

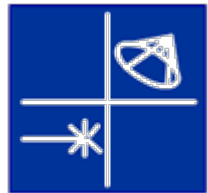
PIXE PAN 2008



NUCLEAR STRUCTURE LABORATORY

ISNAP

UNIVERSITY OF NOTRE DAME



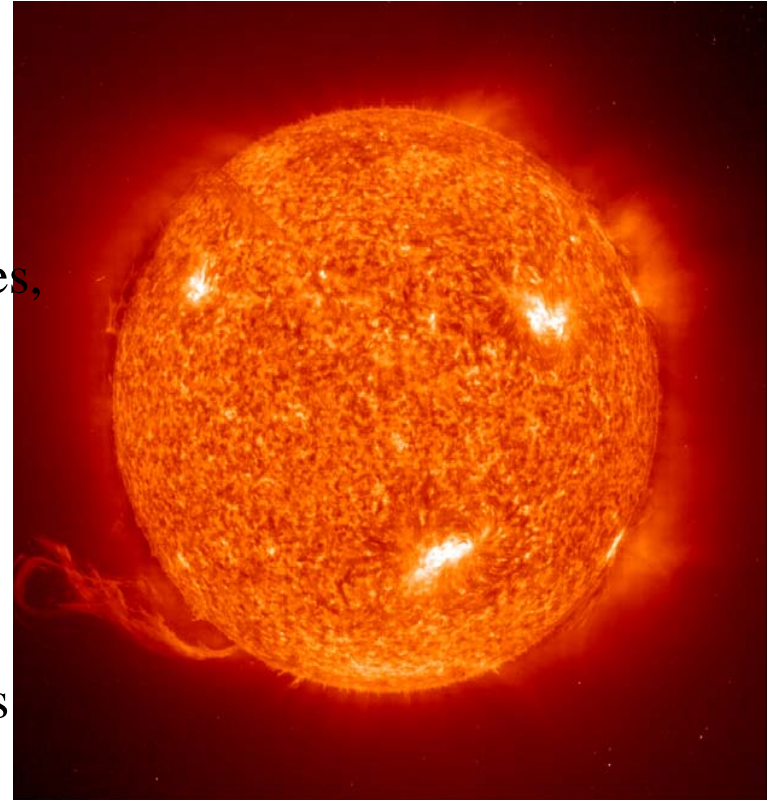
J I N A

The Joint Institute for Nuclear Astrophysics

www.JINAweb.org

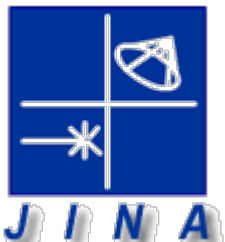
Purpose of the Lab

- Nuclear Structure
 - Determine physical characteristics of individual isotopes (mass, level schemes, half lives)
- Nuclear Astrophysics
 - Recreate stellar conditions to help determine the origin of the elements
- Radiation Chemistry
 - Studies the effect ionizing radiation has on various molecules
- Other Various Projects

