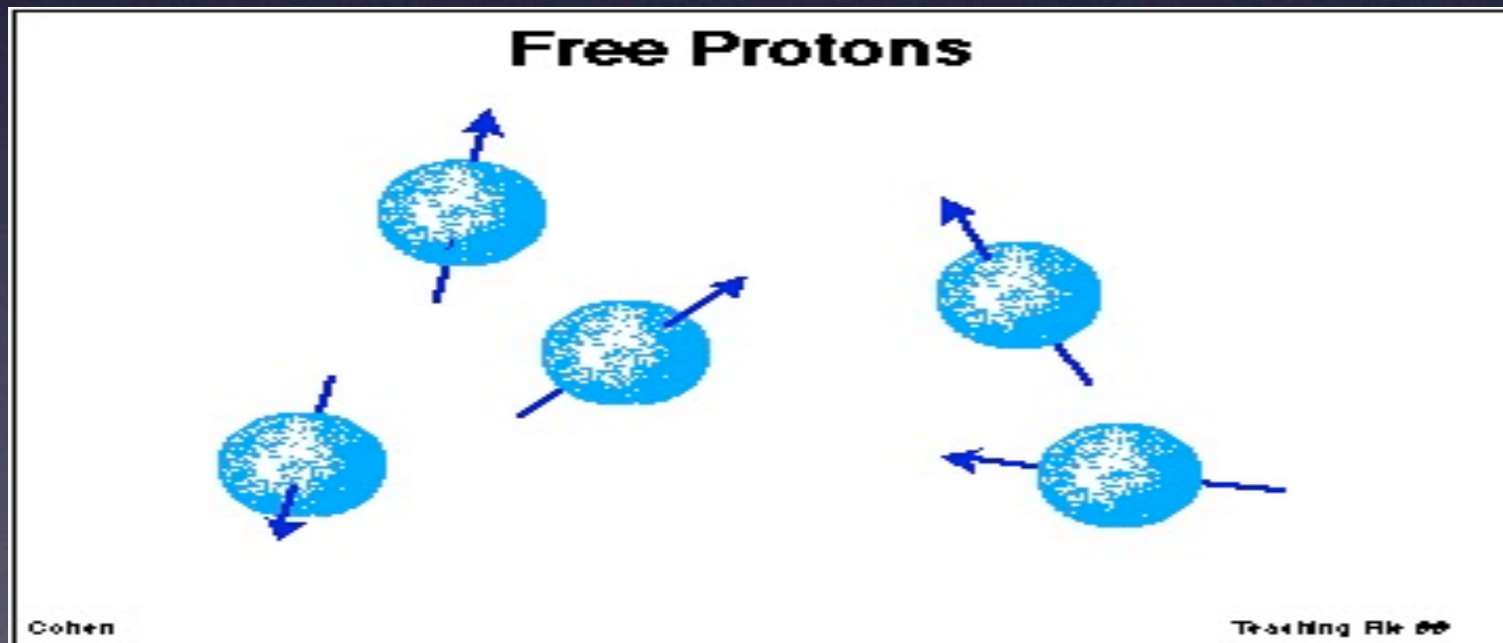
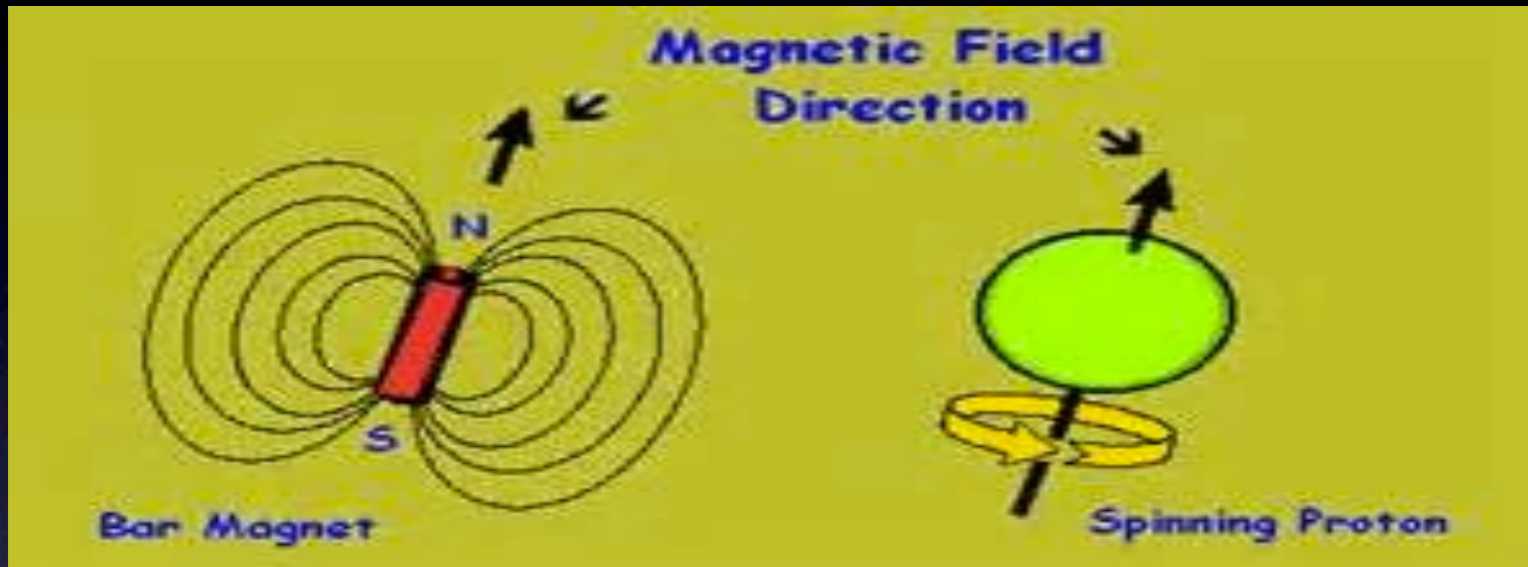


# Magnetic Field - how to create a MF : proton spin



Ask Mish



- MF is produced by **any moving electrical charge**
- inside the atoms: **protons** because of spin behave like **small bar magnets** producing a MF that has a direction given by right hand rule (see first pic on the left).
- electrons - spin and movement in the orbital create a MF;  $2e^-$  in the same orbital have opposite spin, their total MF=0;
- also because **atoms have all directions** in many substances **MF=0**
- b/w atoms: flow of free  $e^-$  thru a wire = current electricity produce MF
- Magnet: term from Magnes, a Greek shepherd who noticed attraction b/w Fe and lodestone (AKA magnetite, a mineral based on  $Fe_3O_4$  produced by interaction of  $Fe(OH)_2$  w/  $H_2O$  10% in sand. Origin of the name lodestone = middle English for leading stone, used as magnet for early navigation).
- Magnet: Fe, Co, Ni- **spin unmatched, atoms align in certain directions= permanent MF**