Initial Results from the Houghton College Cyclotron

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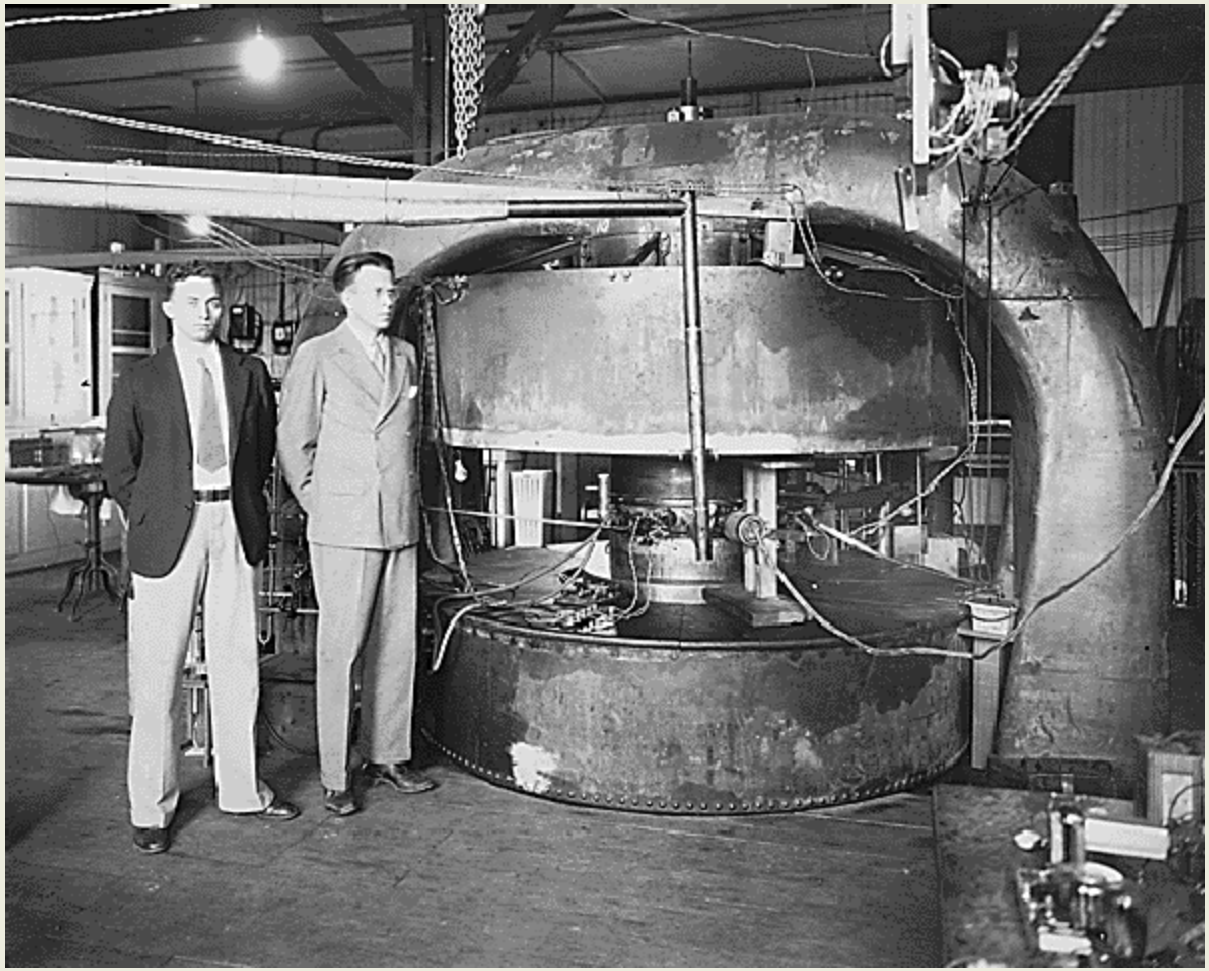
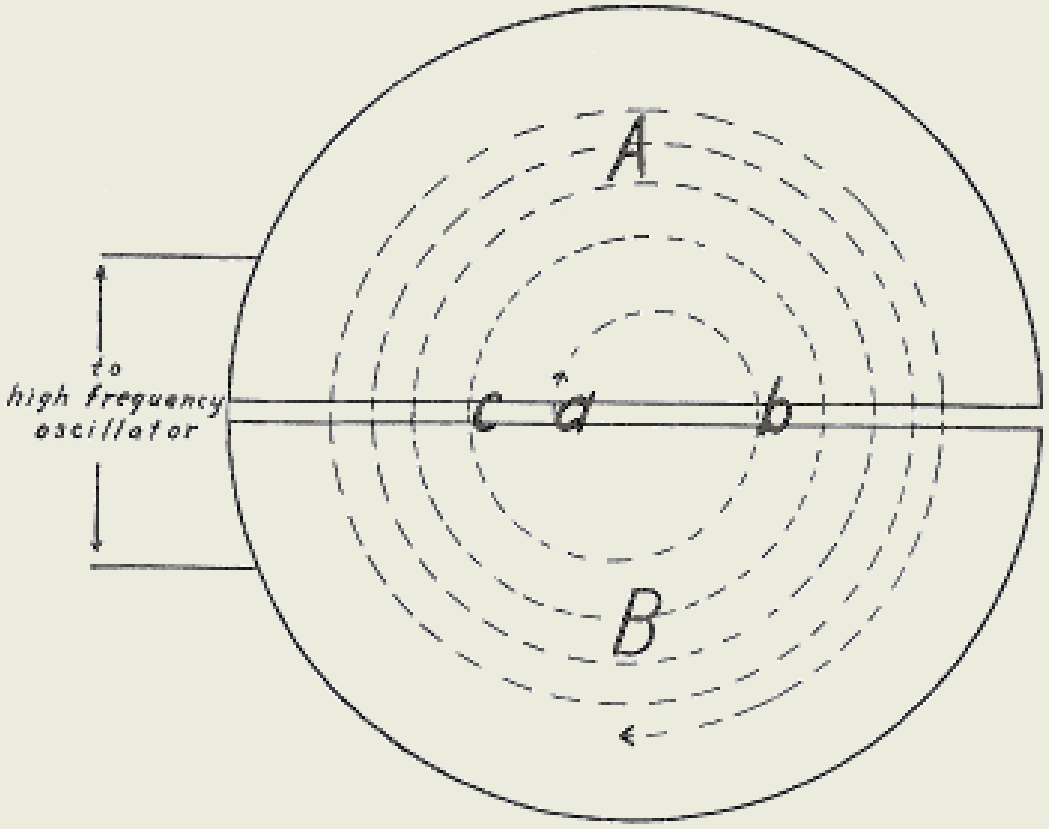
Houghton College

