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The STAR Level-3 Trigger System

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The RHIC accelerator at Brookhaven National Laboratory, USA, will investigate $Au+Au$ collisions with $\sqrt{s} \leq 200$ A·GeV and $p+p$ collisions with $\sqrt{s} \leq 500$ GeV. The STAR experiment is a large scale, cylindrical, symmetric 4π -detector. Data taking will start in 1999 with a full size TPC (Time Projection Chamber, $R_{in}=0.6$ m, $R_{out}=2$ m) with 24 TPC sectors, 6912 pads each. TPCs are specifically suitable for detecting high density charged particle fluxes in high multiplicity nucleus-nucleus events.

The level-3 trigger system of the STAR experiment will in the final stage consist of a farm of at least one ALPHA/Linux processor per TPC sector, interconnected by high bandwidth networks (MYRINET and SCI). The system will perform online tracking of $N_{track} \geq 8000$ tracks per event ($N_{point} \leq 45$ per track). The track data will be transferred to a global level-3 CPU (expected data transfer rate $\simeq 48$ MB/s), performing online event analysis tasks (e.g. invariant mass reconstruction) with a design trigger input rate of $R=100$ Hz. A large scale prototype system (1/3 of the final design, $R=20$ Hz) is envisaged for data taking in 11/99; first results will be presented.

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