

# King Saud University Application to CLAS12

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CLAS Collaboration Meeting  
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# KSU Overview

## 1 Established 1957

First and largest in Saudi Arabia.

## 2 Location

Based in Riyadh, the capital city.

## 3 Student Body

1. Total students: 40,000
2. International students: 7%
3. Female students: 18,525



# Research Groups in the Department of Physics and Astronomy at KSU



## Materials Physics

Focus on renewable energy research.



## Nuclear Physics

High energy physics studies.



## Biomedical Technology

Interdisciplinary physics and medical research.



## Astrophysics

Space sciences exploration.

# About me

- An assistant professor in Experimental Nuclear Physics in the Department of Physics and Astronomy at King Saud University in Riyadh, KSA (May 2024 - Present).
- Ph.D. in experimental nuclear physics at FIU under the supervision of Dr. Raue (Dec. 2023)
- CLAS12 term member under FIU (2020 - Present).
- My main research program is with CLAS12 detector in Hall B

# Previous Work at CLAS12

1

## Neutron Magnetic Form Factor $G_M^n$

During my PhD studies, I participated in Neutron Magnetic Form Factor  $G_M^n$  at high  $Q^2$  with CLAS12

2

## Neutron Detection Efficiency

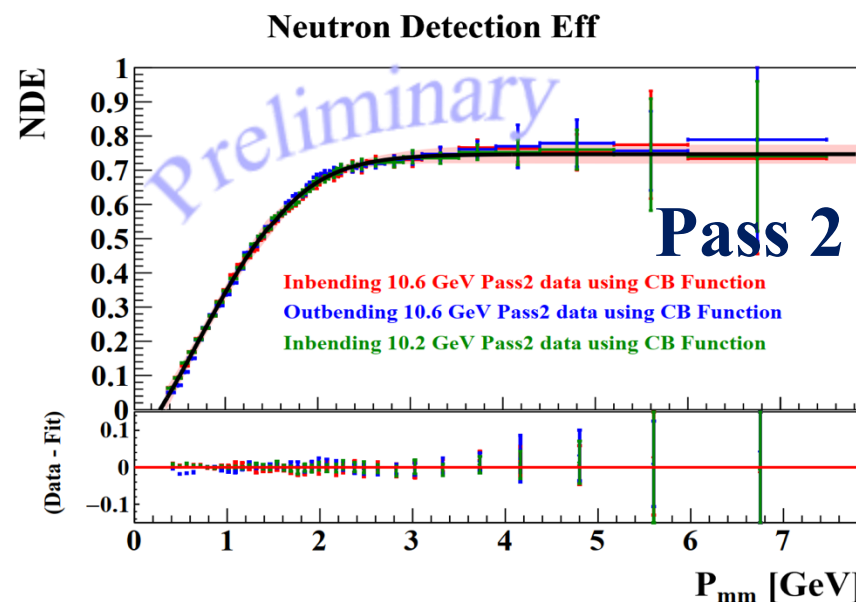
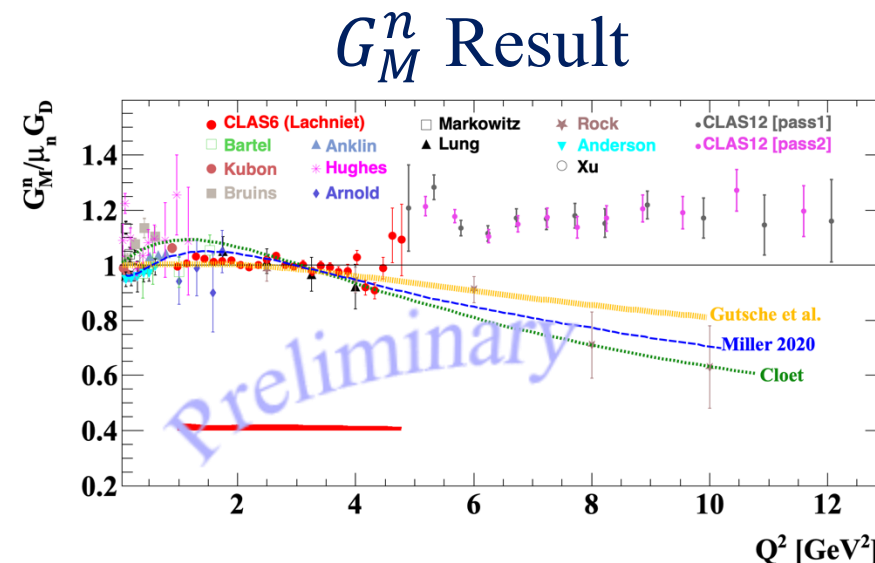
Analyzed neutron detection in calorimeter.