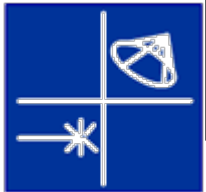
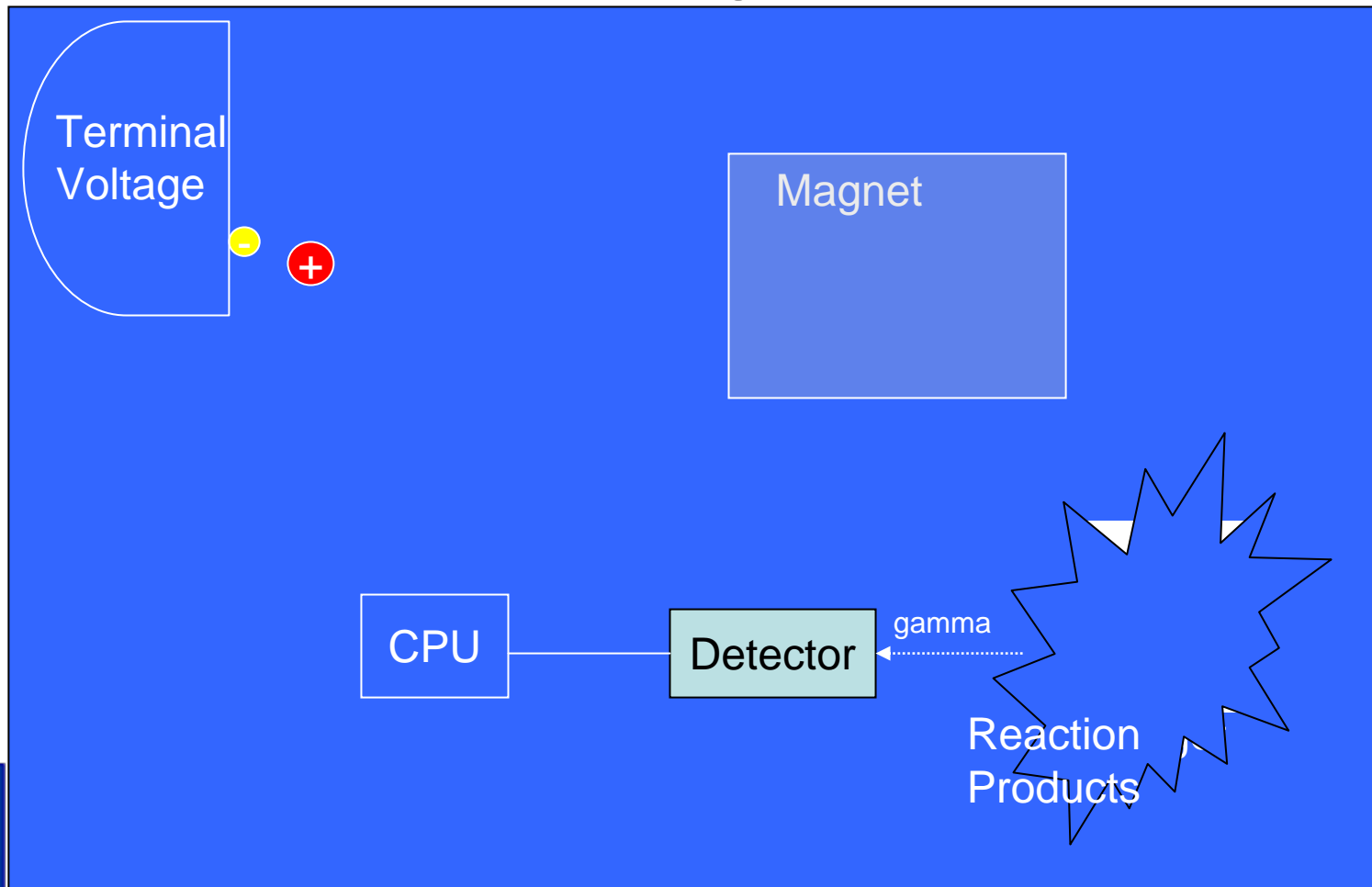


How to make a Nuclear Reaction

- Create High Electrical Potentials
- Use these to provide kinetic energy to charged particles (nuclei)
- Direct these particles so they interact with desired target material