The 11 Inch Cyclotron



http://www.mbe.doe.gov/me70/manhattan/images/Cyclotron1934Large.gif

Cyclotron Operation



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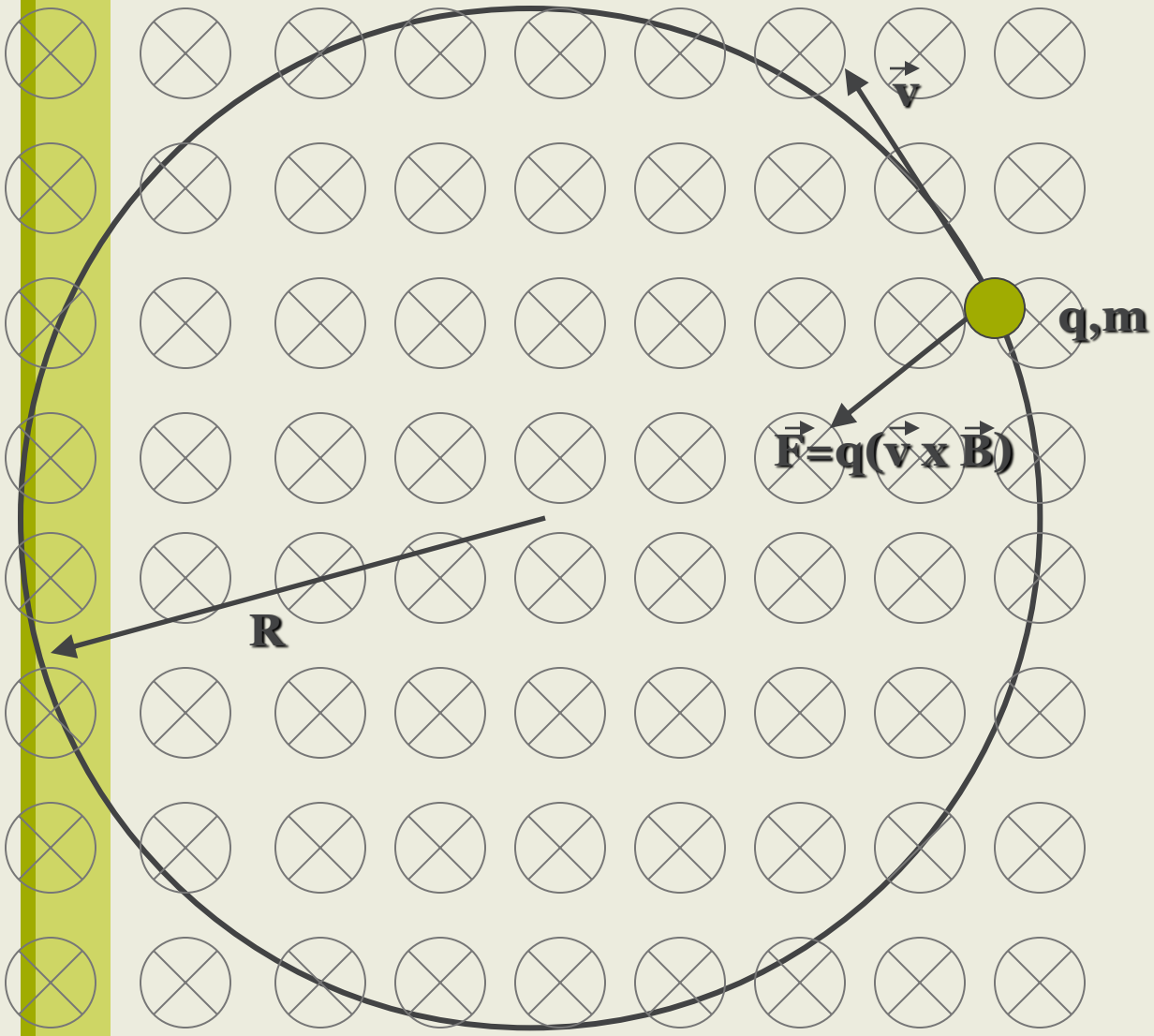
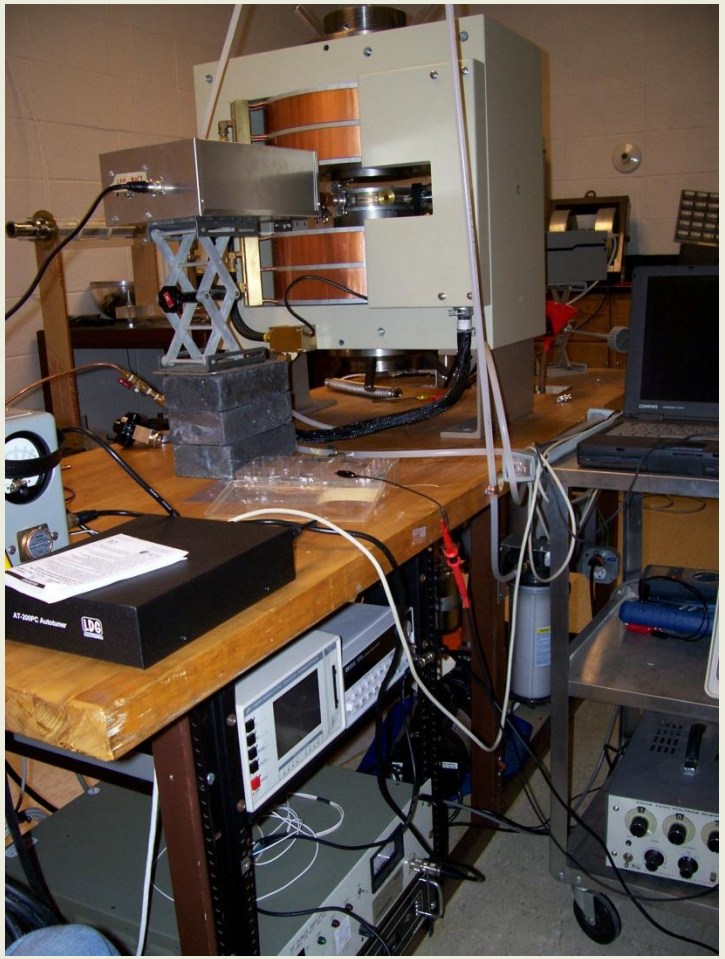
Motion of Charged Particle in a Magnetic Field

