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Beam Interactions with Materials & Atoms

Focused microbeam single event with a scintillating foil trigger and magnetic blanking

D. Bernardi [a], G.P. Egeni [b], F. Parere [a], M. Pegoraro [a], P. Rossi [a,*], V. Rudello [b], H. Somacal [b], E. Vittone [c], M. Viviani [b]

[a] *Dipartimento di Fisica dell'Università and INFN, via Marzolo 8, I-35131 Padova, Italy*
[b] *Laboratori Nazionali di Legnaro, INFN, via Romea 4, Legnaro (PD), Italy*
[c] *Dipartimento di Fisica Sperimentale dell'Università and INFN, via Giuria 1, Torino, Italy*

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Abstract

The focused proton microbeam of the Laboratori Nazionali di Legnaro, Italy has been upgraded to perform "Single Event (SE) physics". For this, a trigger, which recognizes the crossing of a single proton, and a beam blanking system have been implemented. The trigger consists of the light signal coming from a scintillating plastic blade and read by a pair of photomultipliers, while the beam deflection is induced by a magnetic raster system, usually employed in elemental mapping. In spite of its slowness, this last device proves suitable, due to the extremely low particle rate we were able to achieve. Early tests are described here, during which regular matrices of etched nuclear tracks were produced on polymer CR39 foils. Althought, as far as efficiency and spot size are concerned, performance is still far from being satisfactory, we believe this procedure for SE studies to be practicable.

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1. Introduction

For research purposes in many scientific areas, several facilities in the world use micrometric ion beams of a few MeV as an elemental probe of samples of various nature. They often require a magnetic beam raster scanning the beam to cover the area of the sample under inspection. Some of these facilities have been upgraded to handle the so called "Single Event (SE) physics", for which one needs a fast beam blanking system, triggered by the crossing of a single particle.

The microbeam operating in the Laboratori Nazionali di Legnaro (LNL) [1,2], working with H and He with energy up to 2.4 MeV, has recently been upgraded in this way. The trigger was made

* Corresponding author. Tel.: +39-49-8277199; fax: +39-49-8277102; e-mail: rossi@pd.infn.it

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