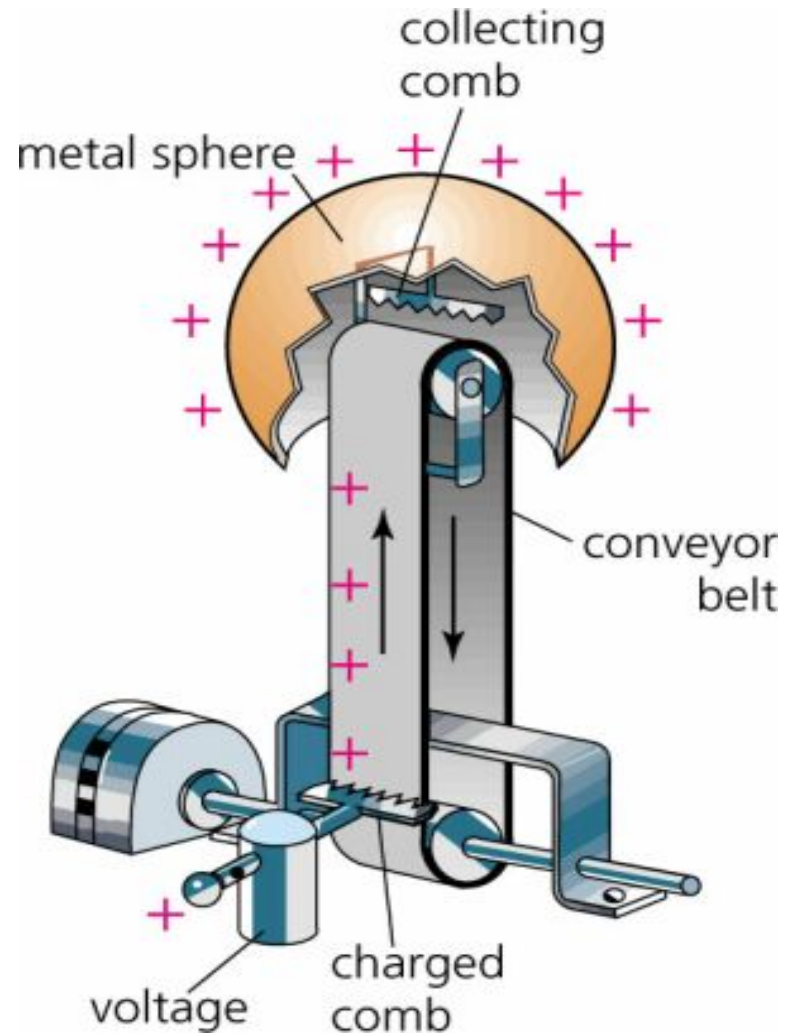


The General Idea:



