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Results on diamond timing detector for the TOTEM experiment

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We describe the results and status of our R&D on timing detectors for the TOTEM Collaboration. Physics program of the TOTEM experiment will require precise time of flight detectors with a resolution better than 50 ps, to be installed in the TOTEM Vertical Roman Pots (RPs).

To achieve such result we exploited ultra pure sCVD diamond technology, which provides fast, low noise and radiation hard devices. Moreover, since each RP can host 4 diamond detection plane, timing constraints are relaxed by a factor 2.

On the other side diamond output signal from 8 TeV proton is very low ($\sim 2fC/particle$) and extreme care must thus be placed on the development of dedicated front-end electronic.

Test-beams performed so far will be presented, describing set-ups and results obtained. At first off-the-shelf devices were used but unsatisfactory results push us to design a new detector. The front-end electronics, one of the critical point of the design, will be presented and discussed.

Different offline analysis techniques indicate how different processing algorithm will affect detector resolution. Digitization of the signal with a fast sampler has already been tested.

Together with timing performance also detector efficiency has been studied during the latest test-beams. Very satisfactory results have been obtained, both for timing and efficiency.

Collaboration

On behalf of the TOTEM Collaboration

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