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Status and realization of an high efficiency transport beamline for laser-driven ion beams

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Laser-target acceleration represents a very promising alternative to conventional accelerators for several potential applications, e.g. in nuclear physics and medicine. However, some extreme features, such as a wide energy and angular spread, make optically accelerated ion beams not immediately suitable for multidisciplinary applications. Therefore, in addition to improvement of laser-target interaction, a large effort has been recently devoted to development of specific beam-transport devices in order to obtain controlled and reproducible output beams. In this framework, a three years contract has been signed between INFN-LNS (IT) and Eli-Beamlines-IoP (CZ) to provide the design and the realization of a complete transport beam-line, named ELIMED, dedicated to the transport, diagnostics and dosimetry of laser-driven ion beams. The transport beam-line will be composed by three sections for the collection, selection and final shaping of the transported beams. The collection section is made of a set of super-strong high field quality permanent magnet quadrupoles with large acceptance to minimize beam losses and a gradient of 100 T/m over a 36 mm net bore able to correct the angular dispersion and focus laser driven ions up to 70 MeV/u. The beam selection is done by a double dispersive mode magnetic chicane made of C-shaped electromagnetic dipoles able to select beams with an high resolution and to work as an active energy modulator. The final beam shaping is done by two correctors and two electromagnetic quadrupoles. In this contribution the actual status of the development and realization of these magnetic systems is described.

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