A transport beamline solution to control optically accelerated proton beams

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Laser-target interaction represents a very promising field for several potential applications, from the nuclear physics to the radiobiology. However optically accelerated particle beams are characterized by some extreme features, not suitable for many applications, as a high peak current, a poor shot-to-shot reproducibility and a wide energy and angular distribution. Therefore, beyond the improvements at the laser-target interaction level, many researchers are spending their efforts for the development of specific beam transport devices in order to obtain controlled and reproducible output beams.

In this background, this contribution want to report about a beam line dedicated for laser-driven proton beams and made of two main sections: a quadrupoles collection device and an energy selector system. It is already realized at INFN-LNS (National Institute of Physics-South National Laboratories, Ct, I) and partially tested with conventional and non conventional accelerated proton beams at INFN-LNS and at the TARANIS laser facility (Queen's University of Belfast, UK). Several simulations have been also performed using the Geant4 Monte Carlo toolkit, in order to best exploit the beamline potentiality. Simulation data on transported beams features for 5 and 30 MeV protons are reported.