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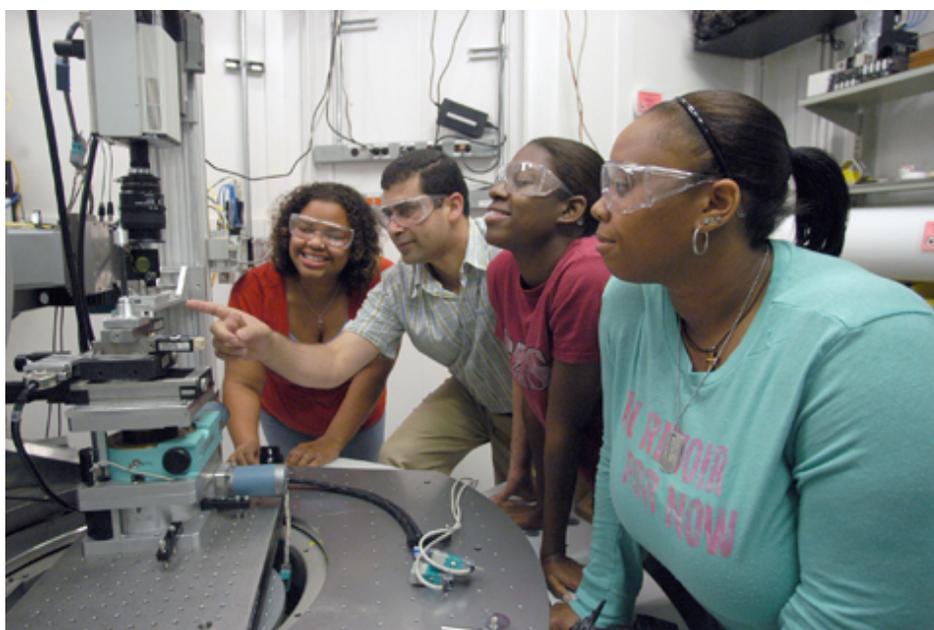
SMART



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Taking the FaST Track to Synchrotron X-ray Science

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The Southern University and A&M College FaST contingent reads their experiment sample inside the GSECARS 13-BM-C enclosure. Left to right are Maude Johnson, Riyadh Al-Raoush, Lindsey Thomas and Meagan Pinkney.

From the time of Roentgen's first experiments with x-rays in 1895, these miraculous gifts of invisible light have afforded us an opportunity to visualize the unseen. For Maude Johnson, her experience with high-brightness x-rays from the Advanced Photon Source (APS) at the U.S. Department of Energy's (DOE's) Argonne National Laboratory is allowing her to see herself in a whole new light.

"This facility has given me the opportunity to view myself as a scientist, and realize the potential I have for improving the well-being of the environment and society," said Johnson, one of three Southern University and A&M College (Baton Rouge, Louisiana) undergraduate students who, under the tutelage of Southern University Assistant Professor Riyadh Al-Raoush, are spending their summer doing research at the APS. Al-Raoush, Johnson, and fellow engineering students Lindsey Thomas and Meagan Pinkney are engaged in a 10-week research project carried out at the GeoSoilEnviroCARS (GSECARS) beamlines at the APS. Their stay is being sponsored by the [Faculty and Student Teams \(FaST\) Program](#), a cooperative effort between the DOE Office of Science and the National Science Foundation that "provides hands-on research opportunities in DOE national laboratories during the summer for faculty and students from colleges and universities with limited research facilities, and those institutions serving populations, women, and minorities underrepresented in the fields of science, engineering..." The FaST Program at Argonne is administered by the Division of Educational Programs (DEP) under DEP Director Harold Myron.

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"The research we're doing at GSECARS is focused on the use of tomography to investigate microscale processes in permeable media (e.g., flow, mass transport, pressure-saturation relations)," said Al-Raoush. "The data being obtained at Argonne will enable us to develop and verify numerical and theoretical models. There is a wide range of applications to this research, including water resources engineering, environmental remediation, and enhanced oil recovery."

"The purpose of this visit is focused on education and research; I am trying to integrate both components. This is a great opportunity for my students to think outside the classroom, to utilize state-of-the-art tools to tackle a research problem, and to interact with scientists."

Lindsey Thomas, a mechanical engineering student entering her third year at Southern University, notes that, "Having the chance to do research at the APS and GSECARS, and to be exposed to the research world is a huge opportunity for me. The research that I have done is a little out of my area of expertise because it's more of an environmentally focused project, so it has been a great way to broaden my horizons."

Senior Meagan Pinkney finds that, "Being one of Argonne's summer participants has been nothing but a blessing from God, and I am trying to take advantage of every opportunity that is presented to me while I am here. The people working at GSECARS have been very helpful toward our experiment, and I thank each and every one of them for making our stay more comfortable."

"The people in the APS, and especially GSECARS, have opened their doors to our curiosity and astonishment about the many projects currently going on throughout the synchrotron," added Johnson. "As you walk around the APS facility's inside perimeter, you can read the various abstracts and reports presented on posters and get an understanding of how useful it is to all the various disciplines of science."

"Our GSECARS supervisors, Mark Rivers and Peter Eng, have worked hard at making sure we know every aspect of the use of tomography, from its hardware and functionality, to its software and image processing. We know we are fortunate to be here and have hopes of bringing more students in the future, so that they will gain the same knowledge and appreciation for science and technology as we have."

Johnson's career objective after graduation with a Bachelors of Science in Civil Engineering "is to continue my education in a Ph.D. program in Hydrology and Fluid Dynamics. I would love to gain a fellowship with Argonne and conduct my research at the Lab during Graduate School, and also as a postdoc."

Thomas plans on going to graduate school after graduation, "so having this experience will be a positive for my future." After graduation, Pinkney plans to "enter industry and move up the corporate ladder. I also plan to obtain a Master's Degree in Business Administration in the near future, and working at Argonne this summer will accelerate my chances of gaining this degree. My ultimate goal is to open my own engineering company."

GSECARS is one of five beamline sectors at the APS managed by the University of Chicago's Center for Advanced Radiation Sources; the others are BioCARS (Sector 14), ChemMatCARS (Sector 15), and the Industrial Macromolecular Crystallography Association Collaborative Access Team (Sector 17).

"This is GSECARS first experience with the FaST program," said Rivers, "and it has been very positive. The group brought a variety of skills to the project, including engineering design, so they were really able to design the experiment from the ground up. We provided the bright x-ray beam and tomographic expertise, and Dr. Al-Raoush had the ideas for the science they wanted to accomplish. It was a successful collaboration, and we look forward to participating in the program again in the future."

- Richard Fenner (Argonne National Laboratory)

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