## Complete the analysis

Prepare two publications:

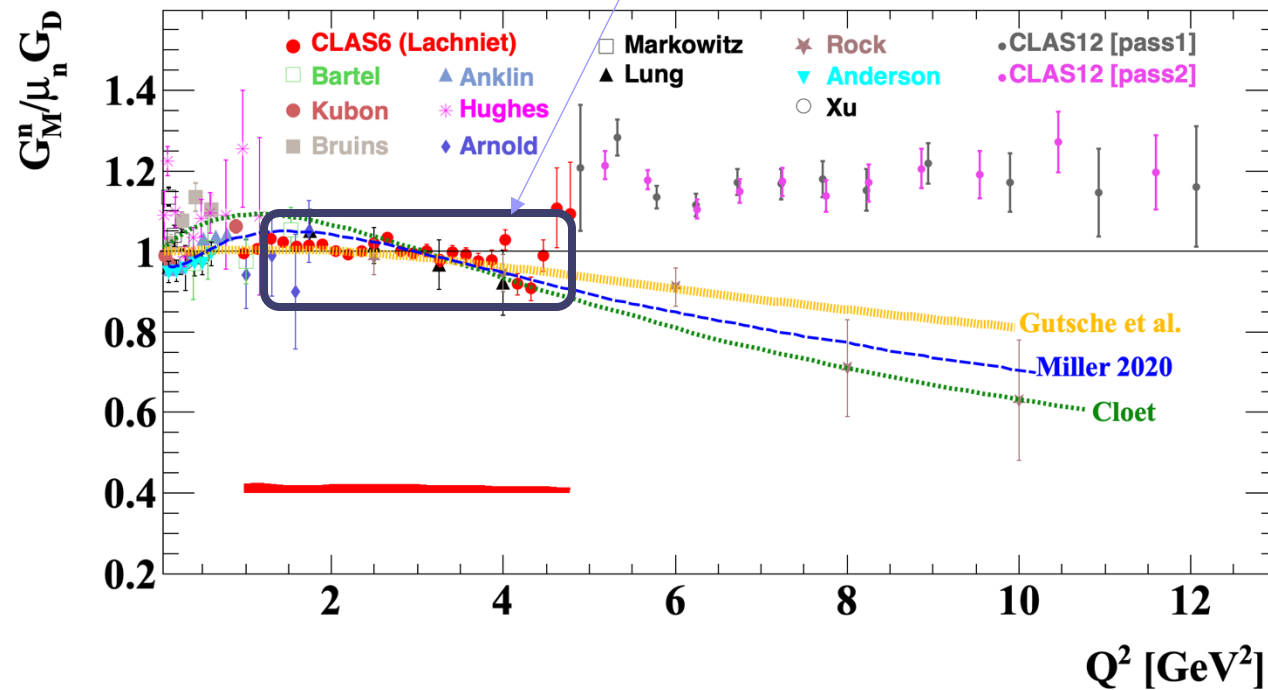
neutron efficiency for NIM

The first result for the neutron magnetic form factor from CLAS12



# Current Physics Interests

Studying  $G_M^n$  at low  $Q^2 < 5 \text{ GeV}^2$   
using CD with RGB data



# Physics Interests at CLAS12

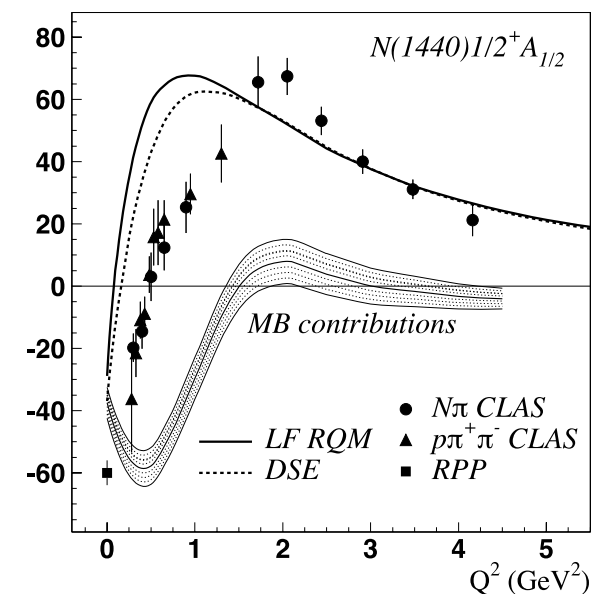
## CLAS / CLAS12 N\* Program

Join the Hadron Spectroscopy Group, working with Volker Burkert, Victor Mokeev, LE, and others.

### Roper Resonance N(1440):

- The focus will be on measuring single pion ( $n\pi^+$ ) reactions using RGK and RGA data.
- CLAS has provided data up to  $Q^2 < 5 \text{ GeV}^2$  to extract the electrocouplings of the contributing N\* states.
- Extending these measurements to higher  $Q^2$  will provide insight into:
  - Transition charge densities.
  - The running quark mass function and its momentum dependence.

Reaction Channel	N*, $\Delta^*$ States	$Q^2$ Ranges of Electrocouplings ( $\text{GeV}^2$ )
$\pi^0 p, \pi^+ n$	$\Delta(1232)3/2^+$ $N(1440)1/2^+, N(1520)3/2^-, N(1535)1/2^-$	0.16 - 6.0 0.30-4.16
$\pi^+ n$	$N(1675)5/2^-, N(1680)5/2^+, N(1710)1/2^+$	1.6 - 4.5
$\eta p$	$N(1535)1/2^-$	0.2 - 2.9
$\pi^+ \pi^- p$	$N(1440)1/2^+, N(1520)3/2^-$ $\Delta(1620)1/2^-, N(1650)1/2^-, N(1680)5/2^+$ $\Delta(1700)3/2^-, N(1720)3/2^+, N'(1720)3/2^+$	0.25 - 1.5 0.5 - 1.5



# Plan

- 1- Assisting in experiment preparation and attending shifts.**
- 2- Working in Data Analysis.**
- 3- Contribution to CLAS12 collaboration services.**
- 4- Expand the collaboration by bringing in a researcher to contribute to CLAS projects.**



**Through this presentation, I am formally applying for membership in the CLAS collaboration.**

**Thank you!**