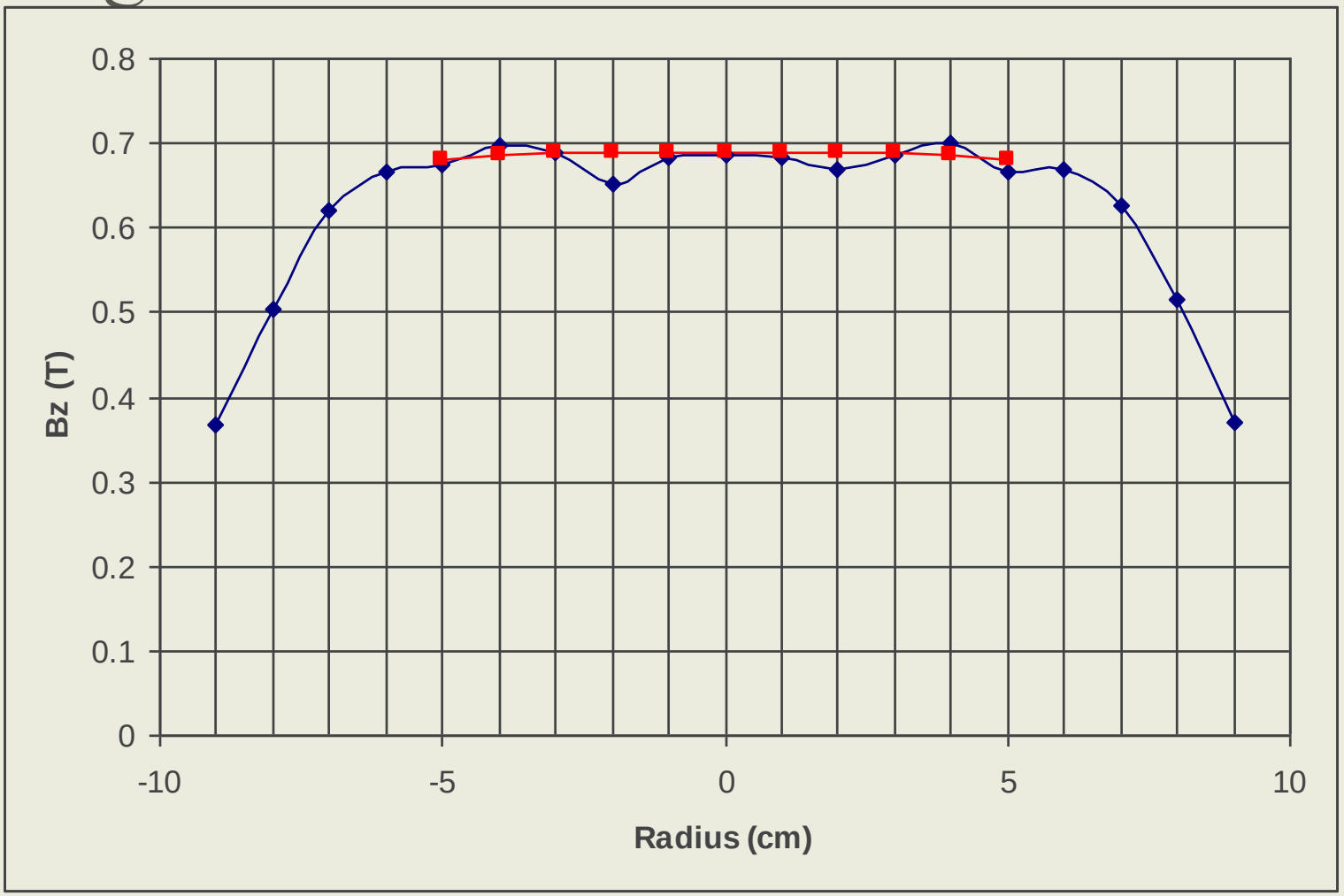


The Houghton College Cyclotron

- Electrodes in Vacuum Chamber
- Vacuum System
- Magnet
- Water Chiller
- RF System
- Gas Handling
- Filament

