



TEXAS SOUTHERN UNIVERSITY

Texas Southern University ePIC Membership Proposal

Mark C. Harvey

Niseem Abdelrahman

Texas Southern University Snapshot

- ❑ **President: Vice Admiral James W. Crawford**
- ❑ **150-acre campus in Houston, TX**
- ❑ **Top Ten HBCU by enrollment**
- ❑ **Dates to 1927**
- ❑ **Enrollment ~ 9k students**
- ❑ **Ten Colleges and Schools**
 - **Thurgood Marshall School of Law**
 - ✓ **#1 in Texas producing African American attorneys; #3 in Texas producing Latino attorneys**
 - ✓ **Among the top 5 (25) in nation-producing African American (Mexican American) graduates**
 - **College of Pharmacy and Health Sciences**
 - ✓ **~ 80% first time pass rate on pharmacy exam**

A photograph of the Texas Southern University archway, a large blue structure with white lettering that reads "TEXAS SOUTHERN UNIVERSITY". The archway is supported by two brick pillars. In the background, there are university buildings, trees, and a blue sky with scattered clouds. A semi-transparent white circle is overlaid on the left side of the image, containing text.

TSU Department of Physics

B.S. Degree program Concentrations:

- **Engineering Physics; Pre-med Physics**

Four tenured faculty; one assistant professor

- **Each faculty member is actively engaged in research**

Areas of Expertise:

- **Atomic and Molecular Physics**
- **Biophysics**
- **Computational Physics**
- **Health Physics**
- **Nuclear Physics**
- **Radioastronomy**

**One of the top producers of Black physics B.S.
degree recipients in Texas**

Education & Professional Career Snapshot

Mark C. Harvey

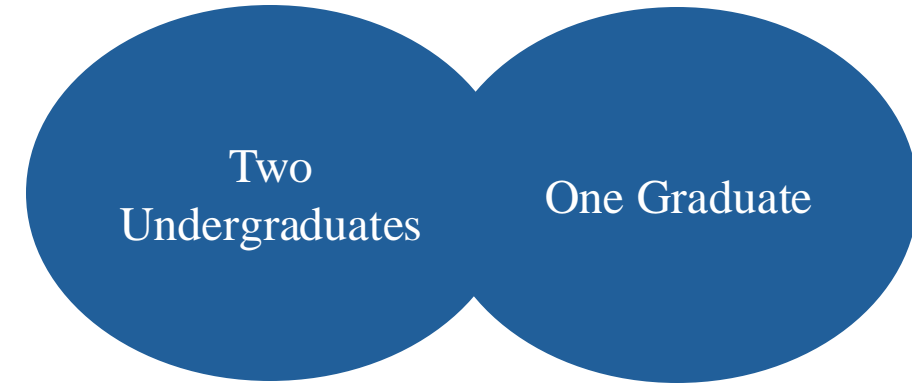
Doctor of Philosophy, Nuclear Physics, Hampton University, Hampton, VA

Postdoc Fellowships

- Medical Physics: The University of Texas M. D. Anderson Cancer Center
- Heavy Ion Collision Physics: Brookhaven National Laboratory, PHENIX

Professor of Physics, TSU

- Director of Health Physics program; Mentored ~ 25 undergraduates
- PI & Co-PI (NRC, NIH, NSF, DOE...) grants totaling > 3 M dollars
- Reviewer for Nuclear Regulatory Commission; Physics in Medicine & Biology
- Member-at-Large of the Executive Committee of the APS Forum on Physics and Society, 2025
- Governor-appointed member of Texas Radiation Advisory Board, 2016 – Present



Niseem Abdelrahman

Doctor of Philosophy, Stony Brook University, Stony Brook, NY

Postdoc Fellowships

- University of Illinois Chicago (STAR)
- Stony Brook University (STAR and ePIC)
- The University of Tennessee, Knoxville (sPHENIX and ePIC)

