

A Career Path for African-American Students from HCBUs to National Laboratories

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Motivation

The underrepresentation of African American students in the fields of Geosciences and in particular in the field of mineral physics [a discipline in which there are presently only three—1 PhD and 2 MS], is clearly evident. In general, Physics and Geosciences have the largest problem to attract and retain African-American talent. While most physics and geoscience departments at majority-serving institutions have played practically no role in the education of African American physical scientist, the Department of Geosciences at Stony Brook University has an established track record in recruiting and educating African American students in Geosciences.

The goal of this new initiative is to recruit undergraduate science and engineering students from underrepresented groups into the graduate program in the Department of Geosciences at Stony Brook University, to educate them via formal courses and research projects to the M. S. degree in geosciences, and to position them for employment as science associates in national user facilities of the U. S. Department of Energy such as the National Synchrotron Light Source [NSLS] at the Brookhaven National Laboratory [BNL]

Approach

The new program is directed to building on the evolving relationship between professors from Historical Black Colleges and Universities [HBCUs] and the National Synchrotron Light Source [NSLS] of the Brookhaven National Laboratory [BNL]. An outcome of this relationship has been the creation of an Interdisciplinary Consortium for Research and Educational Access in Science and Engineering [INCREASE], an organization to promote research in HBCUs and other minority-serving institutions [MSIs], involving utilization of national user facilities, such as the National Synchrotron Light Source at Brookhaven National Laboratory.



Figure 1. 2012: 5th Annual INCREASE Workshop, April 2012.

