

Establishing Nuclear Physics Education and Research at Texas Southern University

Mark Harvey
Texas Southern University

Workshop on Exploring Collaboration in Nuclear and Particle Physics

July 19, 2023

Texas Southern University Snapshot

- Interim President Dr. Mary Evans Sias
- 150-acre campus in Houston, TX
- Dates to 1927
- Enrollment ~ 9k students
- Eleven Colleges and Schools
 - Eight STEM Departments (~ 75 faculty)
 - ~ 1.5k STEM students
 - Thurgood Marshall School of Law
 - #1 in Texas producing African American attorneys; #3 in Texas producing Latino attorneys
 - College of Pharmacy and Health Sciences
 - > 90% pass rate on pharmacy license exam



Education & Professional Career Snapshot



- **Doctor of Philosophy**, Nuclear Physics, Hampton University, Hampton, VA, 2001
- **Master of Science**, Physics, Hampton University, Hampton, VA, 1995
- **Bachelor of Science**, Physics, Virginia State University, Petersburg, VA, 1992
- **Postdoc Fellowships**
 - **Heavy Ion Collision Physics: Brookhaven National Laboratory**
 - **Medical Physics: The University of Texas M. D. Anderson Cancer Center**
- **Associate Professor of Physics**, Texas Southern University, Houston, TX, August 2017 – Present
- **Research Interests:**
 - **Rare Isotope Production at Future EIC**
 - **Radiation Health Physics & Radiation Biology/Biophysics**
 - **Atmospheric Science**



TSU Department of Physics

- **B.S. degree program**
 - Concentrations: Engineering Physics; Pre-med Physics/Biophysics
 - Member of the Texas Physics Consortium (TPC) – www.tarleton.edu/tpc/about
- **Four tenured faculty; one visiting faculty**
 - 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**
- ***Proposal in preparation → Physics M.S. Degree (Fall 2024)***

Education: Nuclear Physics (NP) & Health Physics (HP)

- **Radiation Detection I**

- Topics: radiation sources; radiation detector properties; gas-filled radiation detectors
- **Lab: GM counter experiments**

- **Radiation Detection II**

- Topics: scintillators; PMTs; spectroscopy; digital logic; linear & logic pulse; NIM standard
- **Lab: gamma spectroscopy and nuclear electronics**

- **Additional TPC course offerings**

- **Nuclear Physics**
- **Particle Physics**



Atomic and Radiation Physics

Topics: Intro atomic physics; Interactions in matter (charged particles & photons) Radioactive decay...



Environmental Radioactivity Seminar

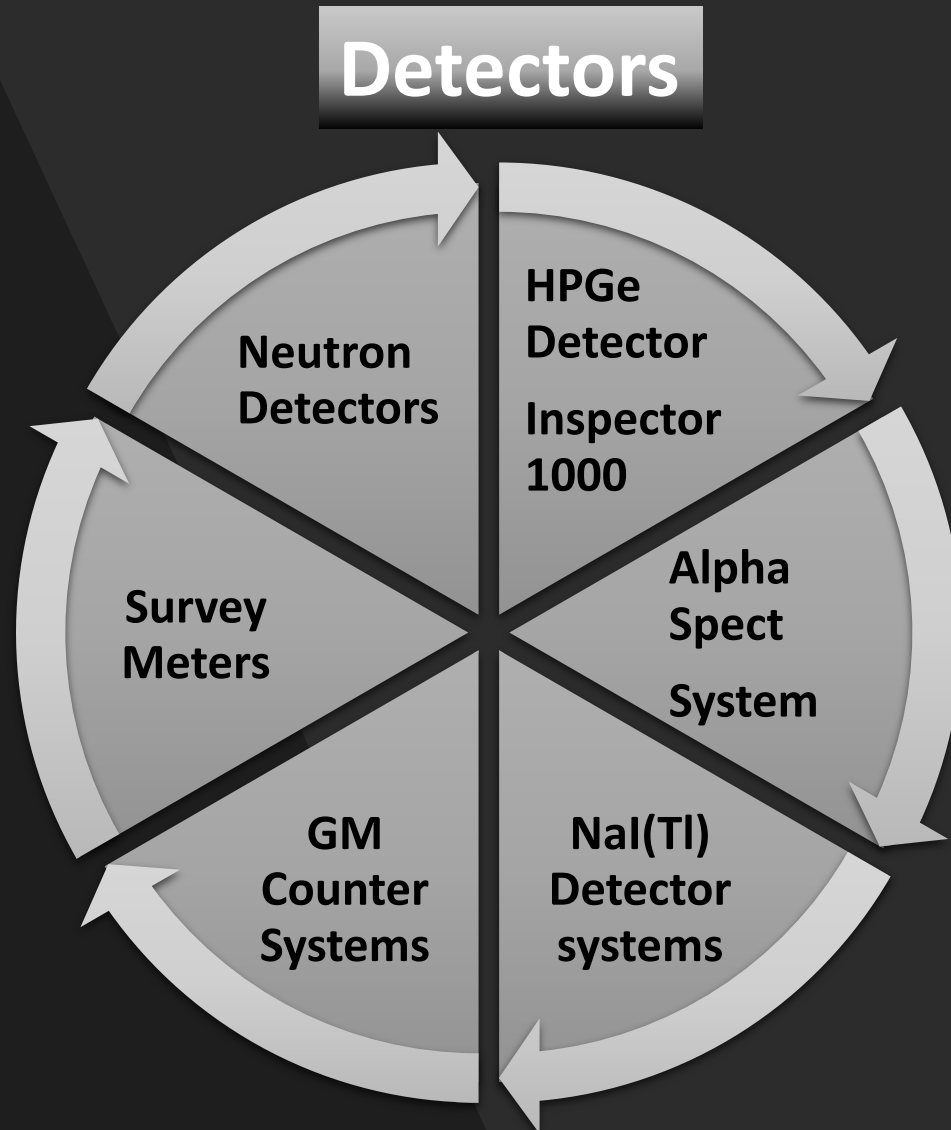
Topics: Radiation biology; Radiation protection...



