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CAD: A Current-Mode Amplifier and Discriminator ASIC for MRPC-TOF Detectors

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A fully current-mode front-end ASIC has been developed for MRPC detectors for TOF measurements. Unlike NINO or PADI developed by CERN and GSI respectively, it uses direct current discrimination to get the timing signal. It has fast time response at low power consumption and high time resolution can be achieved even for small signals. A detailed analysis and demonstration will be described in this paper. The first prototype was implemented in single-ended chain and was fabricated in 0.35um CMOS process. The preliminary test results shows that 20ps time jitter can be achieved for signals ~10uA above the threshold. The threshold is set to 263uA and it is limited by the oscillation caused by the feedback from ground and/or power supply. A newer version was designed and under test. Oscillation was highly suppressed. Detailed results will be reported in this presentation.

Primary author: Dr DENG, Zhi (Department of Engineering Physics, Tsinghua University)

Co-authors: Dr GONZALEZ-DIAZ, Diego (GSI Helmholtz Centre for Heavy Ion Research GmbH, Planckstraße 1, 64291 Darmstadt, Germany); Ms ZHOU, Xin (TSINGHUA UNIVERSITY); Prof. WANG, Yi (Department of Engineering Physics, Tsinghua University); Prof. LIU, Yinong (Department of Engineering Physics, Tsinghua University)

Presenter: Ms ZHOU, Xin (TSINGHUA UNIVERSITY)

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