

Optics study and characterization of the ELIMED permanent magnet quadrupole system prototypes

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A system of Permanent Magnet Quadrupoles (PMQs) has been realized by INFN-LNS researchers, in collaboration with SIGMAPHI company in France, to be used as a collection and pre-selection system for laser driven proton beams. In order to validate the design and the performances of this large bore, compact, high gradient magnetic system prototype an experimental campaign have been carried out, in collaboration with the group of the SAPHIR experimental facility at LOA (Laboratoire d'Optique Appliquée) in Paris using a 200 TW Ti:Sapphire laser system. During this campaign a deep study of the quadrupole system optics has been performed, comparing the results with the simulation codes used to determine the setup of the PMQ system and to track protons with realistic TNSA-like divergence and spectrum.

Experimental and simulation results are in good agreement, demonstrating the possibility to have a good control on the magnet optics and, at the same time, improving the beam quality and fluence.

This system is meant to be a prototype to a more performing one to be installed at ELI-Beamlines for the collection of ions.

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