Radiation Dosimetry & Protection

Topics: Dose quantities; Radiation dosimetry; Environmental monitoring...

Education: NP/HP Laboratory Equipment



Lab Supplements

- NIM bins and modules
- Oscilloscopes
- Radioactive Sources
- Radiochemistry supplies
- Absorbers

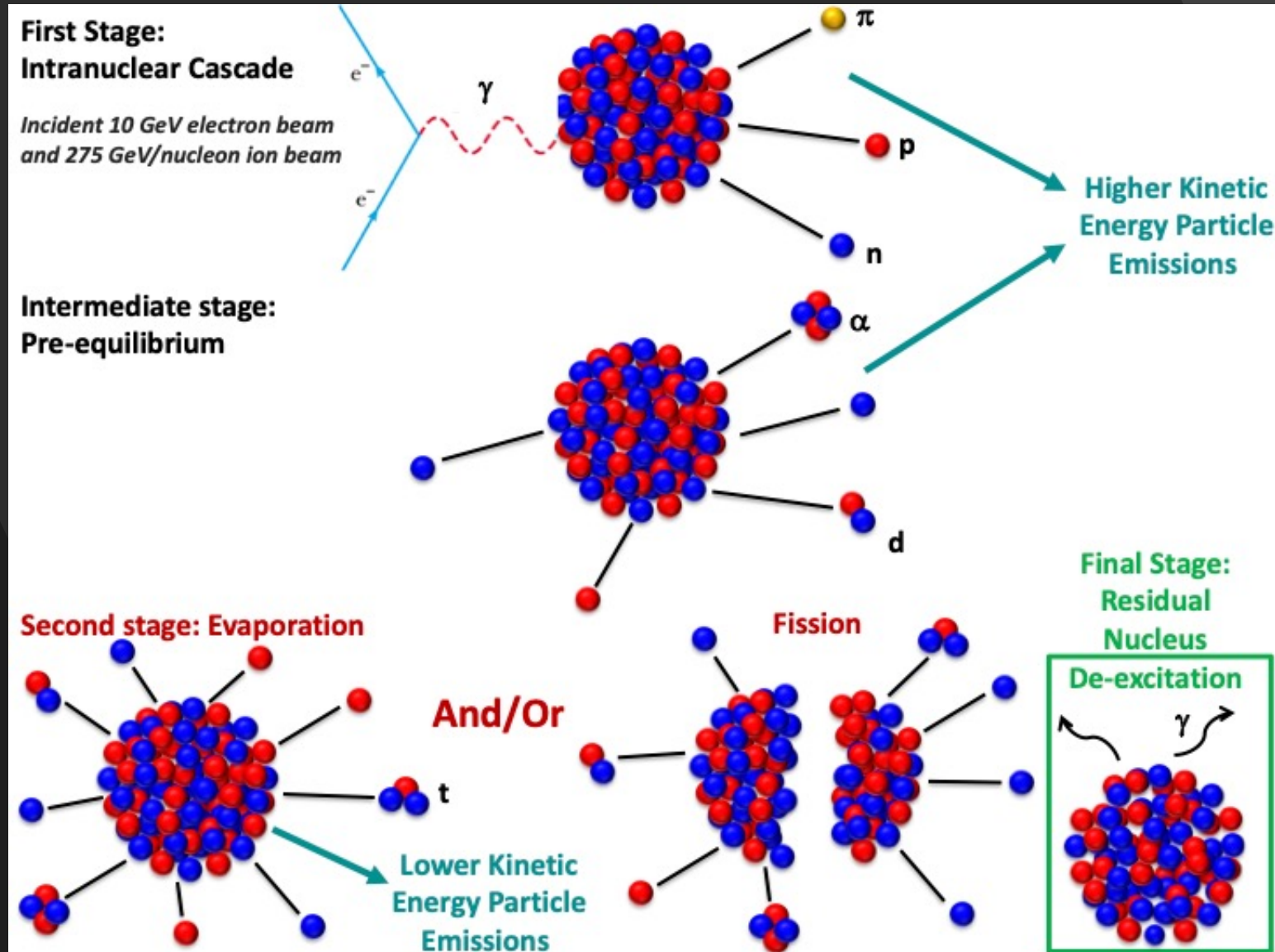
Research: Photon Detector @ EIC

Rare Isotope Research

- **Objective:** Develop a detector to measure photons using an inorganic scintillator
- **Motivation:** Precisely measure gammas emitted from exotic nuclei produced in EIC collisions
 - $\Delta E/E \leq 3\%$ gammas at 662 keV from Cs-137

Parasitic measurements of produced neutrons under consideration as well

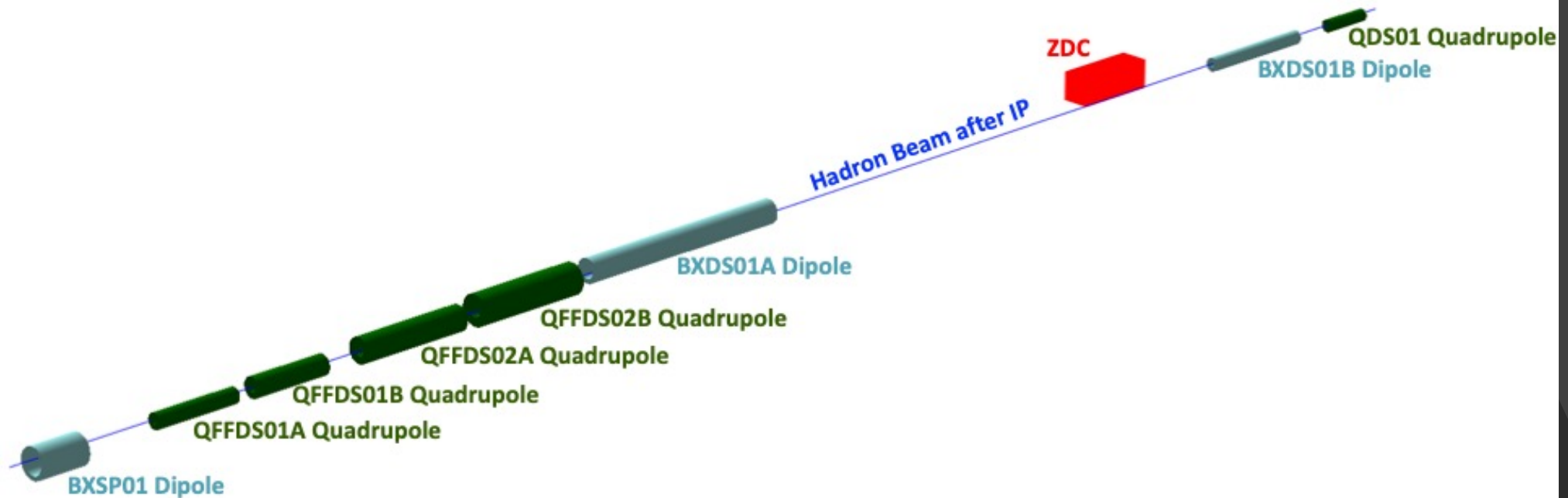
Research: Nuclear Reactions of Relevance



Research: Forward region of IR8 at the EIC

Rare Isotopes Team for Detector Concept:
Mark Harvey; Kétévi Assamagan; Mark Ddamulira

Rare Isotopes Team: Abhay Deshpande;
Barak Schmookler; Pawel Nadel-Turonski;
Oleg Tarasov; Wenliang (Bill) Li; Brynna
Moran; Isaiah Richardson; Niseem Magdy



Monte Carlo simulations are underway (Geant4...)

HBCU Collider Group

- **Members:**
 - Florida A&M University – Carol Scarlet
 - Howard University – Marcus Alfred
 - Texas Southern University – Mark Harvey
- **BNL Collaborator – Mickey Chiu**
- **J/psi analysis (PHENIX) and MBD upgrade (sPHENIX)**
 - Dr. Stacyann Nelson; Dr. Reem Alreshidi
 - Mr. Lameck Mwibanda; Mr. Abdullah Alsayegh; Mr. Alex Holt
- **Nuclear Physics**
 - Recruit/retain/graduate underrepresented students (B.S., M.S., Ph.D.)
- **Grants**
 - Excellence In Research : HBCU Collision Collaboration – J/psi Peripheral Collision Analysis and Detection (NSF-1901420) ~ 600k
 - BNL-MSI Fellowship Program for Research Excellence in Nuclear Physics (DOE-DE-FOA-0002456) ~ 630k

Thank you

