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Coating studies on 6 GHz seamless cavities

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A key challenge for the next accelerators is the cost reduction. Bulk niobium cavities performances are closer to their theoretical limits and an alternative technology is mandatory. Niobium thin film copper cavities are the most explored solution, but the Q-slope problem, characteristic of these resonators, limits the applications where high accelerating fields are requested.

In this work an original approach is adopted in order to enhance the performances of sputtered cavities, exploring the possibility to sputter 70 micron thick films to mitigate the Q-slope in Niobium sputtered copper cavities. Different strategies have been used for stress reduction: deposition at high temperature (550 °C), deposition of thick films at the zero stress pressure point, and the development of a multilayer deposition procedure. Rf tests at 4,2 K and 1,8 K on 6 GHz resonant cavities demonstrate the possibility to mitigate the Q-slope in sputtered cavities with thick films.

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