Research Assistant Professor of Physics, TSU

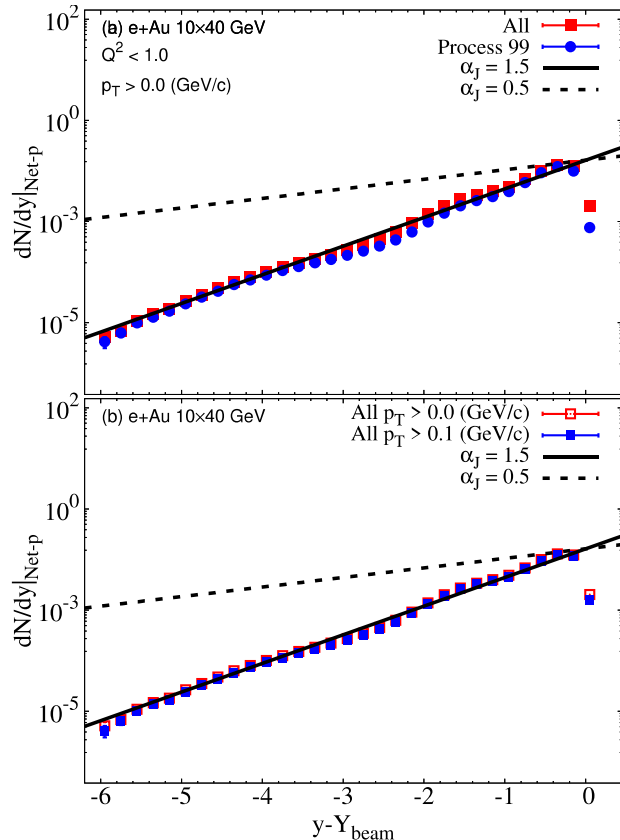
- Researcher at BNL Physics Department

Physics of interest

Professor Harvey and Dr. Abdelrahman have worked for several years with the EIC and the ePIC experiment, which covers several topics.

Building on our expertise, we aim to investigate;

- Baryon stopping physics
- Nuclear structure physics
- Rare Isotope Research



Neither of these scenarios has been verified experimentally.

➤ Regge theory prediction:

$$\checkmark \frac{dN}{dy} \propto e^{\alpha_B (y - Y_{beam})}$$

✓ α_B is related to Regge intercept of junctions ($\alpha_B \sim 0.5$)

α_B in BeAGLE is larger than the prediction for the junction expectation...

Eur. Phys. J. C (2024) 84:1326
<https://doi.org/10.1140/epjc/s10052-024-13702-9>

THE EUROPEAN
 PHYSICAL JOURNAL C

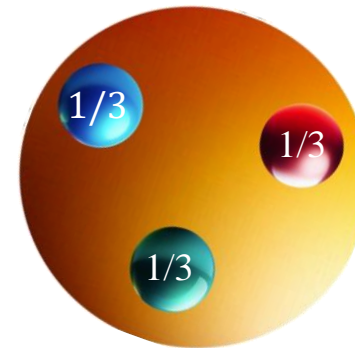


Regular Article - Experimental Physics

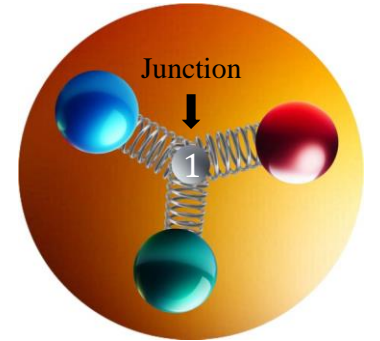
Search for baryon junctions in e+A collisions at the electron ion collider

Niseem Magdy^{1,2,3,a}, Abhay Deshpande^{2,4,5}, Roy Lacey^{1,4}, Wenliang Li^{2,4,6}, Prithwish Tribedy⁵, Zhangbu Xu^{5,7}

(a) Valence quarks, $B=1/3$ and $Q \neq 0$



(b) Baryon Junction, $B=1$ and $Q=0$



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Eur. Phys. J. A (2024) 60:212
<https://doi.org/10.1140/epja/s10050-024-01432-1>

