



Contribution ID: 324

Type: **Recorded Presentation**

## Power Efficient High-Frequency Readout Concepts of SiPMs for TOF-PET and HEP

Recent SiPM developments, together with improved readout electronics, opened new doors in TOF-PET and HEP research with a focus on prompt photon detection with inorganic scintillators. For instance, the relatively high Cherenkov yield of Bismuth-Germanate (BGO) upon 511 keV gamma interaction has triggered a lot of interest, especially for its use in total-body PET scanners due to the relatively low production costs of BGO. However, especially in TOF-PET, the electronic readout for BGO still poses unsolved problems. Lab experiments have shown the benefit of Cherenkov detection, with coincidence time resolutions (CTRs) < 200 ps FWHM achieved, but lack system integration due to an unacceptable high power consumption of the used amplifiers. In this contribution we will discuss different readout concepts of modern analog SiPMs for which we tested several high-bandwidth amplifiers, commercially available, small in dimension, cheap and with a power consumption ranging from 288 mW to 17 mW. We found that all tested amplifiers showed similar CTR performance of ~100 ps FWHM coupling a 3x3x3 mm<sup>3</sup> LYSO:Ce cube from Epic-crystals to an S14160-3050HS Hamamatsu SiPM with 3x3 mm<sup>2</sup> active area. The CTR performance with BGO is comparable for all tested amplifiers and the noise contribution to the SPTR is found negligible. A detailed overview and discussion of the front-end readout and key parameters for achieving highest time resolution with prompt photon emitting scintillators will be given.

### Primary experiment

**Primary author:** GUNDACKER, Stefan (RWTH Aachen University)

**Co-authors:** KRAKE, Mario (RWTH Aachen University); NADIG, Vanessa (RWTH Aachen University); SCHULZ, Volkmar (RWTH Aachen University)

**Presenter:** GUNDACKER, Stefan (RWTH Aachen University)

**Track Classification:** SiPM