# Measurement of the Neutron Magnetic Form Factor $G_M^n$ at High $Q^2$ Using the Ratio Method on Deuteron

**Work by L.Baashen (FIU), B.A. Raue (FIU), G. Gilfoyle ( Richmond), L.C. Smith (UVA)**

**Motivation :** Fundamental quantity related to the magnetization in the nucleon.

**Method :** Extract $G_M^n$ using ratio technique: $R = \dfrac{d(e,e'n)p}{d(e,e'p)n}$ in quasi-elastic (QE) kinematics.

**Required :** Precise determination of the neutron detection efficiency (NDE) using $p(e, e'\pi^+)n$ reaction on hydrogen target in Run Group A.

**Analysis Status:**

➢ **NDE Using RG-A:**
- **NDE = 0.73 at the plateau (p_mm > 3.5 GeV)**
- **Investigating the accuracy of both the numerator and denominator of the efficiency ratio to determine the right shape background using simulation.**
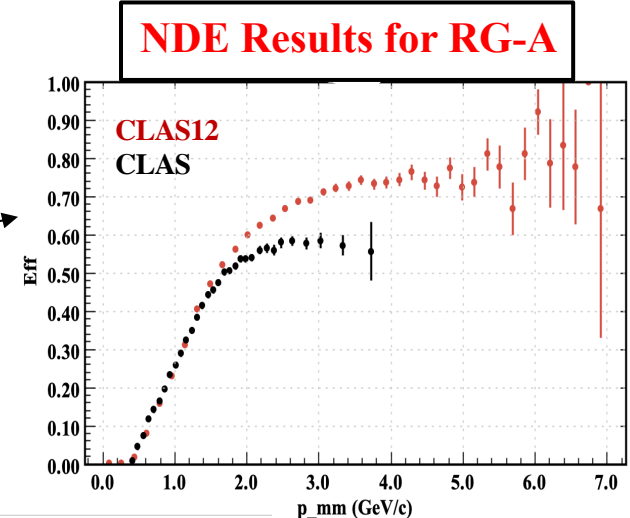
➢ **$G_M^n$ Using RG-B:**
- **Developed and tested codes to extract $R$ on early DSTs and simulation.**
- **Plot shows effect of cuts on QE $e'p$ selection.**



**NDE Results for RG-A**

CLAS12
CLAS



epX Quasi-elastic events
epX$_n$ Quasi-elastic events
Quasi-elastic events with $\theta_{pq} < 3$