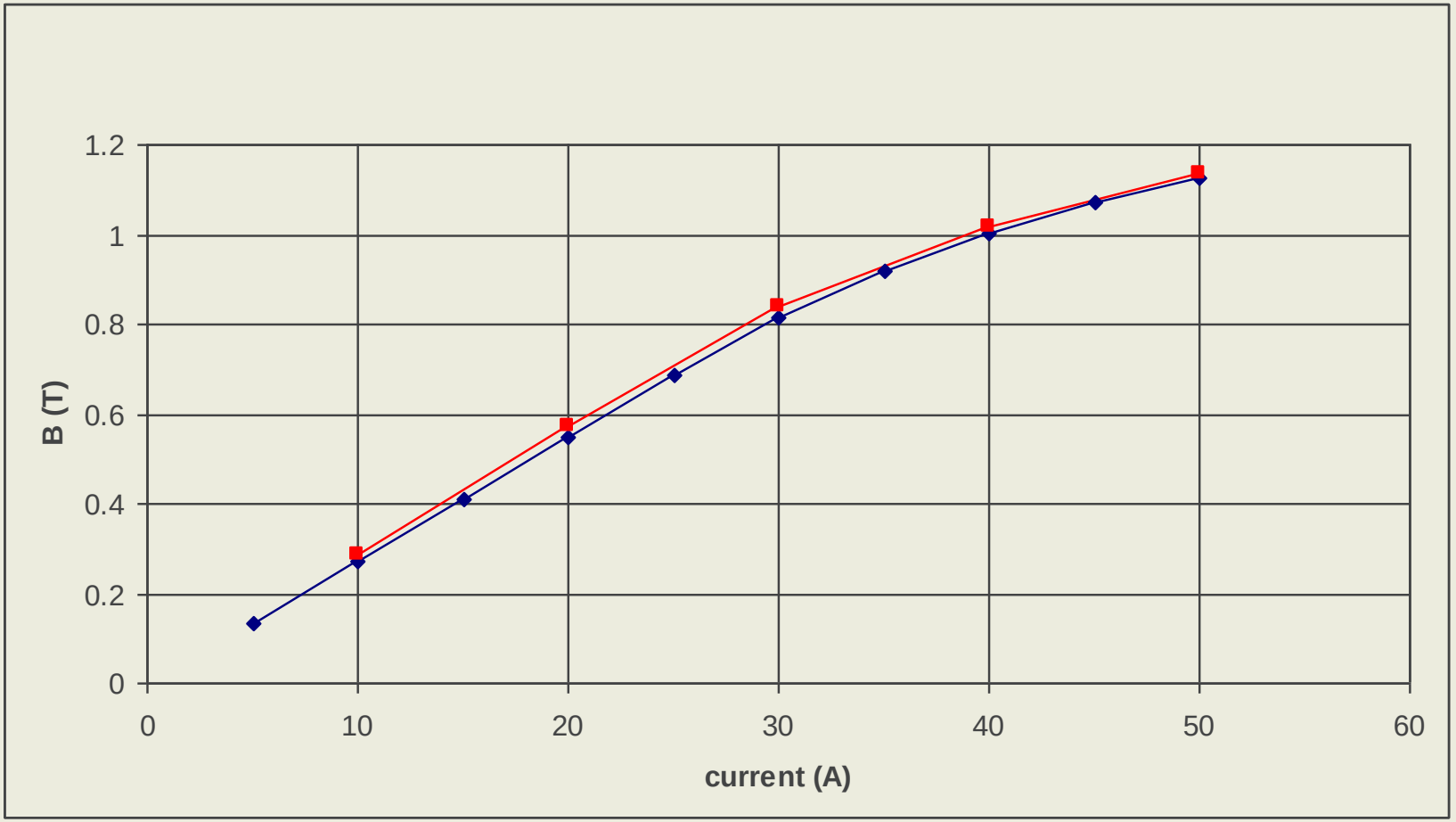


Magnet- GMW Associates 3473-70



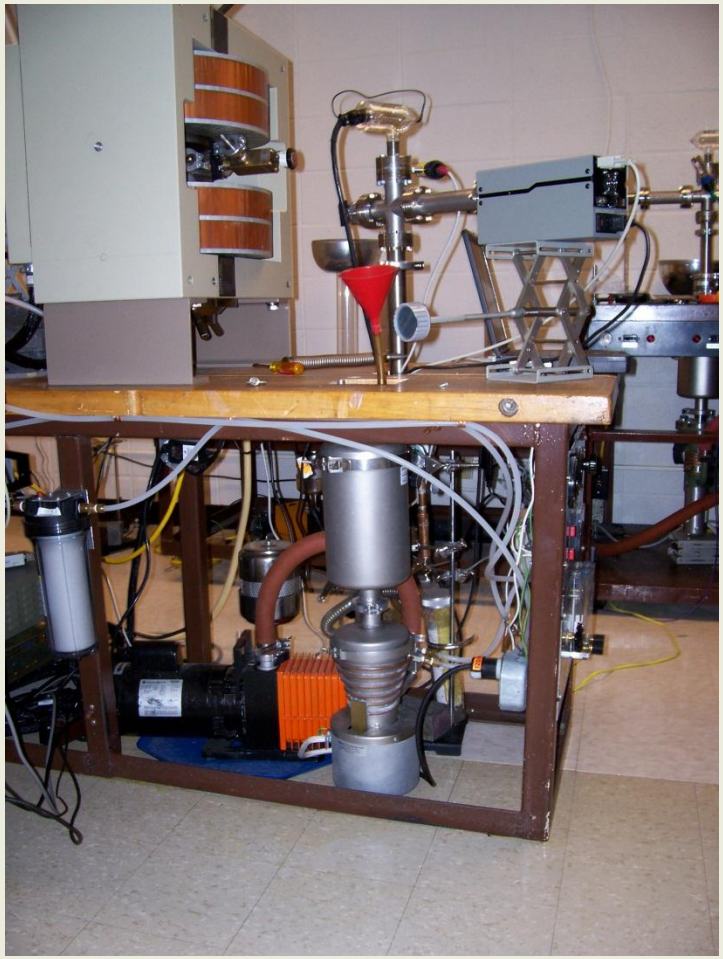
Maximum Field 1.1 T with pole face separation 3.85 cm

Magnet- GMW Associates 3473-70

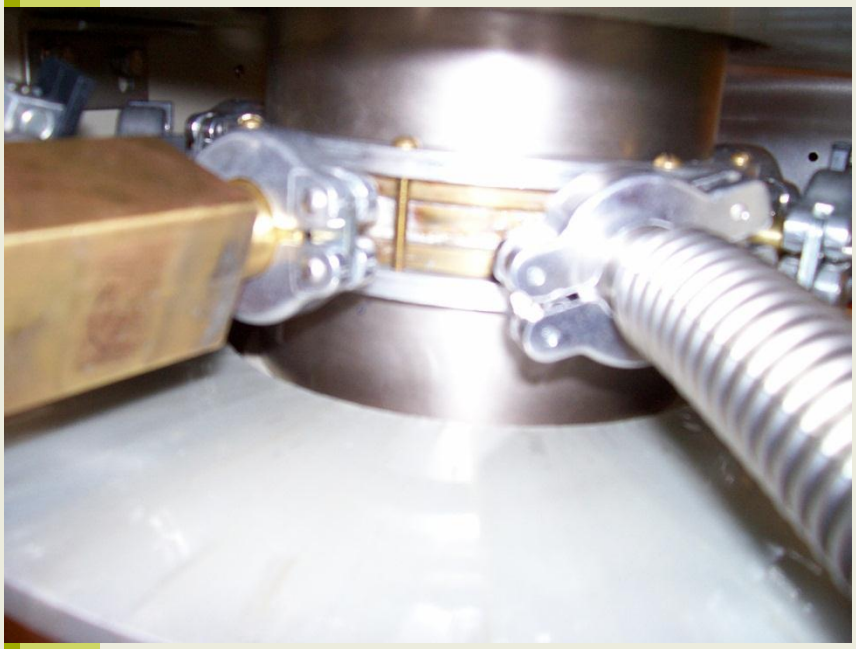


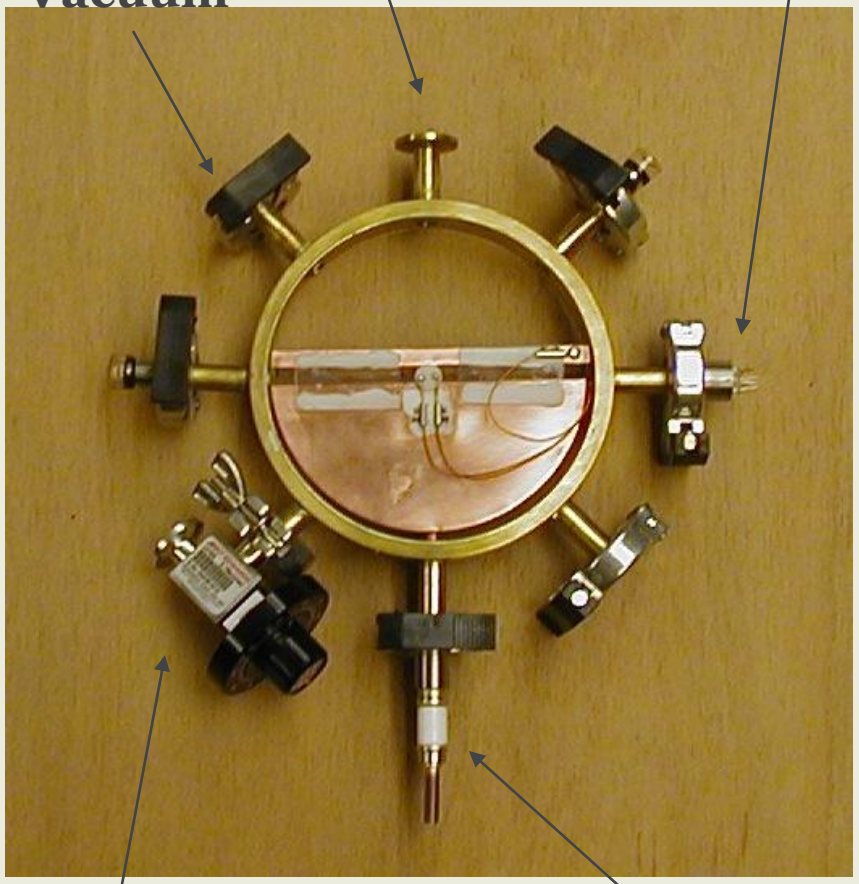
Vacuum System

- Forepump down to ~10^{-3} torr.
- Diffusion Pump down to ~10^{-6} torr.
- LN_2 Cold trap
- Pressure measured with ion gauges, RGA used to determine partial pressures