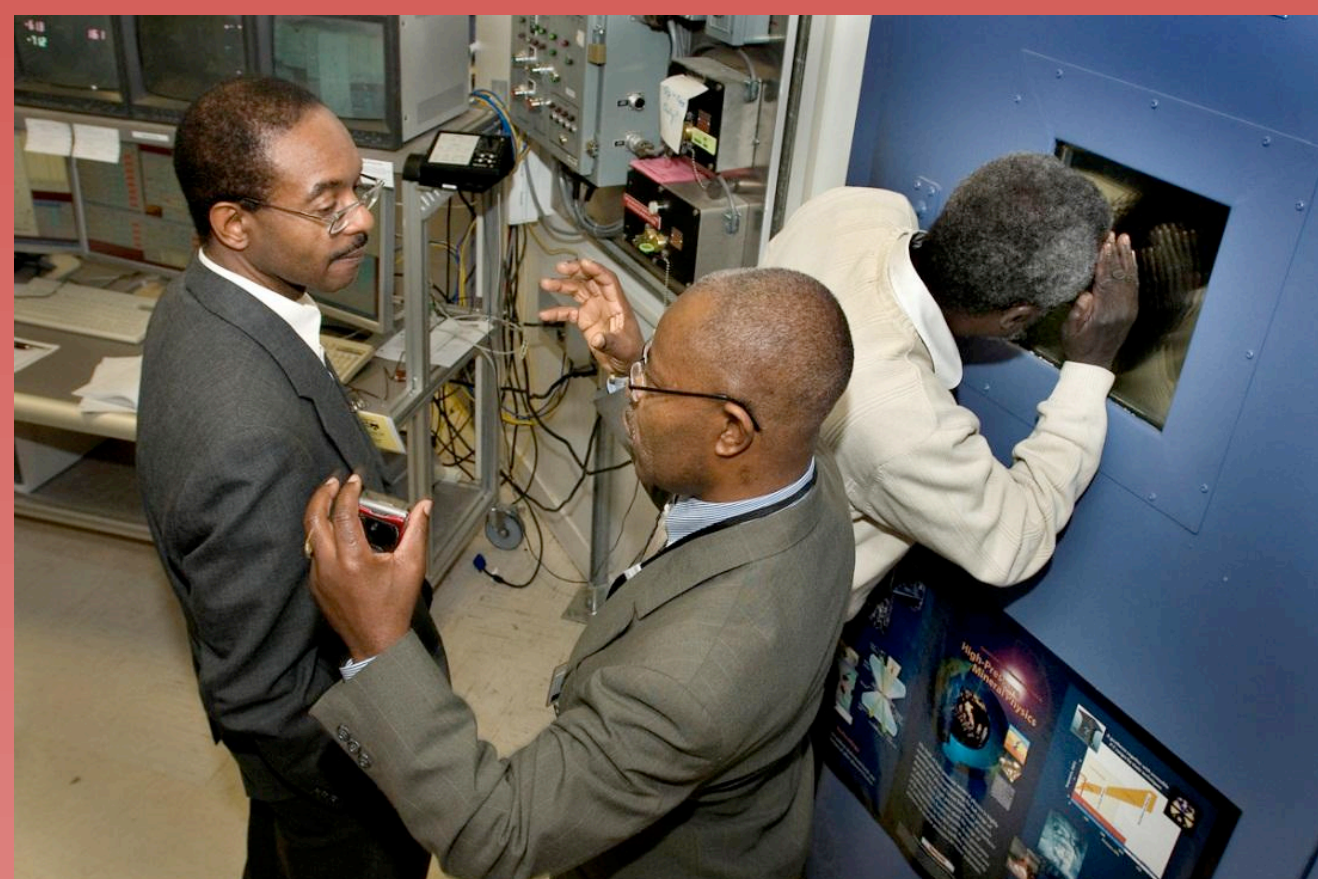


Figure 2. Gabriel Gwanmesia demonstrating the principle of the multi-anvil high-pressure apparatus at X17B2 at BNL

This MS program in Geosciences will include both formal courses and internship research at the X-ray and ultraviolet beamlines operated at the NSLS of BNL by COMPRES [Consortium for Materials Properties for Research in Earth Sciences]. Individual development plans (IDPs) for the students will be generated to provide a planning process that identifies the academic needs, the research skills and the professional development necessary for a position as a Science Associate at a National Laboratory.

Formal Graduate Courses [need 18 total course credits for MS degree] from Departments of Geosciences, Chemistry and Physics & Astronomy]. Each graduate course carries 3 credits toward the degree.

Geosciences:

- GEO 508: Rock-Forming Minerals
- GEO 511: Computer Programming for the Geosciences
- GEO 517: Crystal Chemistry
- GEO 531: Crystalline Solids
- GEO 532: Solid-State Geochemistry
- GEO 533: Geochemistry of the Solid Earth
- GEO 540/551/552: Solid Earth Geophysics/Physics of Earth I and II*
- GEO 556: Solid-State Geophysics*

Physics & Astronomy

- PHY 515/516: Methods of Experimental Research I and II*
- PHY 518: Applications of synchrotron radiation*

Chemistry

- CHE 523: Chemical Thermodynamics

* Required courses

In addition to formal graduate courses, these MS students will be enrolled for up to 12 credits of GEO 599: Independent Research over the 4-semester period of their residency. These research credits may be obtained by working with faculty on campus at Stony Brook and/or with staff at the NSLS of BNL. These projects will deliberately emphasize instrumentation and technical development, as needed to become a science associate at a National Laboratory.

Goals

The main goal of the project is to increase minority participation in the Geosciences, as well as to facilitate diversification of the workforce at BNL in anticipation of the commissioning of the new light source, NSLS II, in 2015.

The goals are:

- Recruit undergraduate science and engineering students from underrepresented groups into the graduate program in the Department of Geosciences at Stony Brook University.
- Educate these student trainees through formal courses and research projects to the M. S. degree in geosciences.



Figure 3. HBCU professors and high school teachers tour the high pressure laboratory at Stony Brook University.

