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Development and large scale production of conductive thin films to reduce surface impedance of collimators for particle accelerators.

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CERN's accelerators complex consist in a sequence of machines with increasing energy, (ranging from MeV up to TeV), supplying beams of protons, antiprotons and ions to the physics experiments. For high intensity beams, the electrical impedance of the surfaces facing the beam must be as low as possible in order to minimize RF losses that can lead to heating of components and beam instabilities.
Collimators provide machine protection in case of beam-instability. Low Z materials with high melting temperature are required. Carbon fibre Composites (CfC), Boron Nitride (BN) and graphite absorbers are used. However, their poor electrical conductivity has to be compensated by a highly conductive thin film coating.
In the first part of this paper we report on the development and production of conductive thin films, (usually copper), for the hundreds of collimators presently in use at CERN. The surface preparation and the multilayer structuring to improve adhesion are discussed. Results of impedance measurements after 3 years of operation are compared with the respective initial values.
In the second part we present the developments of thin films to cope with the candidate materials for next generation of absorbers of the collimators for the Large Hadron Collider, (LHC) and future accelerators. With the ever increasing demand on beam intensity, the traditional collimators with the copper coating will not withstand an accidental impact of the beam as temperatures can rise up to 1700 ºC. The optimization of TiN, TiB2 and molybdenum coatings on Molybdenum-Graphite (MoGr), (one of the candidates for absorber), is presented.

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