

AbstractID: 7167 Title: Clinical use of strip ionization chamber detector as online proton beam monitor

Purpose: In proton therapy it is important to deliver uniform dose distribution in tumor volume. The parameters which indicate the beam geometry have to be evaluated and the beam has to be controlled during radiation. For this reason a detector system has been developed for online beam monitoring at the Centro di AdroTerapia e Applicazioni Nucleari Avanzate (CATANA) within a collaboration with the Istituto Nazionale di Fisica Nucleare- Torino (INFN-To). Shallow tumors (32 mm maximum depth) like uveal melanomas have been treated since spring 2002 in this center.

Method and Materials: The 62 MeV proton beam, extracted from LNS Superconducting Cyclotron, is delivered based on double foils scattering system. A Range shifter followed by an energy modulator is placed downstream of the scattering system to provide the Spread Out Bragg Peak (SOBP) at the tumor position. The detector has been placed upstream of the last collimator; it consists of two parallel plate strip ionization chambers segmented in vertical and horizontal orientation respectively. Each anode consists of 256 0.5 mm wide strips with $12.8 \times 12.8 \text{ cm}^2$ sensitive area.

Results: The detector has been checked in different beam conditions and is currently used in clinical practice. The beam symmetry and integrated fluence are measured with this detector. The value of skewness and centre of gravity have been tested in different clinical beam settings and the ranges of allowed values have been defined. During treatment these parameters are evaluated and checked against the set limits to ensure the correct delivery of the dose.

Conclusion: A strip ionization chamber detector has been developed to be used as online beam monitor in the proton therapy beam line at LNS (Catania, Italy). The beam is monitored with frequency of the order of one Hertz and it can be stopped in case of misbehavior during treatment.