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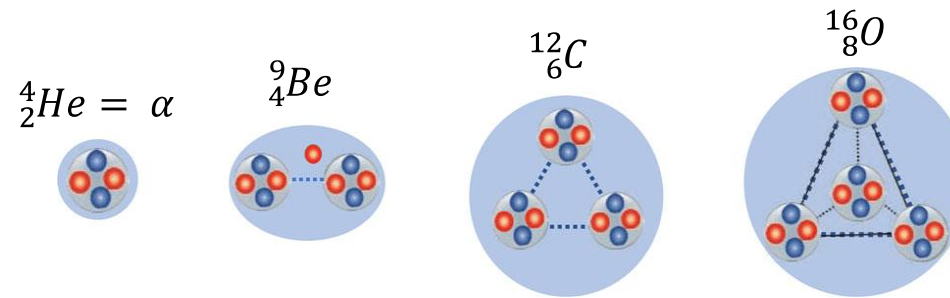
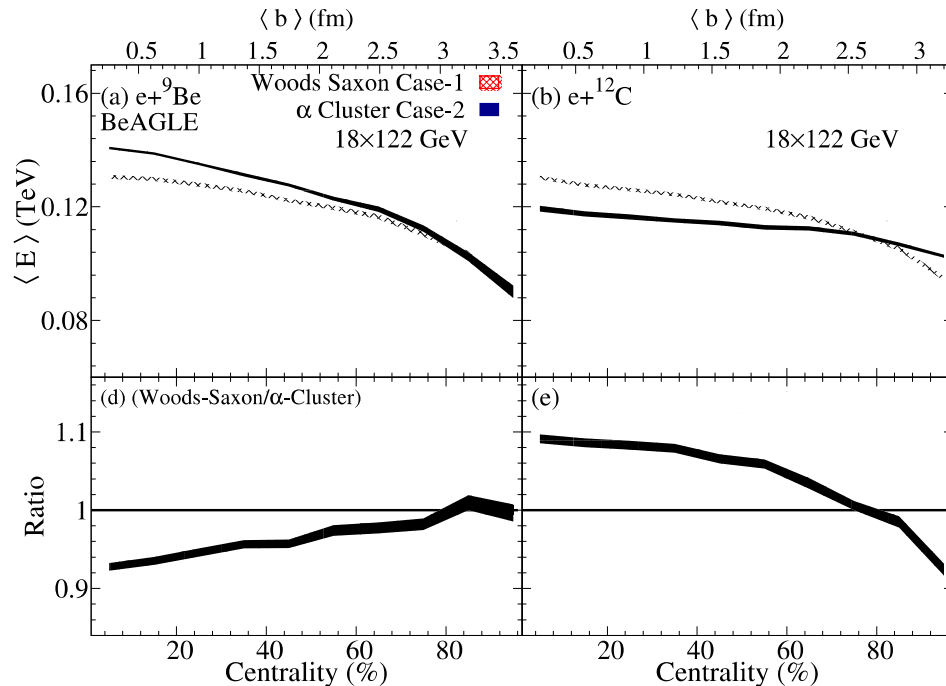
Regular Article - Theoretical Physics

A study of nuclear structure of light nuclei at the electron-ion collider

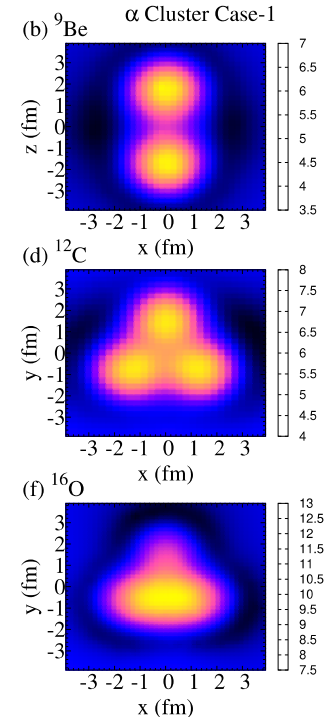
Niseem Magdy^{1,2,3,a}, Mariam Hegazy⁴, Aliaa Rafaat⁵, Wenliang Li^{2,6,b}, Abhay Deshpande^{2,6,7}, A. M. H. Abdelhady⁴, A. Y. Ellithi⁴, Roy A. Lacey^{1,6}, Zhoudunming Tu^{7,c}

The $\langle E \rangle$ in the forward detector acceptance Vs centrality

✓ Centrality is defined via the cutting on the impact parameter.



