



Brookhaven
National Laboratory

BNL-104452-2014-TECH

AGS/AD/Tech Note No. 11;BNL-104452-2014-IR

PROGRESS REPORT (4) CONCERNING HIGH GRADIENT COLUMN

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March 1966

Collider Accelerator Department
Brookhaven National Laboratory

U.S. Department of Energy

USDOE Office of Science (SC)

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AGS DIVISION TECHNICAL NOTE

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The duoplasmatron in the present preinjector continues to perform reliable with an averaged beam current of around 75 mA after the column. Harold Wroe thinks that the cathode attachment will soon be in its final state.

Harold took a bunch of emittance measurements at 750 keV for various conditions and geometries of the extractor region of the source; he is still in the process of evaluating his results. An interesting feature anyhow, is that with a small expansion cup ($\phi = 1\frac{1}{2}$ mm instead of 4 mm), an important higher brilliance ($\approx 8 \times 10^8$ mA/cm² rad²) could be obtained, maintaining the same column output current. To determine the maximum column output (which is now 115 mA), he plans to install a solenoid with large inner diameter just behind the column.

The duoplasmatron with large cup has been installed in the rig; unfortunately oscillations ($\pm 15\%$ of the peak value) have been observed on the output, but none on the discharge current, which was inherent in previous results with the old source. The only difference was the anode exit hole (0.025-in.), which could not be made larger due to the absence of cooling around the leak. A quick check of some larger cup sizes on Harold's rig proved that the size of the exit hole was indeed important. A cathode air-vacuum lock is in the workshop.

Accelerating Column

A column has been assembled with one set of voltage dividers (bananas) and spark gaps. Vacuum has been obtained as low as 6×10^{-7} mm (meter indication).

Vincent Kovarik's RDI power supply is now running more or less reliably at 600 kV. The rectifiers are still a weak part; life tests with modified Machlett tubes will start soon. The HV bushing (an unshielded Sames cable) and the connections with the measuring dome stood 600 kV during short trials. HV tests of dome and column are in progress.

The vital parts for the inner structure and assembling are ready; however, Bill Schneider has to modify the adaptor of the source, so that the anode can reach the extractor at closer distances than originally planned. His measuring box should be ready as soon as possible, (ultimate date - middle of March!).

Final cabling by Bob Lockey's people should be finished soon. A 150 kV power supply will be installed in the equipment dome; it can be used either to increase the voltage up to 750 kV or as a stand-by in case of lower limitation in RDI, bushings, etc.

After some modifications of Rudy Damm's solenoid, the theoretical magnetic field has been obtained; significant asymmetries ($\sim 5\%$ of axis field value) within an effective core of 2-in. were observed over short distances on both ends of the solenoid. An improved version with twice the number of turns per unit length than the original one will diminish the above asymmetries to a smaller figure.

Dick Amari's 750 kV automatic emittance unit is more or less designed.

The 50 MeV emittance unit is in the assembling status. There is some lack of technicians in this building period.

Attached you will find a time schedule of the HV tests, etc.

cc: R. Amari
R. Damm
V. Kovarik
R. Larson
R. Lockey
V. Racaniello
W. Schneider
A. van Steenbergen
H. Wroe

TS/ah

TIME SCHEDULE

	Feb. 7-11	Feb. 14-18	Feb. 21-25	Feb.-March 28 - 4	March 7-11
RDI - dome - column HV tests	←→	-----→			
Installation Ti-electrodes		←→	-----→		
HV tests column and electrodes			←→	-----→	
Installation ion source, emittance box, belt, freon cooling, solenoid, second set of voltage dividers				←→	-----→