ERROR ANALYSIS

TABLE 3
Error Analysis Table

R (cm)	dR (cm)	U (volts)	dU (volts)	2/(B^2*R^2)dU (C/kg)	4U/(B^2*R^3)dR (C/kg)
6.425	0.20	180.00	1.00	1.09E+09	1.22E+12
6.450	0.20	170.00	1.00	1.08E+09	1.14E+12
6.300	0.10	160.00	1.00	1.14E+09	5.77E+11
6.025	0.05	150.00	1.00	1.24E+09	3.09E+11
5.800	0.05	140.00	1.00	1.34E+09	3.24E+11
5.600	0.05	130.00	1.00	1.44E+09	3.34E+11
5.400	0.05	120.00	1.00	1.55E+09	3.44E+11
5.125	0.05	110.00	1.00	1.72E+09	3.69E+11
4.900	0.05	100.00	1.00	1.88E+09	3.83E+11

(The current in the Helmholtz coils was held at a constant 0.90 Amps)

Table 3 reveals that the contribution of radius-measurement uncertainties, δR, to $\delta(e/m)$ is consistently higher that of accelerating voltage uncertainties, δU. Therefore, improving the uncertainty in measuring R is imperative. Two choices are available, one is related to technique and the other is related to equipment. First, we could have collected multiple sets of data, literally, through different eyes. This approach would help narrow down any seriously erroneous measurements. An improvement in equipment would require a larger device that allows much larger radii to be measured. These larger radii would allow the users to make larger scale measurements which would lead to less uncertainty by virtue of measuring equipment accuracy.

A trend analysis of Table 3 shows larger accelerating voltages yield more accurate results for e/m. A further improvement in the accuracy of the results would be to build a support system that permits one to use larger accelerating voltages instead of being capped at 200V.

We have reviewed this document and fully support its content.

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