The $\langle E \rangle$ in ePIC forward detector can be sensitive to the α clustering...



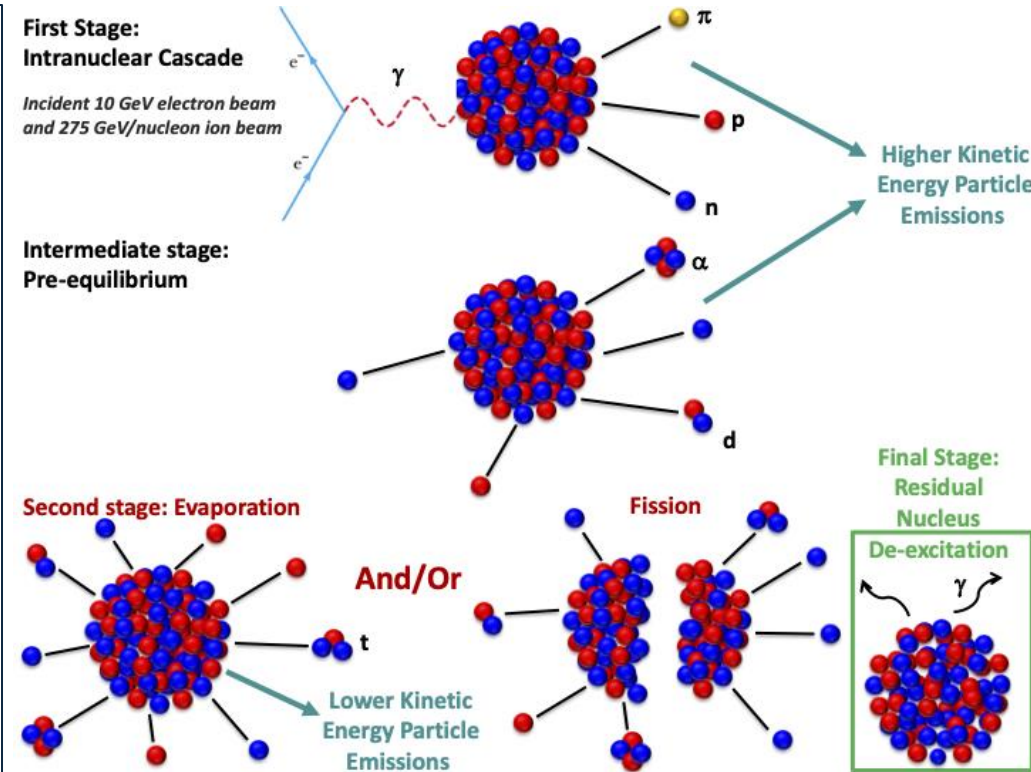
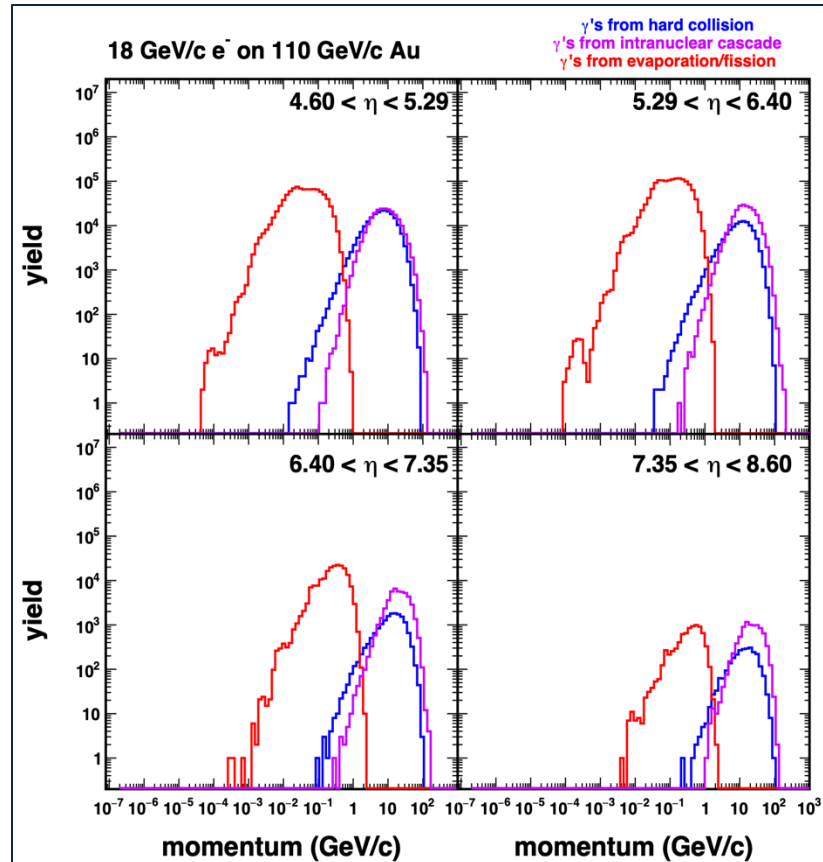
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- Using BeAGLE to simulate e-Au collisions @ EIC energies
- Production of Rare Isotopes at EIC possible?
- Stages of the e-Au interaction
 - Hard scattering/collision
 - Intranuclear cascade
 - Evaporation/Fission
- Identification of produced gammas by stage
 - Study excited state dynamics in exotic nuclei
- Also, investigating photon Eta problem @ very small angles in BeAGLE; eic-smear project




