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Readout electronics for the sPHENIX Time Projection Chamber

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One of the major physics goals of the sPHENIX experiment at RHIC is to measure the Upsilon states with 100 MeV mass resolution. In order to achieve this resolution, a Time Projection Chamber (TPC) was proposed for momentum measurements of electrons and hadrons. The TPC does not have a gating grid similarly to the ALICE TPC case and therefore is capable of handling the collision rate of up to a few hundreds of kHz. In turn, the charge has to be read out continuously. The readout electronics was newly designed to meet this requirement. The signal is read out by 624 Frontend cards that have 8 SAMPA v5 chips, the new version of the one employed for ALICE TPC, and sent to a backend electronics, FELIX PCI card, designed for ATLAS experiment. The data rate from the whole TPC may reach as much as 1.4 Tbps. We will show the readout scheme for the TPC and the performance from the prototype boards as well as the data reduction scheme.

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