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The NASA Radiation Interuniversity Science and Engineering (RaISE) Project:

A Model for Inter-collaboration and Distance Learning in Radiation Physics and Nuclear Engineering



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- **A NASA *Radiation Interuniversity Science and Engineering* (RaISE) Project**
 - Undergraduate/graduate program in radiation physics and nuclear engineering
 - **Collaborators**
 - NASA Johnson Space Center
 - NASA Langley Research Center
 - Prairie View A&M University (PVAMU)
 - Texas Southern University (TSU)
 - **Funded by NASA/Explorations Systems Mission Directorate**
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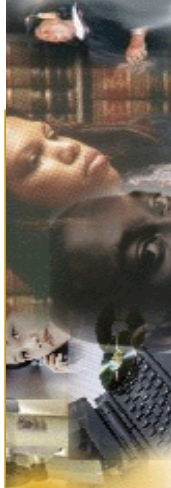
■ Background

- ❑ Radiation is one of the top five risks for human space exploration
 - ❑ NASA has a critical need to further its knowledge in radiation science and the mitigation of this risk
 - ❑ NASA must expand its pool of research scientists and engineers trained to meet the challenges of human space flight and long-term planetary missions
 - ❑ White House Executive Order 12876, which mandates the support of HBCUs, strongly emphasizes developing the human resource potential represented by students served by HBCUs
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- **Strategy**
 - Participating Institutions
 - Prairie View A&M University (PVAMU)
 - Texas Southern University (TSU)
 - Justification
 - Both these institutions are located within fifty miles of NASA Johnson Space Center, a lead center for Space Radiation Health Program.
 - Projected Outcome
 - Contribution to human resource development through special emphases on enhanced and advanced degree curriculum in this critical area among underrepresented minority students
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- **Strategy (con't)**

- Curriculum Focus
 - Radiation Physics
 - Radiation Biology
 - Radiation Measurements
 - Radiation Transport
 - Nuclear Engineering

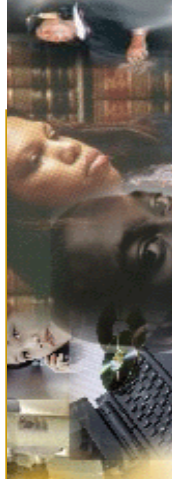
- Course implementation and delivery will be a staged approach with each institution delivering the courses as they are developed within their respective academic environments and on-line delivery between the universities via the NASA Goddard Minority University Space

Interdisciplinary Network (MU-SPIN)



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- **Institutional Assets**

- Both, PVAMU and TSU, have NASA University Research Centers (URC) of Excellence
 - PVAMU: Center for Applied Radiation Research (CARR)
 - TSU: Center for Environmental Sciences and Biotechnology (CESB)
 - Physics Programs
 - PVAMU - expanding existing undergraduate program and developing a new graduate (RaISE) program
 - TSU – expanding undergraduate program with RaISE emphasis
 - Engineering
 - PVAMU – Expanding undergraduate nuclear engineering program and developing a graduate program with RaISE emphasis
 - Biology
 - TSU – Expanding a graduate program with RaISE emphasis with radiation biology emphases
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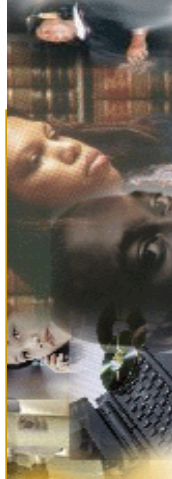
■ Guiding Principles for ESMD Support

- Content
 - Deliverables
 - Accessibility
 - Relevance
 - Customer Focus
 - Pipeline
 - Diversity
 - Management Plan
 - External Partners and Collaborations
 - Timeline
 - Metrics and assessment
 - Cost Effectiveness
 - Value-added
-



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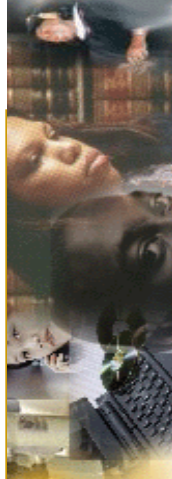


