

MACHINE TIME EXECUTION

REPORT (_____ CYCLE)

Experimental Group	T-535	Reporter	Chuck Hailey
Scheduled Period and Shift		Para	Pi2

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SUMMARY OF EXECUTION AND RESULTS

We took beam from 16 April to 28 April 2004. The first six (6) days were spent tuning the beam for 1 GeV/c antiprotons and setting up our electronics and detector with both protons and antiprotons. The nominal beam position was found to be displaced from that marked on the floor for the optimal magnet settings. A full report on the beam tuning and the intensity of antiprotons observed will be provided shortly in a separate report. The beam intensity was excellent at 20 antiprotons per spill – better than predictions by almost an order of magnitude. We operated with protons for calibration and timing and to establish range curves for degraders. We took 125 total hours (16 equivalent shifts) of data using antiprotons. These targets included ethyl hexafluoride and some work with a carbon aerogel target. We also ran for part of a shift with no target cell in order to assess the effects of target and ambient background, and we performed periodic gain calibration of the detector using a radioactive source. Detector count rates in the GAPS detector were comparable to pre-experiment predictions. Our detector and data-taking system operated as expected with no downtime. We encountered higher than expected background from our thick Pb degrader, and this reduced the signal to noise from what we had predicted. The origin of the background remains unclear (data analysis is underway), but is possibly due to neutrons generated from pion and antiproton interactions in our degrader. Future measurements may require a plastic anticoincidence shield around the GAPS detector to help suppress this background. Preliminary analysis has identified a number of candidate events indicating that antiproton captures and X-ray emission from exotic atoms took place in the target.

EXECUTED MACHINE TIME, BEAM CONDITION, DOWN TIME etc.

We spent 3 shifts tuning the beam to conducting beam studies to optimize antiproton intensity and 15 shifts setting up electronics and performing preliminary calibration measurements on our detector system. Actual data was taken with antiproton beam over the 19 shifts with 2.2 million antiprotons recorded on target (16 equivalent shifts) and 3 equivalent shifts used for periodic gain calibration. The beam condition was stable throughout our measurement and we experienced essentially no accelerator downtime.

COMMENTS

The experiment went smoothly and there is plenty of data to analyze.