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Establishment of a scintillator-based external trigger system for timing applications in an ion beam microprobe

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External trigger systems are essential in ion beam facilities because they enable precise synchronization and detection with other experimental or diagnostic equipment. This synchronization is crucial for achieving reproducible measurements and improving the temporal resolution of some experiments [1]. In this contribution, we report on the development and commissioning of a external trigger device based on an ultra-thin EJ-214 plastic scintillator [2] at the ion beam microprobe of the National Accelerator Center [3] (CNA, Seville). Unlike conventional self-trigger modes, this setup provides enhanced temporal stability and enables both single-ion recognition and Time Of Flight applications. The thickness and uniformity of the scintillator were assessed using Rutherford Backscattering Spectrometry, which revealed deviations from the nominal design. Although the reduced thickness lowered the output signal amplitude, it also decreased energy straggling, helping to preserve beam quality and enabling more precise timing analyses. Experimental tests confirmed a strong dependence of detector response on the ion impact position and transmission studies showed that less than 2% of protons in the 2-3 MeV energy range passed through the collimator slits, highlighting the device's suitability for high-current conditions thanks to the radiation tolerance of plastic scintillators. These results establish the system as a reliable trigger for techniques with high temporal resolution like in the Time-Resolved Ion Beam Induced Charge experiments and as a diagnostic tool for microbeam applications.

- 1) Magalhaes-Martins, P.; Dal-Bello, R.; Seimetz M.; Hermann, G.; Kihm, T.; Seco, J. *Front. Phys.* 2020, 8:169.
- 2) Seimetz, M.; Bellido, P.; Soriano, A.; López, J.G.; Jiménez Ramos, M.C.; Fernández, B.; Conde, P.; Crespo, E.; González, A.J.; Hernández, L.; et al. *IEEE Trans. Nucl. Sci.* 2015, 62, 3216-3224.
- 3) Lopez, J.G.; Ager, F.J.; Rank, M.B.; Madrigal, M.; Ontalba, M.A.; Respaldiza, M.A.; Ynsa, M.D. *Nucl. Instrum. Methods B.* 2000, 161-163, 1137-1142.

Abstract

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Primary author(s): Dr. RODRÍGUEZ RAMOS, Mauricio; GARCIA LOPEZ, Javier (Dept. Atomic, Molecular and Nuclear Physics and National Accelerator Center. University of Sevilla. Spain); SEIMETZ, Michael (CSIC - Instituto de Instrumentación para Imagen Molecular (i3M)); Sra. TORRES MUÑOZ, Carmen (Centro Nacional de aceleradores); Sra. JUAN MORALES, Jessica (Instituto de Instrumentación para Imagen Molecular (I3M), CSIC-Universitat Politècnica de València - 46022 Valencia, Spain); JIMÉNEZ-RAMOS, M^a Carmen (Centro Nacional de Aceleradores-Sevilla)

Presenter(s): Dr. RODRÍGUEZ RAMOS, Mauricio

Clasificación de la sesión : Transferencia de Tecnología

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