

Charge to the STAR TPC Review Committee

The STAR Collaboration has recently upgraded the Time Projection Chamber readout electronics so the TPC can take data at ~ 1 kHz rates. The collaboration is also planning to install several new detectors whose installation will coincide, in time, with a significant increase in the luminosity of the beams at RHIC. These upgrades will allow the collaboration to continue to do compelling physics for many more years but the usefulness of these new detectors will depend on excellent performance from the TPC. Therefore, it is important to know if the TPC can meet the requirements of the experimental program in the high luminosity era at RHIC and if there are intrinsic lifetime or aging issues for the TPC that might affect how, or how long, it can run.

The committee is requested to assess the performance of the TPC in the high luminosity environment which will be encountered at RHIC II, for both pp and HI collisions. The benchmark values of the luminosity for 2013, and beyond, are:

$$\begin{array}{ll} \text{Au-Au (200 GeV/N)} & L_{\text{avg}} = 80 \times 10^{26} \text{ cm}^{-2} \text{ sec}^{-1} \\ \text{pp (200 GeV)} & L_{\text{avg}} = 6 \times 10^{31} \text{ cm}^{-2} \text{ sec}^{-1} \\ \text{pp (500 GeV)} & L_{\text{avg}} = 15 \times 10^{31} \text{ cm}^{-2} \text{ sec}^{-1} \end{array}$$

The committee should also review the manpower commitments that are devoted to the operation of the TPC.

Questions:

Under the above conditions, the specific questions to be discussed in the review are:

- (1) The measure (seriousness) of the aging problem: Is it possible to anticipate problems and predict the future performance of the TPC
- (2) The impact on the physics programs, including pp and HI collisions
- (3) Possible ways to mitigate the problem or restore prior performance

The committee is requested to submit their final report to the STAR spokesperson by the end of May, 2009.