

## Design a TDC in SiGe for the Front-end electronics for the RPCs used in a high-rate experiment.

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With the new RPC's generation, it is possible to work with induced signals of hundreds  $\mu V$ , hence the front-end electronics is an important and delicate part of the detector order to get a detectable signal. The electronic chain is made up of an amplifier, a discriminator, a TDC. The new front-end is realized by the use of silicon-germanium (SiGe) components, provided by IHP microelectronics. With this technology, it is possible to implement BJT and MOS transistors on the same chip. The benefit of this improvement is minimized: power consumption of the channels ( $2 \div 3 \frac{mW}{ch}$ ), noise ( $500 e^- \text{ RMS}$ ), radiation hardness ( $10^{10} \frac{n}{cm}$ ) and it maximizes the speed of response electronics.

In this talk I will show the first results of TDC prototypes. The TDC uses a local oscillator, that has an oscillation range between 0.6-3 GHz, and a the temporal jitter of 15 ps. The data output from the TDC are presented in binary in order to lighten data processing to the acquisition system. Moreover, we are studying a way to minimize system latency. This optimization involves the adding a serializer (PISO) that sends the TDC data output to the acquisition system at 2 GHz.

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