

Brief Article

The Author

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$$\vec{\mu} = g \frac{q}{2mc} \vec{L} \quad (1)$$

$$\vec{\mu} = g \frac{q}{2mc} \vec{S} \quad (2)$$

$$\vec{S} = \frac{\hbar}{2} \vec{\sigma} \quad (3)$$

$$\sigma_i \quad (4)$$

$$g = 2 \quad (5)$$

$$g_e = 2.00283(6) \quad (6)$$

$$g \approx 2 \quad (7)$$

$$g \neq 2 \quad (8)$$

$$a_\mu = \frac{g_\mu - 2}{2} \quad (9)$$

$$E_{e,max} \approx \frac{m_\mu c^2}{2} \quad (10)$$

$$E_{e,min} = 0 \quad (11)$$

$$a_\mu = \frac{g_\mu - 2}{2} \quad (12)$$

Table 1: Systematic errors for ω_a for the three high-statistics running periods. † In the 2001 run, the AGS background, timing shifts, E field and pitch correction, binning and fitting procedure have a total systematic error of 0.11ppm.

Category	BNL (2001) (ppm)	E989 Goal (ppm)
Pileup	0.08	0.04
Lost Muons	0.09	0.02
E-field and pitch	0.05	0.03
CBO	0.07	< 0.03
Gain Changes	0.12	0.02
Total systematic error on ω_a	0.18	0.07

$$dP^+ \propto N(E_e) (1 + A(E_e) \cos \theta) dy d\Omega, \quad (13)$$

$${}^{60}\text{Co} \rightarrow {}^{60}\text{Ni} + e + \bar{\nu}_\mu$$

$$E_{e,max} \approx \frac{m_\mu c^2}{2} = 53 \text{ MeV}$$

$$g_e = 2 \left(1 + \frac{1}{2} \frac{\alpha}{\pi} + \mathcal{O} \left(\left(\frac{\alpha}{\pi} \right)^2 \right) \right), \quad (14)$$

$$\cos \theta = 1 \quad (15)$$

$$a_\mu \approx 1.66 \times 10^{-3}, \quad \gamma \approx 29.30$$

$$p \approx 3.09 \text{ GeV}$$

$$\frac{e}{m_\mu}$$

$$\vec{\omega} = \vec{\omega}_a + \vec{\omega}_{EDM} \quad (16)$$

$$a_\mu(SUSY) \approx sgn(\mu) 130 \times 10^{-11} \tan \beta \left(\frac{100 \text{ GeV}}{\Lambda} \right)^2 \quad (17)$$

$$\omega_a = a_\mu \frac{e}{m_\mu c} B \quad (18)$$

$$\mu_\mu = g \frac{e}{2m_\mu c} \frac{\hbar}{2} \quad (19)$$

Table 2: Systematic errors for ω_p for the three high-statistics running periods. † After 1999, the inflector, which was damaged, was replaced making the disturbance of the inflector’s fringe field on the main storage ring field negligible.

Category	BNL (2001) (ppm)	E989 Goal (ppm)
Absolute calibration of standard probe	0.05	0.035
Calibration of the trolley probes	0.09	0.03
Trolley measurements of B	0.05	0.03
Interpolation with fixed probes	0.07	0.03
Uncertainty from muon distribution	0.03	0.03
Time dependent external B fields	—	0.005
Others	0.10	0.03
Total systematic error on ω_p	0.17	0.070

$$g = 2(1 + a_\mu) \quad (20)$$

$$\frac{e}{m_\mu c} = \frac{4\mu_\mu}{2(1 + a_\mu)\hbar} \quad (21)$$

$$B = \frac{\hbar\omega_p}{2\mu_p} \quad (22)$$