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Study on the dosimetry of laser accelerated beams for future clinical applications.

Charged particle acceleration, based on the interaction of ultra-intense and ultra-short laser with solid target, can represent a future alternative to conventional techniques, in many applications, from to nuclear physics to radiobiology.
Nowadays, laser accelerated beam has unique features such as a very high peak current and a rather small transverse and longitudinal emittance, as well as a wide energy and angular distribution, and a poor shot-to-shot reproducibility; this makes the beam not directly suitable for many applications, in particular medical ones.
Extensive studies have been carried out on transport, diagnostic and dosimetry in order to obtain a controlled and reproducible beam.
The detectors dedicated to dosimetry of laser accelerated beams must offer response independent of dose rate and must be suitable to operate with high intense beam pulse and strong electromagnetic noise in order to obtain a precise knowledge of the absolute dose delivered, mandatory for clinical applications.
Many detectors are under investigation: solid state detectors (such as nuclear track detectors, radiochromic films, etc.) and ionimetric detectors (such as Faraday Cups and Ionization Chambers for high dose rate beams).
The nuclear track detectors, CR-39, reveal very high sensitivity and uniformity of response and permit the direct measure of particle fluence independent of the particle dose rate.
Dosimetric tests with CR-39 were performed with laser-driven beam at TARANIS, a laser facility in Belfast, at LULI, a laser facility in France, and at PALS, a laser facility in Prague.
The results obtained at the mentioned facilities will be presented.

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