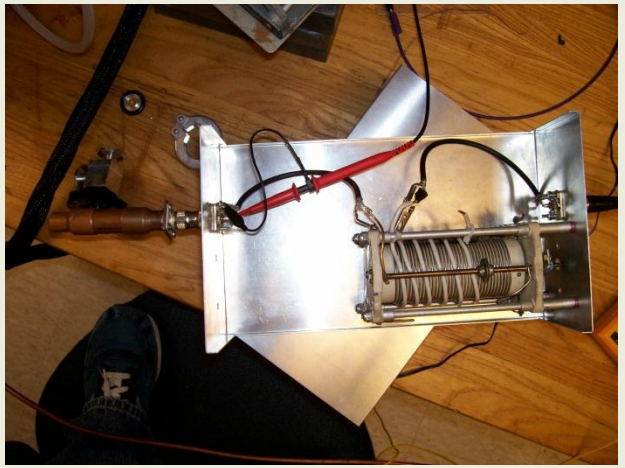
Vacuum Chamber

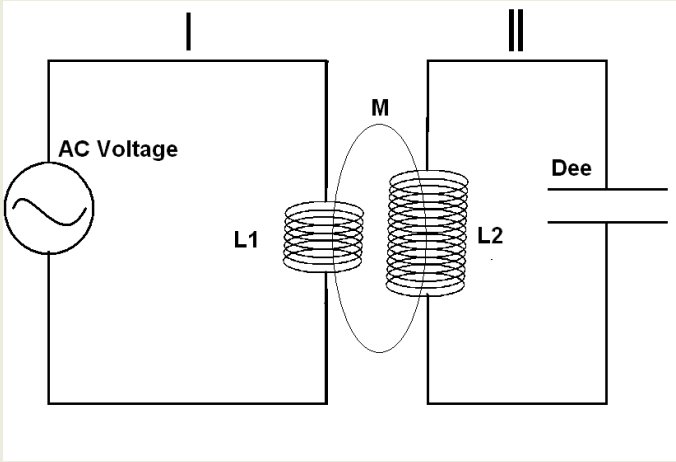




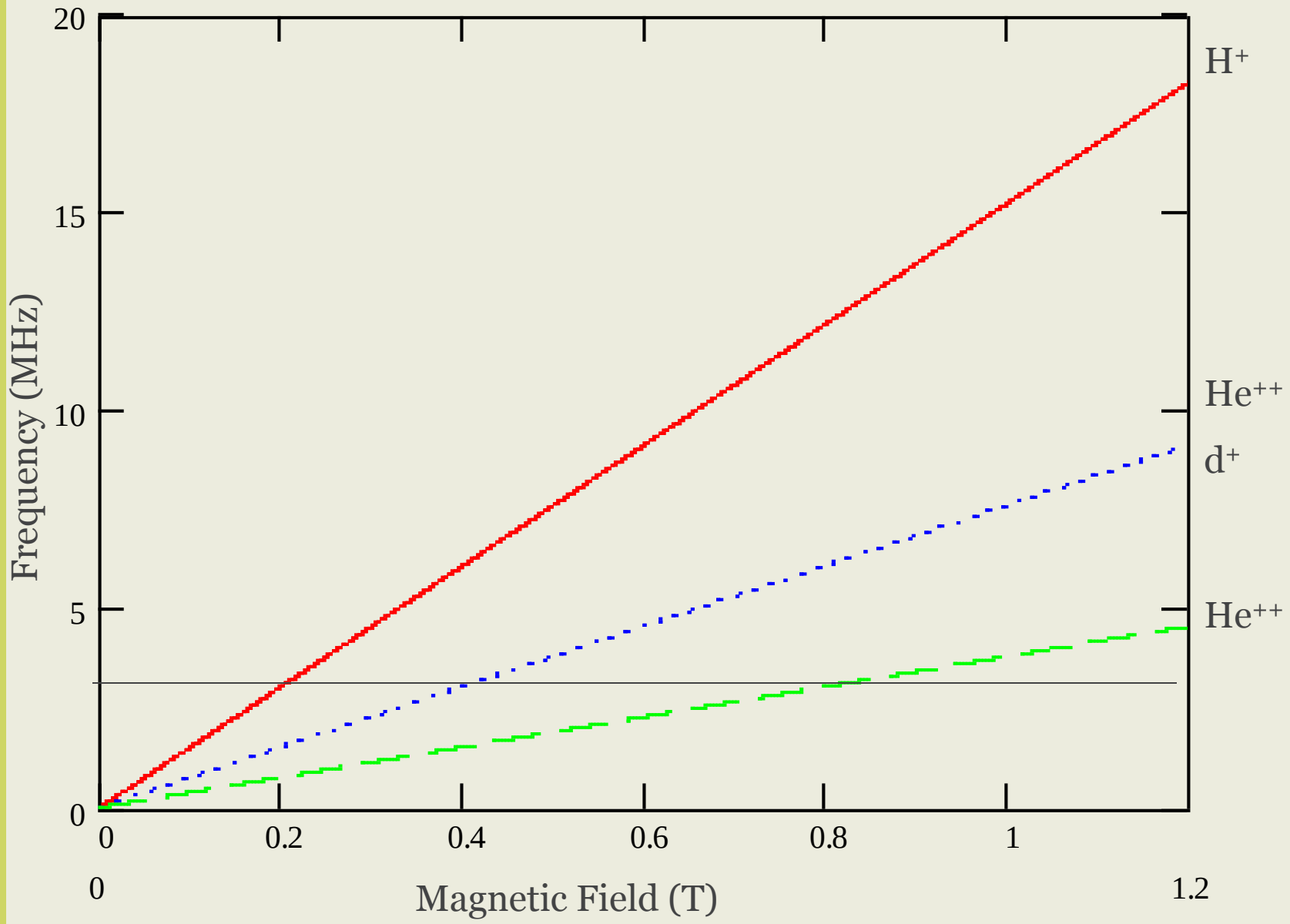
RF System

- Components
  - HP 33120A Function Generator
  - Kalmus 155LCRH RF Power Amplifier
  - LDG AT200PC Tuner
  - RF Box (pictured)

