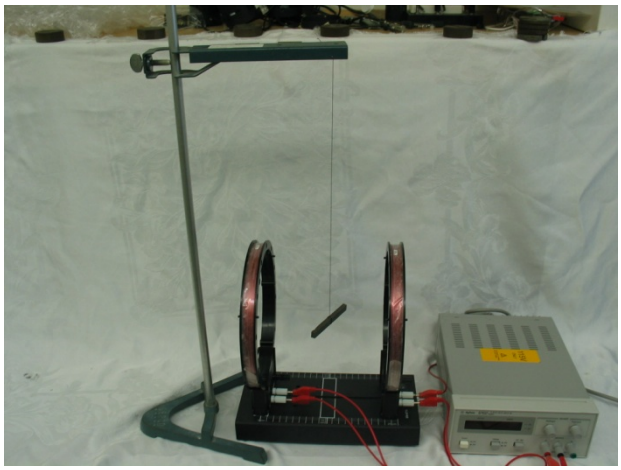
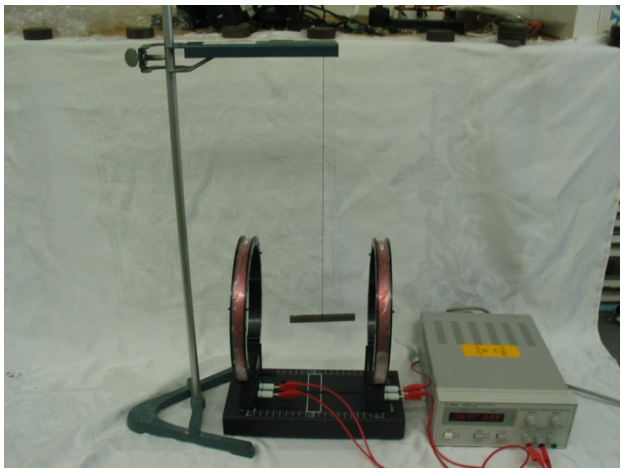
Torque on Magnetic Dipole

Purpose: To demonstrate that a magnetic dipole, in this case a permanent bar magnet, experiences a torque when placed in a uniform magnetic field.

Location: Room 146; shelf M6, rod in vertical bin (near door to room 144), HP power supply on C3; more coils on F6.

Connect the power supply in series with the Helmholtz coils and attach the clamp to the vertical rod such that the bar magnet (dipole) is at the same height as the centers of the coils. Let the dipole come to its rest (i.e. equilibrium) alignment. Place the Helmholtz coils such that their magnetic fields would be approximately perpendicular to the bar magnet (left photo). Turn the power supply on and increase the current to show that a torque is exerted on the dipole causing it to align with the magnetic field (right photo).

You can show that the net force on the dipole is negligible by rotating the coils so their field is aligned with the equilibrium orientation of the dipole and demonstrating that it does not move when the current is turned on.