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Faraday Cup: absolute dosimetry for ELIMED beam line

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In the last years, the scientific community has shown a growing interest towards new acceleration techniques based on interaction of ultra-intense and ultra-short laser with solid target. Laser-driven approach in acceleration, potentially represents an exciting alternative to the conventional techniques and many researchers are investigating their possible use for multidisciplinary applications [1].
In this framework, the ELIMED (ELI-Beamlines MEDical and multidisciplinary applications) beam line , which will be installed inside the ELIMAIA experimental hall of the ELI-Beamlines facility (Dolny Brezany, CZ), has the aim to demonstrate the possibility to use laser-driven ion beams for medical applications [2, 3].
Detectors for dosimetry represent, of course, one of key-element of the ELIMED beamline and they have to permit a dose delivering with an accuracy as close as possible to the one required in the clinical applications [4].
Absolute dosimetry will be performed using a Faraday Cup, able to collect and counts the charged particles entering in the detector. It has been realized with a peculiar geometry able to optimize the charge collection efficiency and reduce the uncertainties related to the secondary electron emission. It is composed, in fact, by an internal conventional guard electrode for the charge collection maximization and a second beveled-shaped electrode, coaxial to the first one, and able to generate a special-shaped electric field [5] .
The developed Faraday Cup has been tested with conventional proton beams at CATANA facility (INFN-LNS), and the results will be compared with the ones obtained with the SIMION software. Moreover, preliminary experimental tests have been recently performed with laser-driven ion beams at RAL facility (UK), using the Petawatt Vulcan laser and at the LOA facility in Paris (France).

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