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Preliminary tests of innovative thin silicon detectors for beam monitoring in particle therapy.

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Title: Preliminary tests of innovative thin silicon detectors for beam monitoring in particle therapy

Authors:

Anna Vignati – Author 2
Vincenzo Monaco – Author 1-2
Andrea Attili – Author 2
Nicolò Cartiglia – Author 2
Mohammad Fadavi Mazinani – Author 2
Simona Giordanengo – Author 2
Omar Hammad Ali - Presenting Author 1-2
Lorenzo Manganaro – Author 1-2
Giovanni Mazza – Author 2
Roberto Sacchi – Author 1-2
Amedeo Staiano – Author 2
Federico Fausti – Author 2-3
Marco Donetti – Author 4
Marco Ferrero – Author 2
Marco Mandurrino – Author 2
Valentina Sola – Author 2
Roberto Cirio - Senior Author 1-2

(1) Physics Department, Universita' degli studi di Torino (UniTO), Torino, Italy

(2) Istituto Nazionale di Fisica Nucleare (INFN), Torino, Italy

(3) Centro Nazionale di Adroterapia Oncologica, Pavia, Italy

(4) Politecnico di Torino (PoliTo), Torino, Italy

Purpose. For beam monitoring in particle-therapy, silicon detectors could overcome limitations of ionization chambers. In particular, silicon sensors with internal gain (Ultra Fast Silicon Detectors, UFSDs) provide high signal-to-noise ratio and fast collection times (~1ns in 50um thickness) allowing single particle counting. Beam energy can be measured with time-of-flight techniques.

Methods. Two UFSD pads (1mm²) aligned along a proton beam are used to test UFSD counting and timing properties at therapeutic fluxes.

Results. Measurements showed well separated signals with low pile-up. Number of particles, beam flux, and crossing time were determined obtaining a time resolution ~50ps for single crossing.