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Ultraefficient superconducting RF cavities for FCC

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Recent Fermilab discoveries of nitrogen doping and effective magnetic flux expulsion allow quality factors in bulk niobium SRF cavities several times higher than the previous state-of-the-art from only two years ago. The combined approach using both of these techniques allows to minimize both residual and BCS surface resistances leading to the world-record quality factors of $>2 \times 10^{11}$ corresponding to surface resistance of <1.5 nOhm up to the highest fields of 20+MV/m. Possibility of such high quality factors holds the potential to dramatically decrease a dynamic heat load and affect the choice of the optimal operating temperature of FCC.

In this contribution I will briefly review these recent developments and outline their potential impact on the design of FCC.

The plans for Fermilab Nb₃Sn SRF cavity work for future 4.2K industrial (and potential FCC) applications will be discussed as well.

Presenter: ROMANENKO, Alexander (FNAL)

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