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Beam absorbing material candidates for primary collimators for FCC-ee

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The baseline beam parameters of the FCC-ee contemplate different operation modes, with beam energies ranging between 45.6 GeV and 182.5 GeV. The highest expected beam stored energy reaches 20 MJ for the so-called Z operation mode (45.6 GeV), i.e. two orders of magnitude above that found in previous and operating lepton colliders.

In order to protect sensitive equipment and to limit background to the experiments, a two-stage collimator system is planned to be implemented.

Considering that collimator materials need to have a relatively low density in order to minimise the energy density deposited by the beam, the active length of the jaws would be relatively high (30-40 cm); hence, producing a significant impact on the impedance of the machine.

For this reason, materials with high electrical conductivity are to be considered. Another important property is thermal conductivity (to be able to dissipate the heat deposited by the beam).

A preliminary study of energy deposition and thermal stresses in different candidate materials for primary collimators is presented here.

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Footnotes

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Yes

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