Current Balance Lab Notes (2016)

Absolutely essential: tare the scale at zero current each time.

Circuit

You must do all 6 circuit and enter the data in the correct tab.

Here to verify $|\vec{F}| = I L B$ for I and B at right angles. From this, you will then make a measurement of the magnetic field.

Measure the inner distance of the circuit. This is Lmin.
Measure the outer distance of the circuit. This is Lmax.

The calculated measurement of B is on the last spread sheet tab.
You should turn in the last tab with your report, showing the measured B.

Spinner

Here you are verifying that the angular dependence of the force.

$\vec{F} = I\vec{L} \times \vec{B} : F = ILB\sin(\theta)$.

It is absolutely essential to tare the scale at zero current

(1) orient the magnet so that the words on the magnet face downward (and can not be seen looking down from above).
(2) Initial setting is: plastic tab with red line set to 105 degrees on side close to the word “current” on the spinner.
(3) With the magnet on the scale, tare at zero current.
(4) When turning the spinner, it should not touch the magnet but it should be down inside the magnet.
(5) Set the current to about 2.5 A
(6) Take data every 5 degrees: -105, -100, -95, ... -5,0,5,..., 95,100,105

Fitting the spinner data

First get your initial guesses for the phase and amplitude:
Adjust the Phase until the 2 curves overlap.
Adjust the Amplitude until the 2 curves overlap

Then, run the solver

(1) tools > solver
(2) target cell is G6
(3) minimize
(4) by changing cells Phase;Amplitude (G2, G4) : the semicolon is essential
(5) Cell references: Phase >= 0   Phase <=360 Amplitude >=0
(6) Options: SCO evolutionary algorithm
(7) Solve (should stagnate). Look at plot to see if it is a good fit. If not, get better initial guesses.