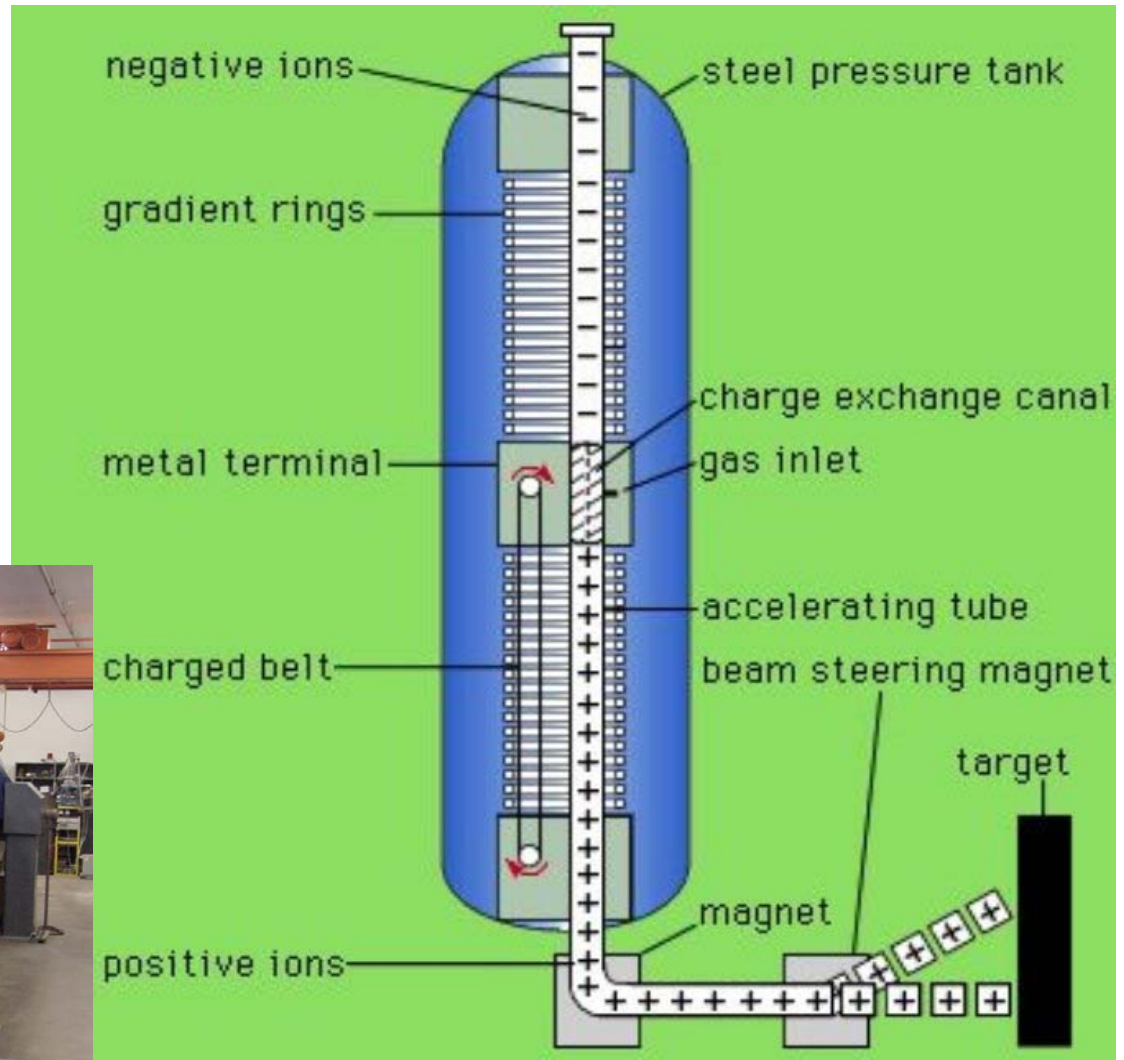
The Van de Graaff

- Our accelerators are based upon Van de Graaff Generators first developed by Robert Van de Graaff in the early 1900's
- Very High Voltages can be achieved with this method
 - JN 1 Million Volts
 - KN 4 Million Volts
 - FN 10 Million Volts



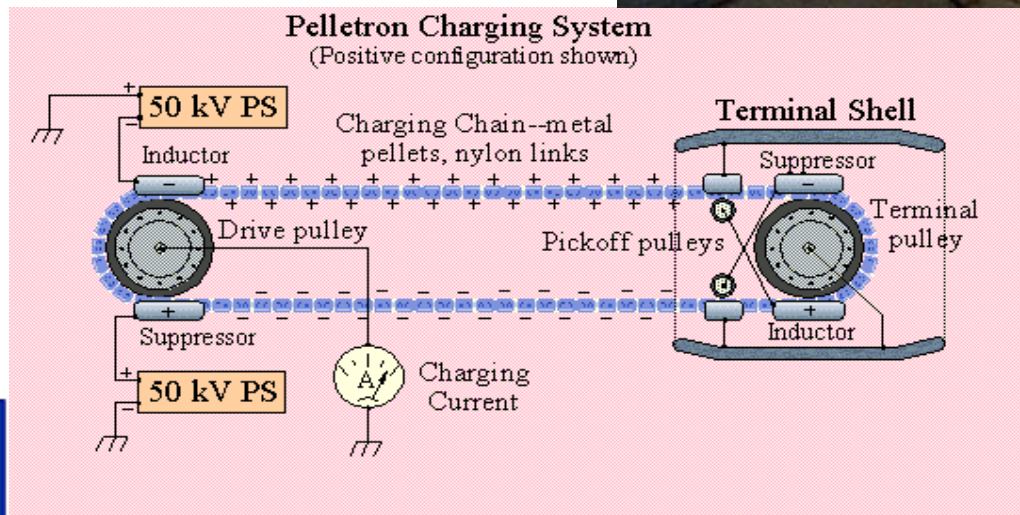
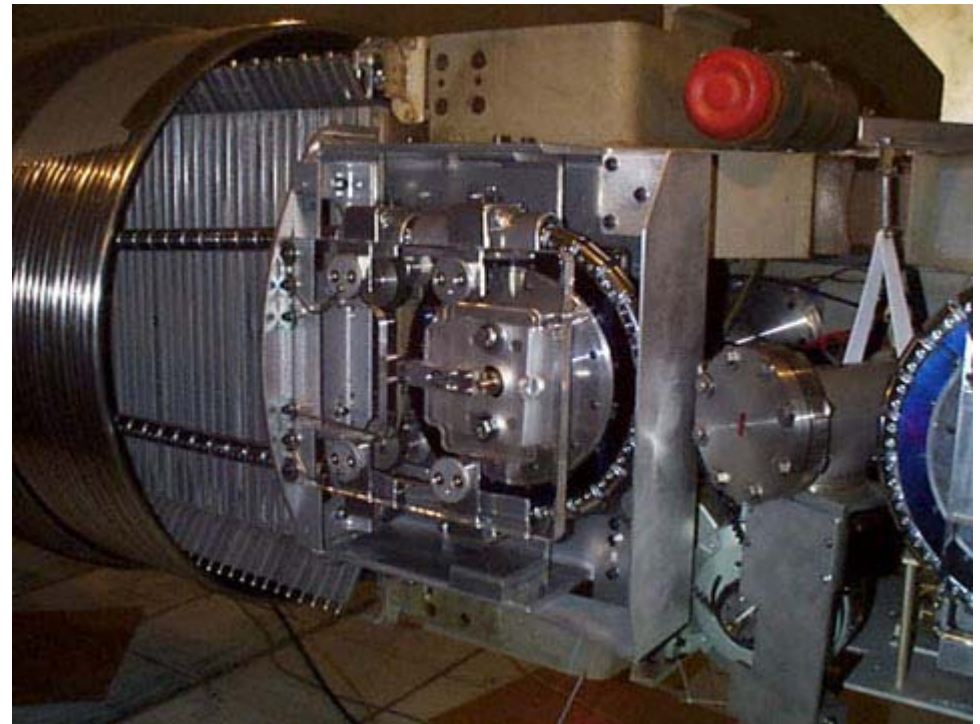
From Generator to Accelerator