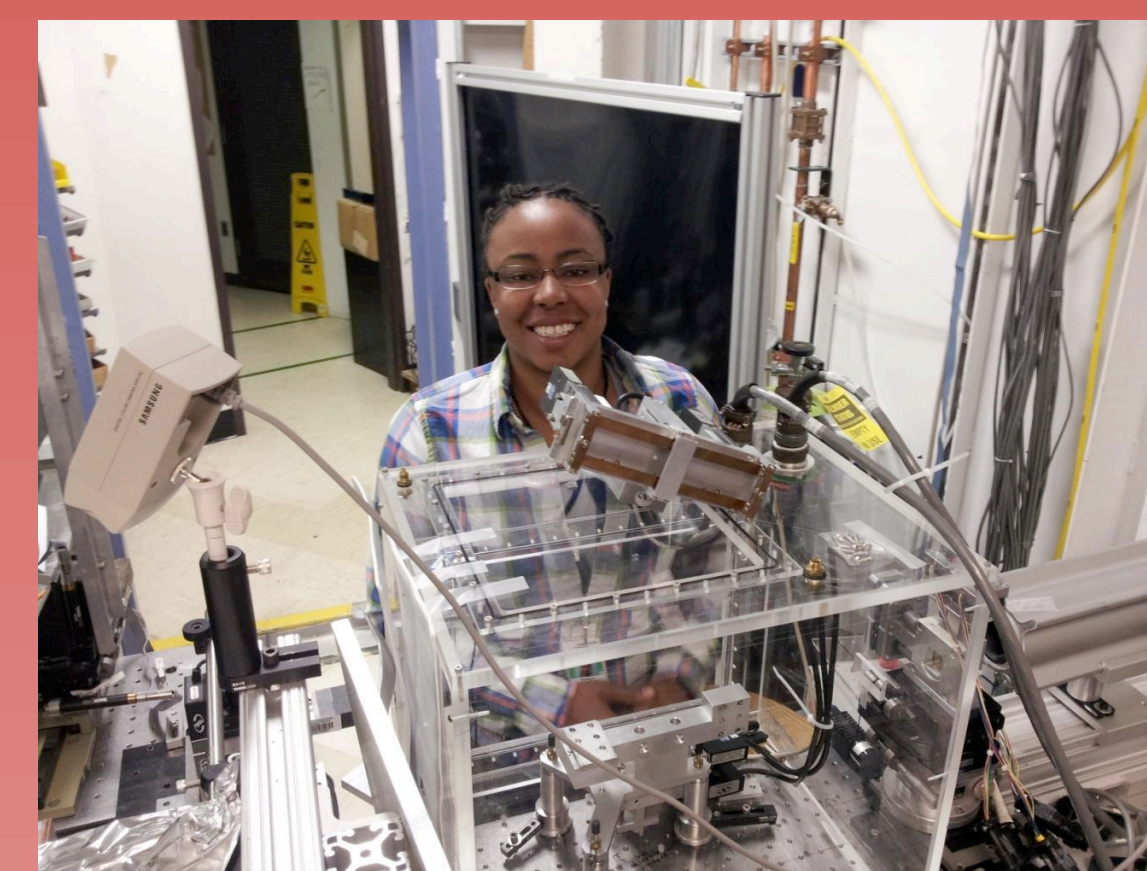


Figure 4 Ashley Thompson, the first student in the program, working at X17B3.

- Provide these student trainees with a marketable skill set in the emerging field between science and technology.
- Prepare these student trainees for employment as science associates in national user facilities of the U. S. Department of Energy [DOE], such as the National Synchrotron Light Source [NSLS] at the Brookhaven National Laboratory [BNL].



Figure 5 Artists' rendering of Brookhaven National Laboratory's National Synchrotron Light Source II. When completed, NSLS-II will be the world's leading storage-ring-based synchrotron light source. It will be the first light source that combines nanometer spatial resolution with high brightness, coherence, and beam stability, enabling nanometer-scale characterization of materials.

- One clear indicator of the success of this Track 1 program will be when the graduates of this MS program in Geosciences obtain jobs at the NSLS or other synchrotron facilities in the national laboratories of the DOE. However, we will also consider the program to be successful if these graduates pursue other types of careers in science, including teaching in the public schools, jobs in industrial companies and/or pursue PhD degrees and academic careers.

As a collaboration between the National Science Foundation [NSF] and the US Department of Energy, this model can also be extended to diversifying the workforce at the other national user facilities of the DOE.

As of September 2012, three students have been recruited into this M. S. program: Ashley Thompson from Delaware State University enrolled in January 2012; Melissa Sims from the University of South Carolina and Adaire Heady from Delaware State University enrolled in September 2012.

Acknowledgements

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