



ID de Contribution: 0

Type: **Poster**

## **Novel applications and future perspectives of a fast diamond gamma ray detector**

*lundi 9 mai 2016 15:30 (1 heure)*

For the first time, a diamond sensor was operated for the characterisation of a high average-intensity gamma-ray beam.

Data was collected for gamma beam energies between 2 and 7 MeV, at the HI $\gamma$ S facility of TUNL.

The nanosecond-fast resolution of diamond detectors is exploited to distinguish bunches of gamma rays 16.8 ns apart.

It allows a precise direct determination of the time-structure of the gamma beam.

The strong potential of such a detector for precise absolute flux, position and polarisation measurements is exposed.

It is thus shown that diamond detectors are a decisive and unique tool for the detailed characterisation of upcoming gamma sources, such as ELI-NP and HI $\gamma$ S-2, which will revolutionise the future of nuclear physics.

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**Classification de Session:** Poster session

**Classification de thématique:** Accelerator Physics