- Need to provide a evacuated path for the ions
- Need to be able to provide a stable yet variable terminal voltage
- Need to provide a smooth gradient from the terminal

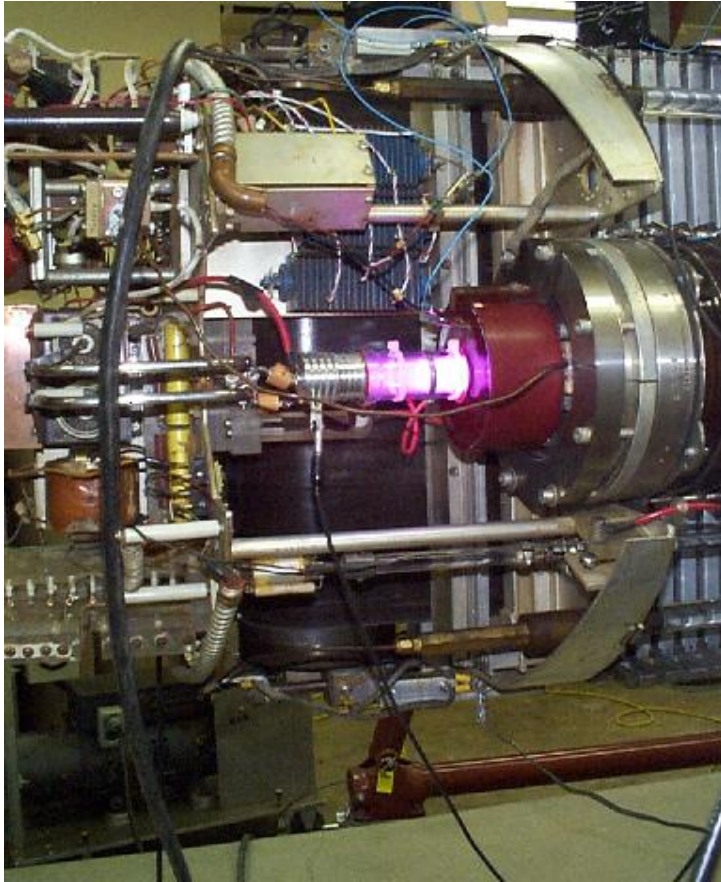


The Pelletron

An improvement over the belt based charging system by NEC which is used in our FN.



