

PHY 122/124 EXPERIMENT 8 Measurement of e/m for the electron Worksheet

Part I: Qualitative Exploration:

Keeping V constant at either 150 V or 250 V, depending on your setup, increase I in several steps and observe the radius r of the electron path. Explain your observation in terms of the coil current I , the electron velocity v and the relation (18.2) in Ch18 sheet 9.

Keeping I constant at ~either 1.2 or 1.5 A, depending on your setup, increase V in several steps and observe r . Explain your observation in terms of the accelerating voltage V , the electron velocity v and the relation (18.2) in Ch18 sheet 9.

Part II: Measurement of e/m:

The **diameters** of the magnet coils and their **errors** (assumed to be the same for all 4 measurements) are:

	$2a_{v1}$	$2a_{v2}$	$2a_{h1}$	$2a_{h2}$
Unit				
Measurement				
Error				

The average value for a based on the above data is: _____ +/- _____

Equation (8.3) from the manual is:

Solve equation (8.3) for V and write it such

that it has the form $V = \mathbf{constant} \times \frac{e}{m} \times (Ir)^2$

The **measurements** of the accelerating voltage V , magnet current I , radius r of the electron circular path and its error are:

Meas.	V []	I []	r []	Δr []
1				
2				
3				
4				
5				
6				

Slope	Error in slope	constant	Error in constant	e/m	Error in e/m	"Textbook" Value for e/m