Contribution to ePIC

Professor Harvey and Dr. Abdelrahman are working on simulations related to the ePIC experiment, such as BEAGLE and Geant4. We plan to contribute to ePIC experiment simulations and detector building based on our expertise.

- Dr. Abdelrahman currently holds a joint position with BNL (for two years) and plans to actively contribute to the ongoing efforts in developing the TOF detector.
- Mr. Mark Ddamulira (graduate student) works with Professor Harvey on improving the eic-smear development and will present soon in the WG.
- We constantly attend the weekly Exclusive/Diffraction/Tagging meeting. Dr. Abdelrahman presented his nuclear structure work at the WG.

The Department of Physics at TSU operates the High-Performance Computing Center (HPCC), which will play a key role in supporting our work in the ePIC experiment.



The screenshot shows the website for the High Performance Computing Center at Texas Southern University. The header includes the TSU logo and the text "TEXAS SOUTHERN UNIVERSITY College of Science, Engineering & Technology". A navigation menu contains links for Home, About COSET, Departments and Programs, Faculty and Staff, Student Resources, and Research. Below the navigation is a section titled "HIGH PERFORMANCE COMPUTING CENTER" with a sub-menu for About, Participants, Capabilities, Achievements, Opportunities, Scientific Software, and Status. The main content area is titled "Mission and goals" and contains two paragraphs of text describing the center's mission and goals.

TSU TEXAS SOUTHERN UNIVERSITY
College of Science,
Engineering & Technology

Home About COSET Departments and Programs Faculty and Staff Student Resources Research

HIGH PERFORMANCE COMPUTING CENTER

About Participants Capabilities Achievements Opportunities Scientific Software Status

Mission and goals

The Texas Southern University High Performance Computing Center (TSU-HPCC) promotes research and teaching by integrating leading edge, high-performance computing and visualization for the faculty, staff, and students of Texas Southern University, as well as advance disciplinary diversity, partnerships, and excellence. Additionally, our secondary mission is to partner with and promote research at underrepresented Universities across the state of Texas.

The HPCC will facilitate research and aid in educational advancement by integrating leading edge, high-performance computing and visualization to individual administrative units, as well as multidisciplinary units across campus. The Center will embrace this disciplinary diversity by creating partnerships across the department and colleges of Texas Southern University and additionally with underrepresented universities across the state of Texas. The center will ensure that Texas Southern University obtains and retains superior computing and visualization facilities for the present and future of the University.