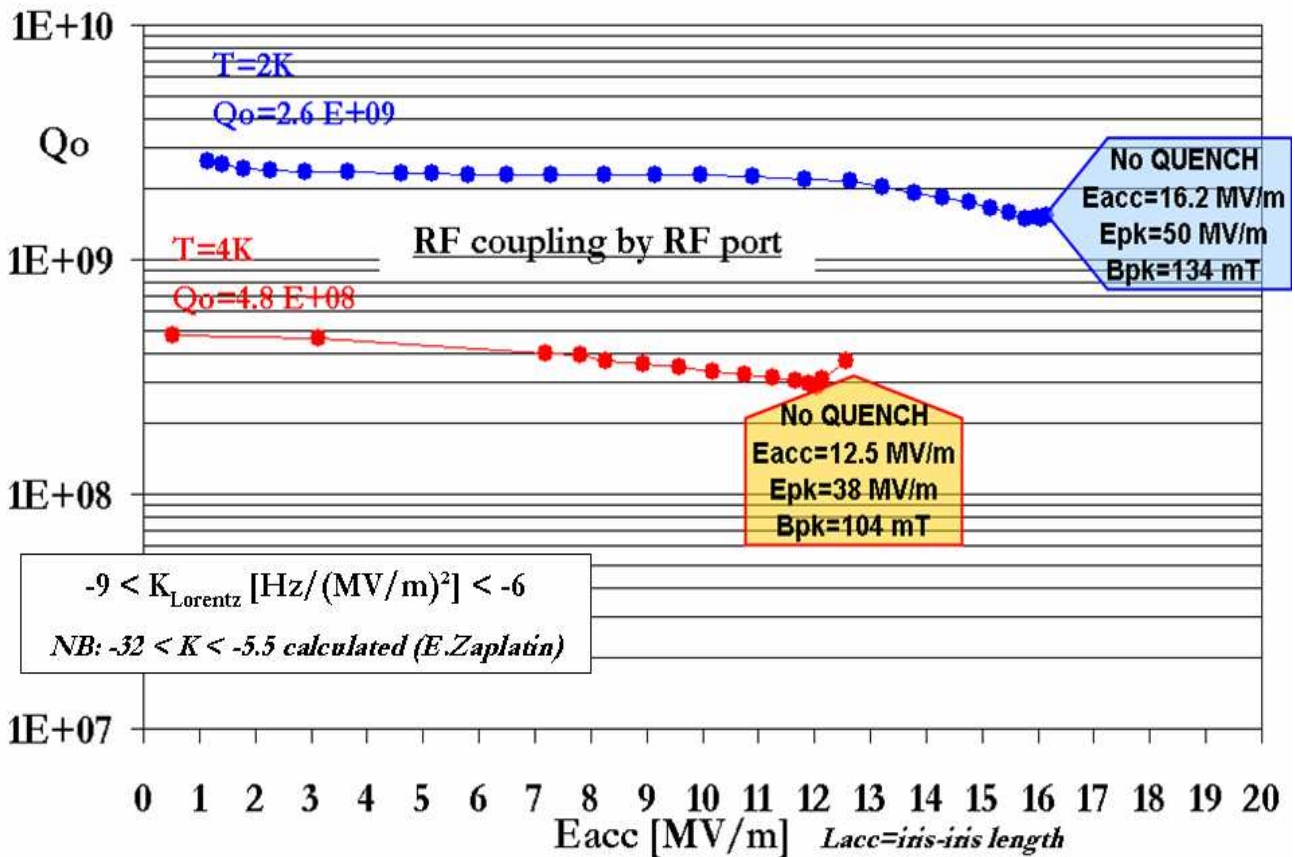


Fig. 4: Cold test results of the β 0.35 spoke cavity

The low beta cavity exhibits a strong field emission, starting at 3.5 MV/m. After a difficult processing which took several hours, the cavity reached a maximum accelerating field of 4.5 MV/m (65 mT), limited by a quench, at almost the same field we reached before the helium tank welding. 2 MP barriers were observed at 1.5 MV/m and 7-8 MV/m (processed in a few minutes).

On this cavity, we suspect the presence of a defect in the niobium surface, limiting the maximum achievable accelerating field.

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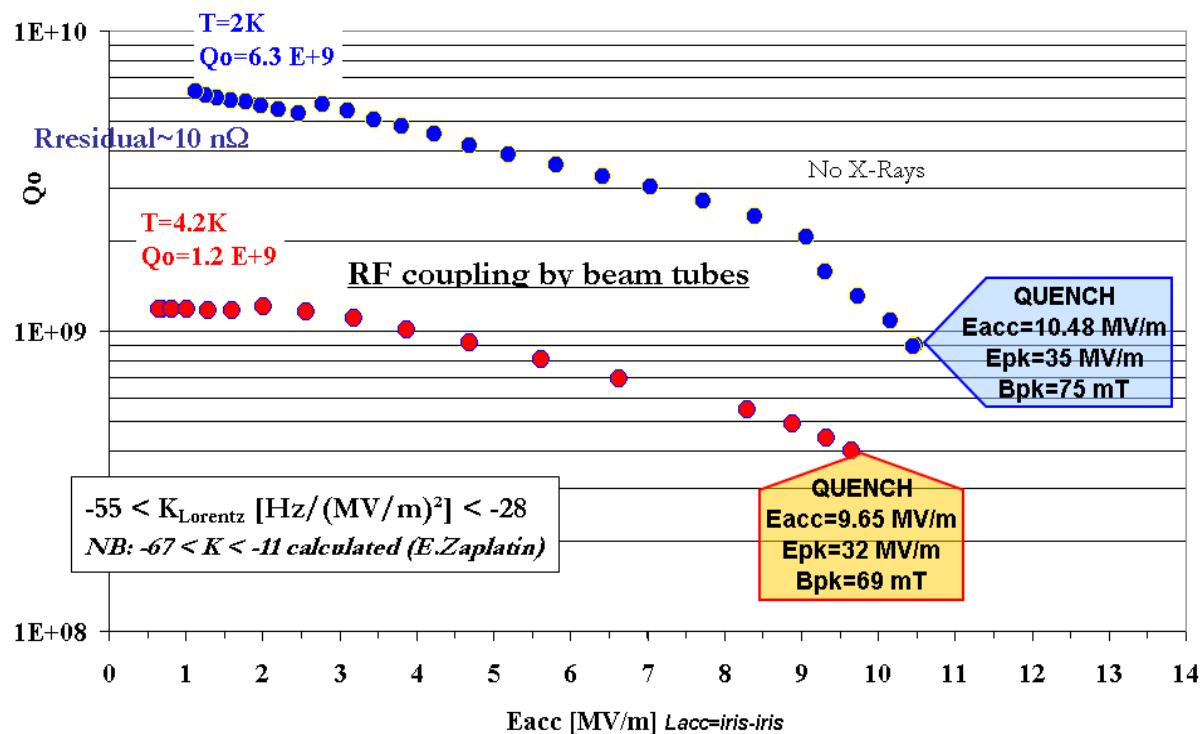


Fig. 5: Cold test results of the β 0.15 spoke cavity

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