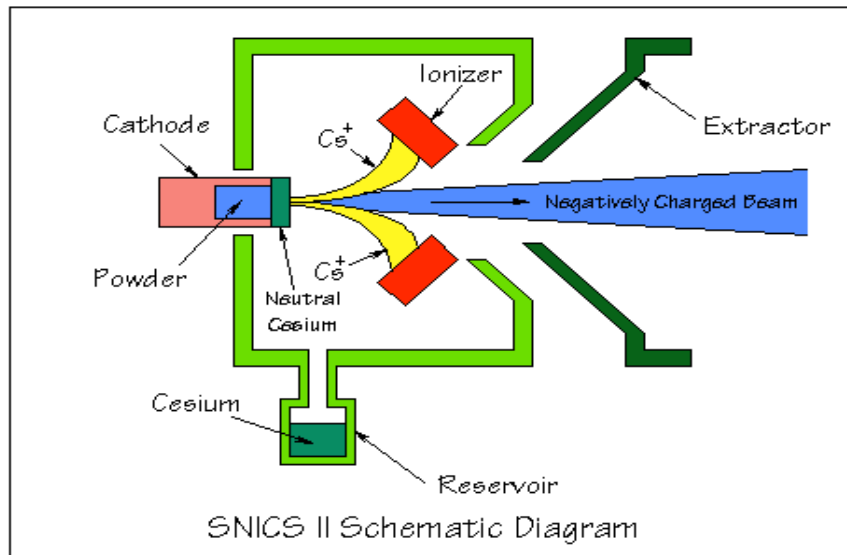
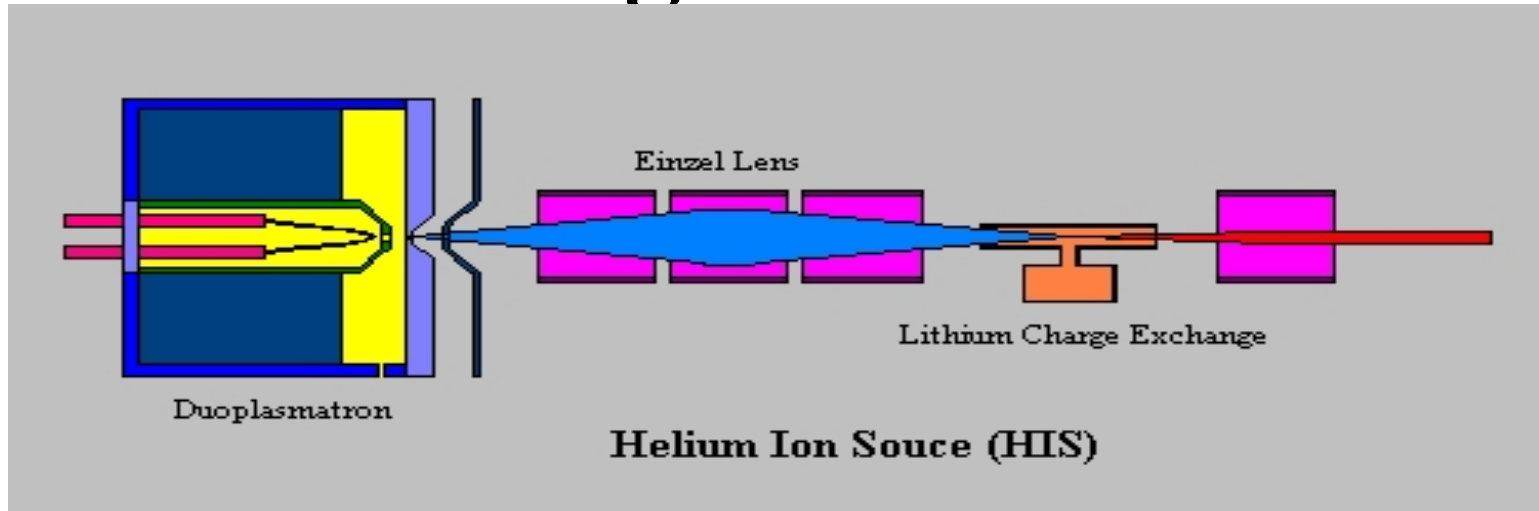
Making Beam



