

Purpose: accelerate charged particles to high energy.

- Low-energy protons are injected at S.
- Path is bent by magnetic field  $\vec{B}$ .
- Proton is energized by alternating voltage  $\Delta V$  between  $Dee_1$  and  $Dee_2$ .
- Proton picks up energy  $\Delta K = e\Delta V$  during each half cycle.
- Path spirals out as velocity of particle increases:  
Radial distance is proportional to velocity:  $r = \frac{mv}{eB}$ .
- Duration of cycle stays is independent of  $r$  or  $v$ :  
cyclotron period:  $T = \frac{2\pi m}{eB}$ .
- Cyclotron period is synchronized with alternation of accelerating voltage.
- High-energy protons exit at perimeter of  $\vec{B}$ -field region.