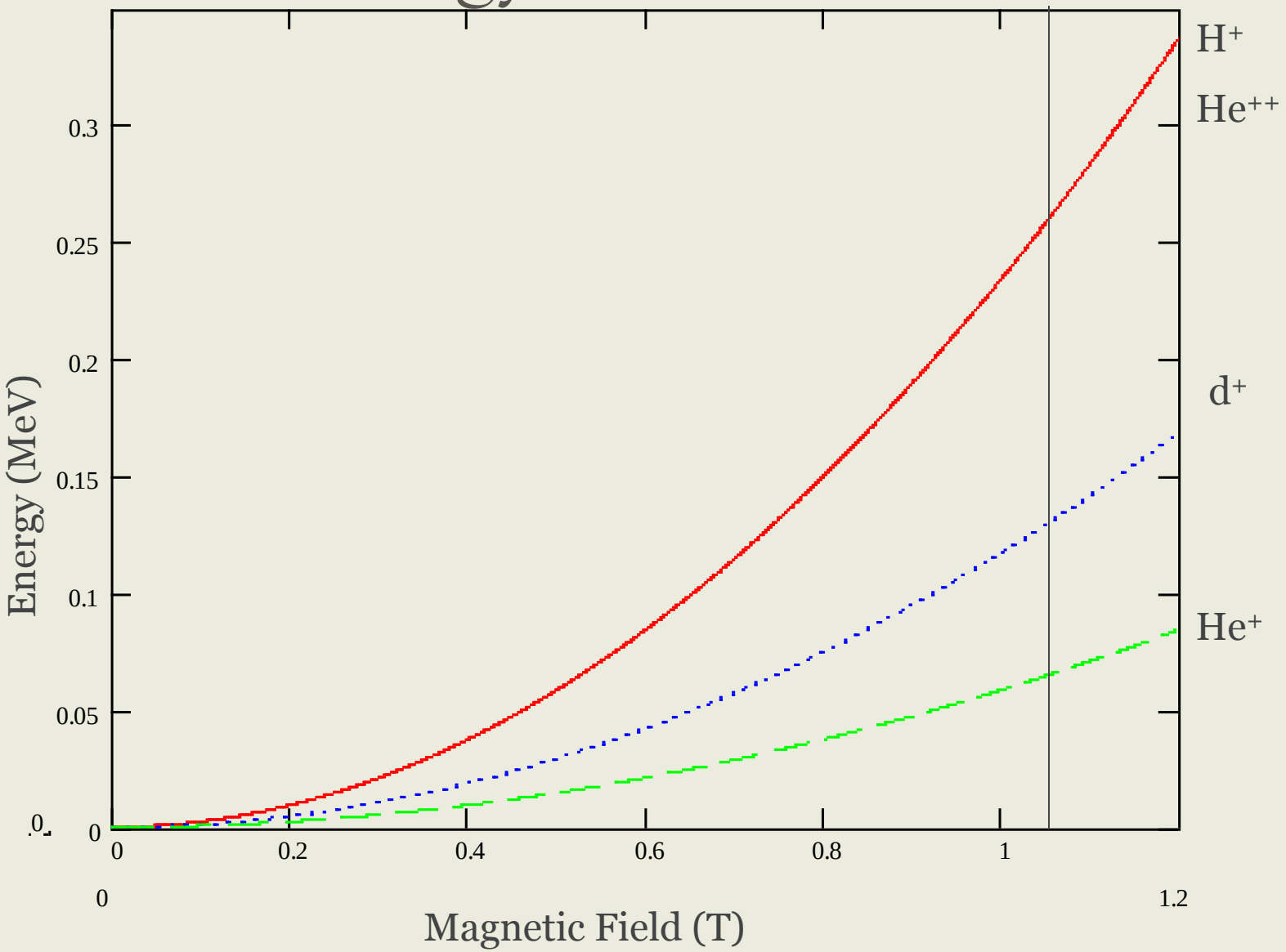




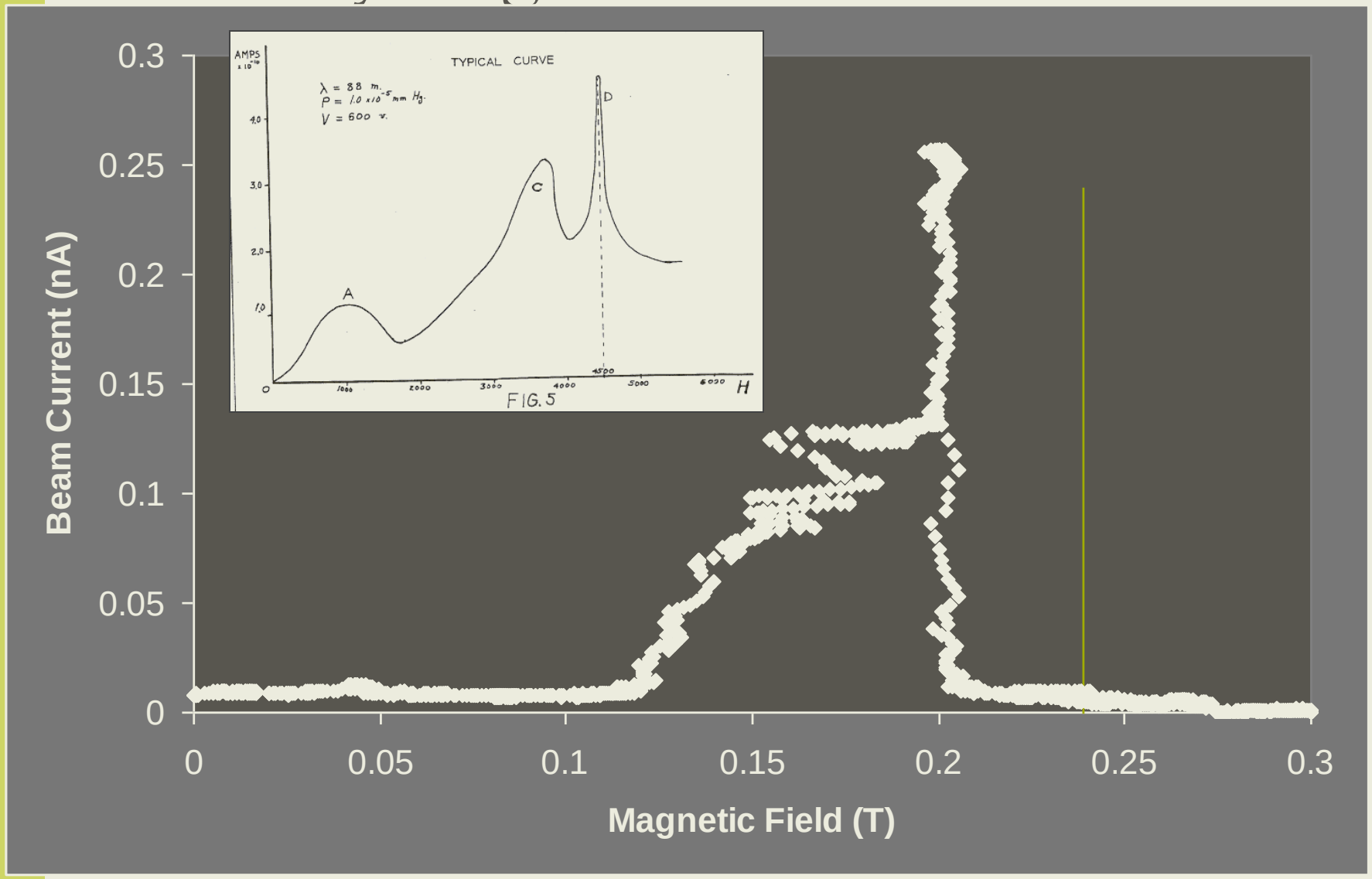
Resonance Plot



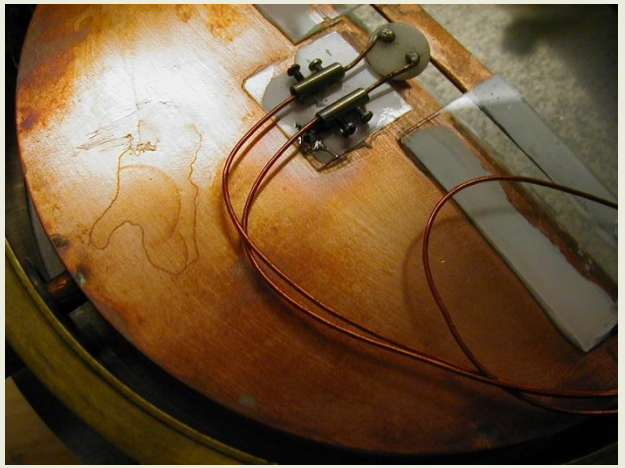
Energy of Particles

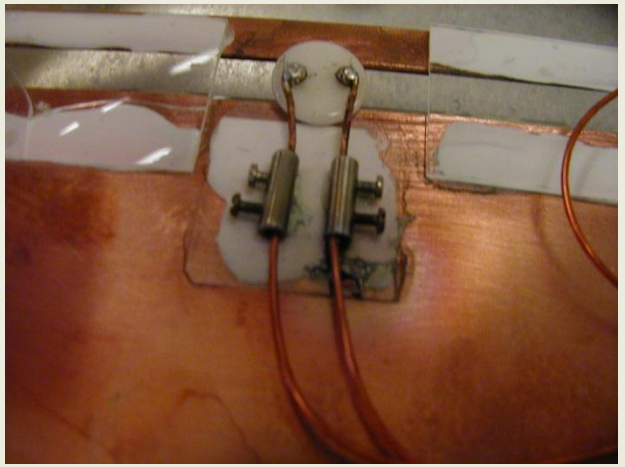


Hydrogen Resonance



Damage

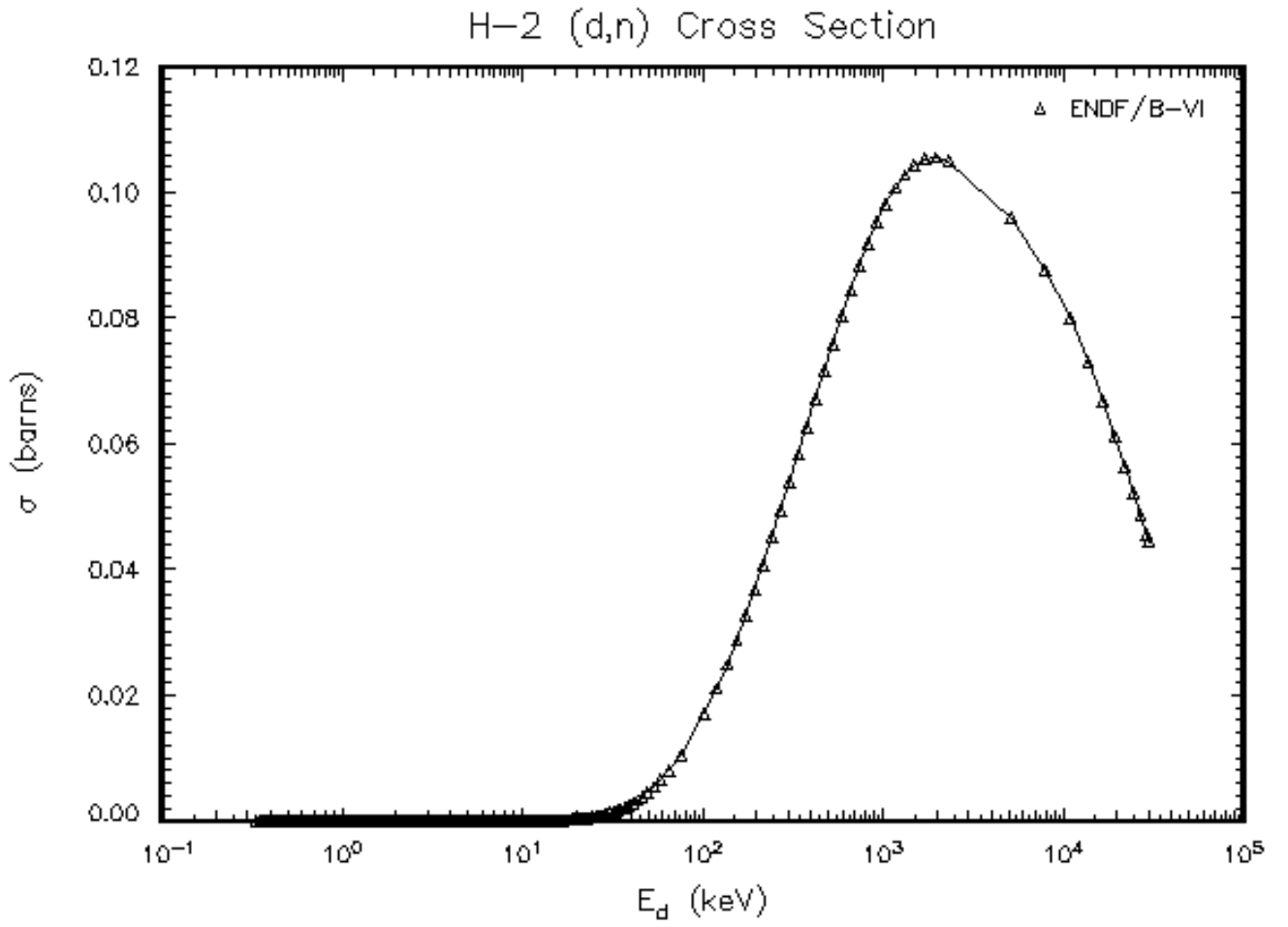




