

Innovative approaches in the dosimetry of laser-driven proton beams for future hadrontherapy applications

F. Romano¹, G.A.P. Cirrone¹, V. Scuderi^{1,2}, A. Amato¹, A. Attili³, M. Borgesi⁴, G. Candiano¹, L. Cosentino¹, M. Costa¹, G. Cuttone¹, G. De Luca¹, D. Doria⁴, G. Gallo¹, G. Korn², R. Leanza¹, M. Maggiore⁵, R. Manna¹, V. Marchese¹, D. Margarone², A. Maugeri¹, G. Milluzzo¹, A. Musumarra¹, L. Pandola¹, G. Petringa¹, S. Pulvirenti¹, D. Rifuggiato¹, D. Rizzo¹, R. Sacchi³, S. Salamone¹, F. Schillaci¹, M. Sedita¹, A. Seminara¹, A. Tramontana^{1,6}, B. Trovato¹

¹ *Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali del Sud, Via Santa Sofia 62, Catania, Italy*

² *Department of Experimental Program at ELI-Beamlines, Institute of Physics of the ASCR, ELI-Beamlines project, Na Slovance 2, Prague, Czech Republic*

³ *Istituto Nazionale di Fisica Nucleare, Sezione di Torino, Via P. Giuria 1, Torino, Italy*

⁴ *Centre of Plasma Physics, School of Mathematics and Physics, The Queen's University of Belfast, United Kingdom of Great Britain*

⁵ *Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Legnaro, Viale dell'Università 2, Legnaro (Pd), Italy*

⁶ *Università di Catania, Dipartimento di Fisica e Astronomia, Via S. Sofia 64, Catania, Italy*

Over the last decades, charged particle acceleration using ultra-intense and ultra-short laser pulses has been one of the most attractive topics in the relativistic laser-plasma interaction research. Actually, one of the most challenging ideas consists on using laser-target interaction as a source of high-energy ions for medical applications. In this framework, the purpose of the international ELIMED network consists in demonstrating that laser-driven high-energy proton beams can be used for multidisciplinary applications investigating, particularly, new approaches in the hadron-therapy field. We started to design a beam transport line prototype able to deliver laser-generated proton beams with properties suitable for multidisciplinary applications. A Faraday cup (FC) prototype for absolute dosimetry has been also realized and preliminary tests have been performed with conventional proton beams at LNS-INFN, and with laser-driven beams at the PALS laser facility in Prague and at the TARANIS laser facility in Belfast. In this contribution, design and characterization of the dosimetric prototypes developed will be presented. Preliminary results obtained during the above mentioned experimental tests will be also discussed.