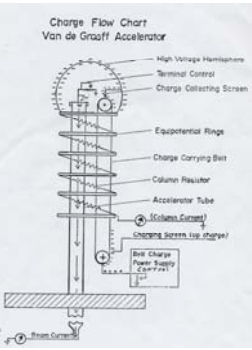


Computer Interfacing the Van Der Graff Generator

Scott Little, Taylor University
 Dr. Gary Farlow, Wright State University



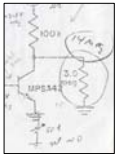
How the Van Der Graff Accelerator Works

- The main tank of the accelerator is filled with gas to prevent arcing and production of ozone. The beam tube is placed under a vacuum.
- Steps



Schematic of Accelerator

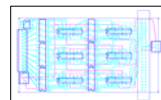
- Bias the belt pulley with a positive charge to induce a negative charge onto the belt
- From the belt the charge can go into 3 places:
 - Charge can collect (via a collecting screen) on the hemisphere to produce a 2 MeV potential.
 - Charge can go through a series of resistors that cause a voltage drop. When the potential is differentiated with respect to distance ($E = -dV/dx$), it creates a constant E-field. The constant E-field produces a force on the electrons ($F = q \cdot E$) in the beam tube and effectively accelerates them via Newton's second law: $F = m \cdot a$.
 - Part of the electrons go into the beam tube to be accelerated onto an irradiation sample
- The currents and voltages produced in these steps are then monitored on a control panel shielded from the radiation of the machine.



Stabilizer Circuit

Project Overview

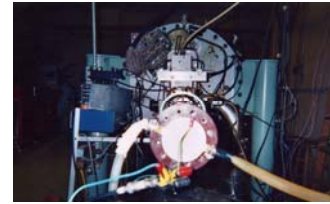
- Purpose**
 - Monitor input signals from the Van Der Graff generator
 - Control via computer the amount of charge implanted into an irradiation sample
 - Use the computer to automatically adjust the amount of charge present on the charging belt
 - Provide a computer controlled emergency stop
- Means of implementation**
 - Read and buffer signals via a self-designed signal conditioning board (SCB)
 - National Instrument's Data Acquisition Board (DAQ) will then read the buffered data into its analog inputs and make the information to Labview
 - A Labview program written by Alan Henderson (Wright State physics graduate student) and Scott Little will provide for monitoring and control via a graphical user interface
 - Computer control will be provided by the DAQ's analog outputs and digital I/O ports



The signal conditioning board schematic



Above: the signal conditioning board



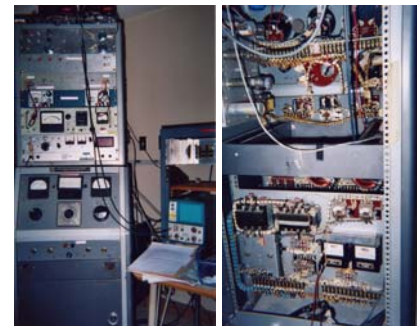
End of accelerator where sample is mounted



Gas filled tank that produces potential difference



Column in which the electrons travel in vacuum



Left: Front of VDG control panel Right: Back panel of panel

Acknowledgments for support and funding:



National Science Foundation



Physics REU Program



Department of Defense