- **Courses Conducted**
 - ❑ **Methods in Biomedical Sciences (Fall '05)**
 - ❑ **Molecular Biology I (Fall '05)**
 - ❑ **Radiation Biology (Spr '06)**
 - ❑ **Computational Methods in Physics I (Spr '06)**
 - ❑ **Mathematical Methods in Physics I (Spr '06)**
 - ❑ **Intro to Electromagnetic Theory (Spr '06)**
 - **Forty-eight students have enrolled in and completed the courses**
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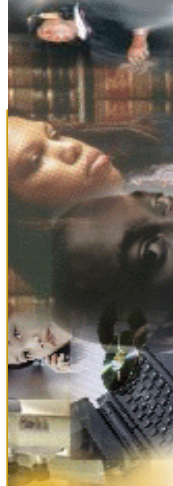


- Courses and Laboratories Planned ...
 - **Prairie View**
 - Intro to Nuclear and Particle Physics: Radiation Applications – 15 students expected (Fall 06)
 - Intro to Modern Physics and Radiation Science – 15 students expected (Fall 06)
 - Physical Sciences for non-majors (mostly education majors) – 300 students total, 30 students for RAISE emphasis (Fall 06)
 - Computation Methods in Radiation Transport (Spring 07)
 - Nuclear Engineering II (Spring 07)
 - Space Environments (Fall 07)
 - Radiation Measurements – Laboratory (Spring 07)
 - Radiation Quantities – Laboratory (Spring 07)
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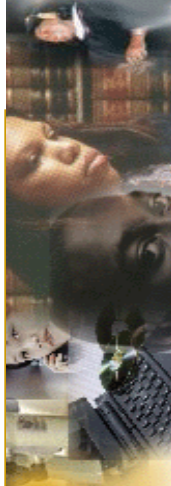


- **Courses and Laboratories Planned ...**
 - **Texas Southern University**
 - Computational Methods in Physics II (Fall 06)
 - Mathematical Methods in Physics II (Fall 06)
 - Electricity and Magnetism I (Fall 06)
 - Molecular Biology I (Fall 06)
 - Molecular Biology I – Laboratory (Fall 06)
 - Nuclear Physics I (Spring 07)
 - Radiation Science I (Spring 07)
 - Radiation Damage and DNA Repair (Spring 07)
 - Radiation Biology (Spring 07 or Spr-08 depending on demand)
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- **Online Delivery Planned...**
 - Online Curricula
 - PV: Intro to Modern Physics and Radiation Science (Spring 07)
 - PV: Intro to Nuclear and Particle Physics: Radiation Applications (Fall 07)
 - Course Video Teaching (MUSPIN)
 - Technical difficulties are hampering this effort
 - Looking for alternatives
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Text/Reference Material Development Planned...

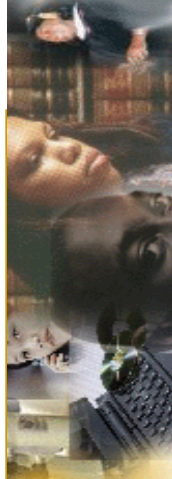
- Sample Series
 - Volume I: Space Radiation Environment
 - Volume II: Nuclear and Atomic Physics Measurements
 - Volume III: Radiation Transport Methodologies
 - Volume IV: Radiation Damage and Risk Management
 - Volume V: Space Design for Radiation Mitigation





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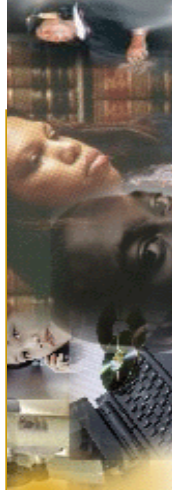
Additional Progress...

- Equipment Acquisition Through Leveraging
 - TSU: ~10 Ci Cs-137 Radiation source (NASA - URC/TSU)
 - PV: 4-processor SGI Tzero W/S (NASA - CARR Sponsored)
 - PV: Gamma Spec Instrument (TAMU - DOE Sponsored)
 - Advisory Committee Development
 - PV and TSU are identifying persons for the advisory committee
 - Student Surveys and Tracking
 - Student survey data will be acquired through annual state-required surveys
 - Student demographics are being collected
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- *More to come and other places to go.....*
 - ❑ *Increase student enrollment*
 - ❑ *Promote student participation in internships, etc.*
 - ❑ *Finalize graduate degree program in Physics*
 - ❑ *Expand to other institutions*
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