Contribution ID: **83**   Type: **not specified**

Tests at INFN on X-ray photon counting hybrid pixel detectors based on the Timepix4 ASIC

Thursday, 22 June 2023 13:10 (20 minutes)

Timepix4 is the readout chip produced by the Medipix4 international Collaboration for hybrid pixel detector assemblies, developed to provide particle identification and tracking with high spatial and timing resolution. The chip is composed of 448 x 512 pixels with a size of 55 μm x 55 μm, which can be coupled to a sensor with a matching pixel structure, for a total active area of about 7 cm^2. For the first time, these chips are fully prepared for Through-Silicon-Via (TSV) processing, so that they could be tiled on four sides to cover large areas with negligible dead regions.

Timepix4 can operate in two different modes: frame-based, where each event generating a signal above a programmable threshold increments a counter, and data-driven, in which time-of-arrival and time-over-threshold are measured for each signal over threshold in a pixel.

INFN joined the Medipix4 collaboration in 2020 with the aim of studying and testing the possible applications of the read-out chips in a wide range of fields, from X-ray spectral imaging to nuclear medicine and dosimetry. The characterization of the first available assemblies of Timepix4 bump-bonded to silicon sensors are currently ongoing at INFN. In this contribution we will present an overview of this innovative technology and the first results of the characterization activities at INFN.

Summary

Primary authors: CARDARELLI, Paolo (Istituto Nazionale di Fisica Nucleare); BIESUZ, Nicolò Vladi (INFN, Ferrara (IT)); BOLZONELLA, Riccardo (Istituto Nazionale di Fisica Nucleare); CAVALLINI, Viola (Istituto Nazionale di Fisica Nucleare); DELOGU, Pasquale (Istituto Nazionale di Fisica Nucleare); FERUGLIO, Alessandro (Istituto Nazionale Fisica Nucleare); FIORINI, Massimiliano (Istituto Nazionale di Fisica Nucleare); FRANZOSO, Edoardo (Istituto Nazionale di Fisica Nucleare); LONGO, Renata (Istituto Nazionale di Fisica Nucleare); METTIVIER, Giovanni (Istituto Nazionale di Fisica Nucleare); ROMOLINI, Gabriele (Istituto Nazionale Fisica Nucleare); ROSSO, Valeria (Istituto Nazionale di Fisica Nucleare); TAIBI, Angelo (Istituto Nazionale di Fisica Nucleare); TUDISCO, Salvatore (Istituto Nazionale di Fisica Nucleare)

Presenter: CARDARELLI, Paolo (Istituto Nazionale di Fisica Nucleare)

Session Classification: X-ray detectors