1. Introduction

The realization that the neutron, a neutral particle, possesses a non-zero magnetic moment has been of considerable importance in the development of nuclear and particle physics. Even before any explicit measurement of μ_n had been made, there was a strong indication that $\mu_n \neq 0$ from comparisons of the proton and deuteron magnetic moments μ_p and μ_D. If the neutron and proton combine in a pure $^3S_1$ state to form the deuteron, one would expect $\mu_D = \mu_n + \mu_p$. Early measurements of μ_p and μ_D gave, according to this relation, $\mu_n \approx -1.8\ \mu_N$ where μ_N is the nuclear magneton.

According to Dirac Theory, which assumes structureless, spin 1/2 particles, $\mu_n = 0$ and $\mu_p = \mu_N$. The anomolous moments are defined as the differences between the actual moments and the Dirac moments. The first serious attempt to explain the anomolous moments of the nucleons was made by Frölich, Heitler and Kemmer [1] in 1938. Their "meson exchange theory" predicted equal magnitudes and opposite signs for the anomolous proton and neutron moments [2]. The actual magnitudes of the moments are much more difficult to obtain using this theory. Though subsequently refined by many others [3] the initial conclusions of Frölich, Heitler and Kemmer adequately summarized the state of the theoretical understanding of the neutron magnetic moment until the introduction of the quark model.

The first explicit measurement of the neutron magnetic moment was made by Alverez and Bloch [4] in 1940. Using Rabi's magnetic resonance technique with a neutron beam obtained by deuteron bombardment of Be, they obtained a value of $|\mu_n| = 1.93 \pm 0.02\ \mu_N$. In general, no information about the sign of a magnetic moment is obtainable from a resonance experiment utilizing a purely oscillating magnetic field (In 1949 Rogers and Staub [5] determined the sign of μ_n using a resonance technique that employed a rotating field. As had been thought, the sign was negative.)