Single Ended machines use
RF Ion Source

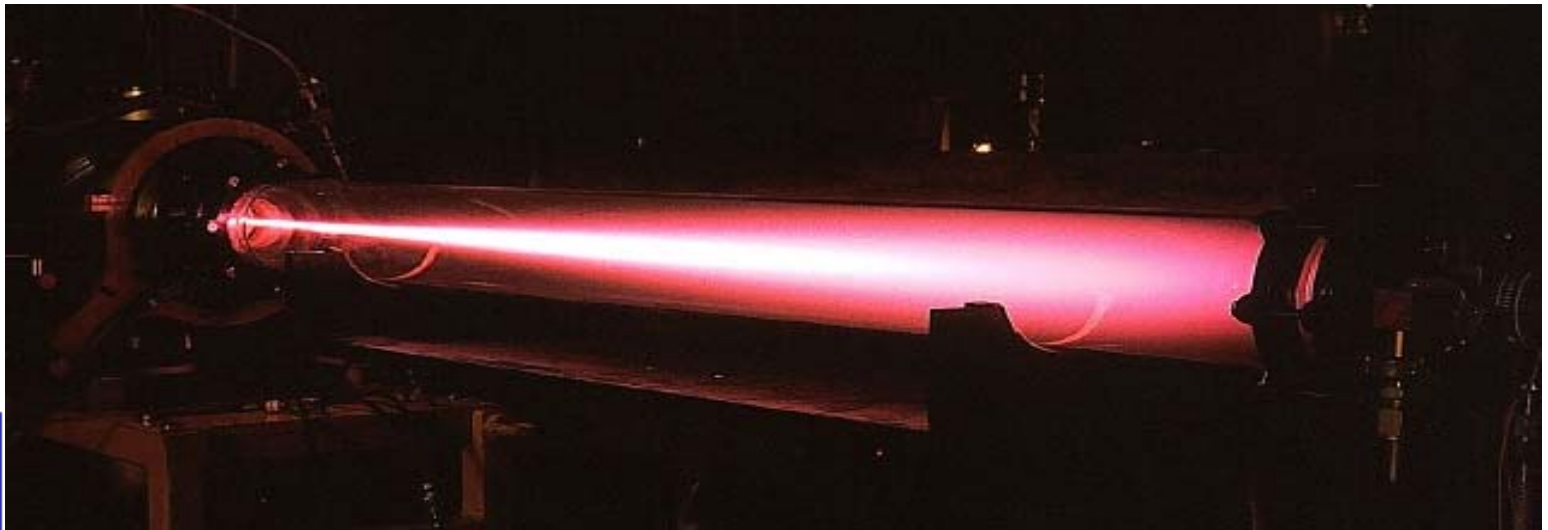
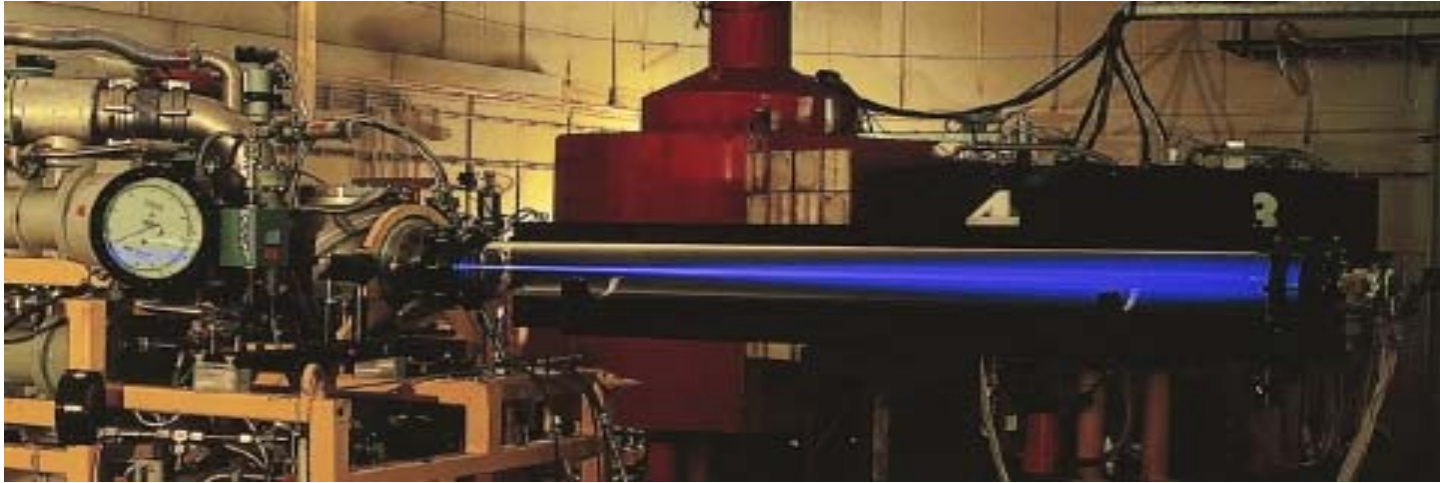
- Uses Gases typically H or He
- Produces Positive Ions
- Ion Source Inside Tank

Making FN Beams



- Makes Negative Beams
- Outside of Tank

What Does The Beam Look Like?



What Do Targets Look Like?



Where am I?



Words of Caution

- You do not have to worry about being exposed to radiation on your tour but for your own safety, please...
- **WATCH YOUR HEAD**, there are many low pieces of beamline on which to hit it
- **Watch Your Step**, there are also floor trenches and cables on which to trip