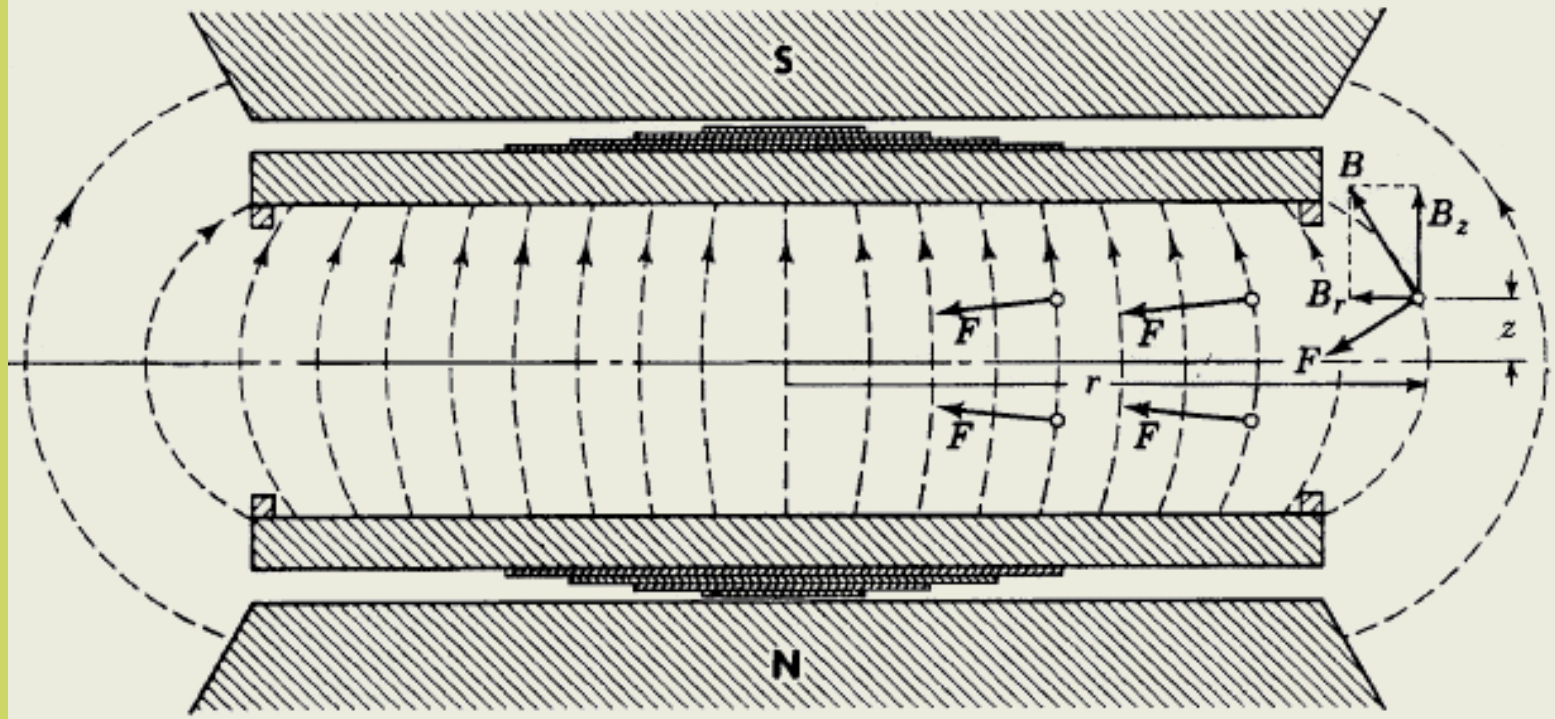
Conclusions

- Results suggest Hydrogen was accelerated
- Future plans:
  - Networked Labview Controls
  - Accelerate deuterons for neutron production

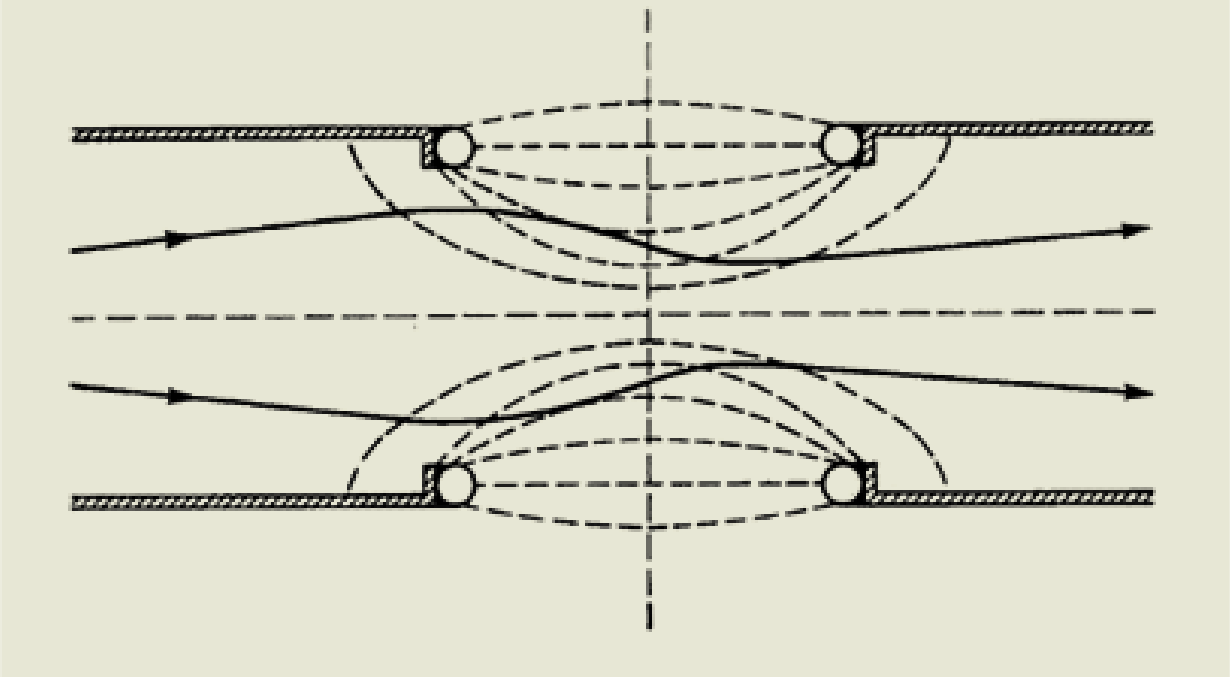
d(d,n)He^3


H–2 (d,n) Cross Section
ENDF/B–VI
σ (barns)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
10⁻¹
10⁰
10¹
10²
10³
10⁴
10⁵
E_d (keV)
24–NOV–1999

Magnetic Field Focusing



Electric Field Focusing



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