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AGS STUDIES REPORT

Low Intensity Studies for Polarized Proton

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Objectives 1. Final test of preamplifiers and line drivers for the E-20 R.F. phase electrode and the radial position servo.

2. Test of the beam position pickup electrode preamplifier/line driver prototype assembly.

General

The first step in this study was to get calibrations on the wall current monitor and the IPM. After these initial measurements were made and recorded, the installation of the polarized proton equipment was made and their performance at various beam intensities noted.

Study Sequence

At the beginning of this study, the beam intensity was reduced to 3×10^{10} ppp. Calibrations were obtained from the F20 wall current monitor and the IPM. Pictures were taken of the radial loop sum and difference signals and the RF system clipper amplifier signal.

The E-20 RF phase electrode and radial loop, preamplifiers and line drivers, were then installed and set for their lowest gains (typically + 26db).

The beam intensity was again reduced to about 2.8×10^{10} ppp, current monitor and IPM measurements were again made and recorded. The RF clipper amplifier input and the radial servo sum and difference signals were again recorded. There were no problems noted at this time.

The beam intensity was lowered again until the threshold level of the radial loop was reached. The beam intensity measurements were repeated. The intensity was now found to be about 1.4×10^{10} ppp.

At this time the beam was turned off and the gains of the amplifiers, located in the ring, were raised by +20 db. We now had our first real problem. For some reason we could not accelerate beam. There appeared to be sum and difference signals from the radial loop, but the current monitors showed nothing. Switching the RF system to synthetic sweep, we found the radial signals to be stray RF pickup. It should be noted that the J7 pickup electrode was being used for the radial position, and there is an RF cavity at J10. The G7 pickup electrodes had been used for previous low intensity studies and this problem did not occur. The extra +20 db gain brought the RF signals out of the noise.

Time was running short and the 2nd phase of the study had not been started yet. The decision was made to install the beam position preamplifier/line driver package (four channels) at E - 14 pue and then to return to the 1.4×10^{10} ppp intensity level (with lower preamp. gains).

Again we could not accelerate beam. It was then determined that one of the injection bumps had tripped off. This apparently had caused the problem when we wanted to run at intensities lower than 1.4×10^{10} ppp, but now it was too late to repeat that exercise.

The beam was accelerated again at the 1.4×10^{10} ppp intensity. The RF and DC outputs of the E-14 pue amplifier, at the main control room, were observed. Eureka, the preamp works!!

Results

The first part of this study proves that the final models of the rf system preamplifier/line drivers work as well as their prototypes and we will be able to accelerate beam at polarized proton intensity levels.

The second part of this study was the first real test of position pue preamplifier/line driver package. Looking at the system outputs at the main control room end, the RF waveforms had flat baselines, showed no clipping or saturation, and no noticeable distortion. The sum and difference outputs were equally as acceptable and of sufficient amplitude to make position measurements. No SCR noise was seen on the outputs.

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