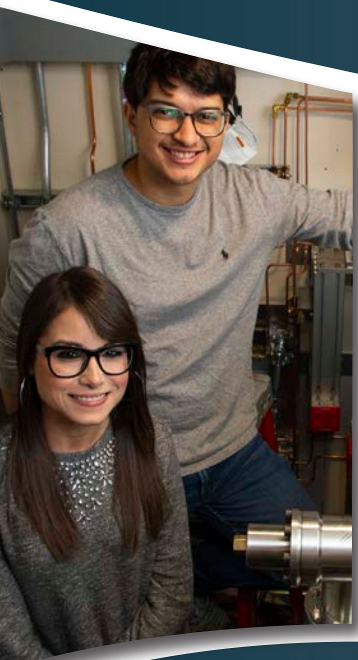
NSF

CHEXS
CENTER FOR HIGH ENERGY X-RAY SCIENCES

At-a-Glance

October 15, 2020



CHESS
CORNELL HIGH ENERGY
SYNCHROTRON SOURCE

CHESS/Wilson Lab | Cornell University | 161 Synchrotron Drive | Ithaca, NY 14853 | 607-255-7163

Message from **Joel Brock** CHESS Director

In October 2019, CHEXS began its first user operations just as the CHESS-U upgrade was nearing completion. The upgrade project reconfigured and optimized the storage ring for the production of intense high-energy X-rays. An increase in flux and energy of the X-ray beams was achieved by increasing both the energy of the stored positron beam (from 5.3 GeV to 6.0 GeV) and the positron current (from 100 mA to 200 mA). Moreover, the emittance was considerably reduced, resulting in smaller and more collimated X-ray beams.

In parallel with the upgrade of the storage ring, unique X-ray beamlines optimized for specific scientific capabilities were installed on the completely reconfigured and rebuilt experimental floor to exploit the upgraded storage ring source:

- **The Q-Mapping for Quantum Materials (QM2)** beamline is a facility for high-throughput characterization of quantum materials in reciprocal space (also known as "Q-space"), using both resonant and non-resonant scattering over a wide range of X-ray energies.

- **The Forming and Shaping Technology (FAST)** beamline is capable of rapid (millisecond and below) high-energy X-ray measurements to study manufacturing processes such as laser welding and rapid quenching, as well as providing capabilities for critical mechanical performance studies.

- **The Photon-In, Photon-Out X-ray Spectroscopy (PIPOXS)** beamline is optimized for spectroscopic studies of valence electronic states in systems ranging from catalysts to enzymes.

- **The High Pressure Biology (HPBio)** beamlines are devoted to monitoring the structure of the building blocks of life at the molecular level under high pressure, e.g. found at the bottom of the ocean, an important regime not previously accessible to biologists. The macromolecular crystallography (MX) beamline determines the atomic structure of macromolecules in a diamond anvil cell at pressures up to 400MPa. The high-pressure small angle scattering beamline (SAXS) determines the shape at pressures up to 700 MPa.

The first call for proposals for the fall run in 2019 resulted in more than 110 new proposals and an oversubscription of the CHEXS beamlines by a factor of two to three (depending on beamline).

During the first two run cycles, the facility ran exceptionally well with a 95% storage ring uptime and 62% average beamline proposal success rate, serving 162 proposals, and 648 users.

One of the largest groups to utilize the facility were researchers affiliated with our PREM partners in Puerto Rico. This partnership increased participation by Hispanic surnamed researchers to 6.3% of all users.

By early 2020, three high impact publications acknowledging the use of CHEXS facilities or support of CHEXS scientific staff had been published. Mid-way through our second user operation period, CHEXS was clearly off to an amazing start.

The world-wide COVID-19 pandemic suspended both X-ray user and accelerator operations on March 16, 2020 (and shut-down the entire Cornell University campus) when New York Governor Cuomo announced the "New York State on PAUSE" executive order, that required that all non-essential businesses close to reduce the spread of the COVID-19 virus. Almost immediately, facility staff started preparing to restart operations under appropriate conditions, and on April 29th, Cornell University gave the green light to restart operations for (university approved) COVID-19 research. Several weeks later, the definition of essential research expanded to include all NIH and DoD funded research. On June 10th user experiments resumed and continued through June 29th, when CHESS shut down for the scheduled summer maintenance period.

Like many research programs, social distancing and reduced staffing slowed the progress of the CHEXS R&D program. Nevertheless, A. Temnykh further developed the capabilities of Cornell Compact Undulators and the characterization of novel detectors and X-ray optics made very good progress.

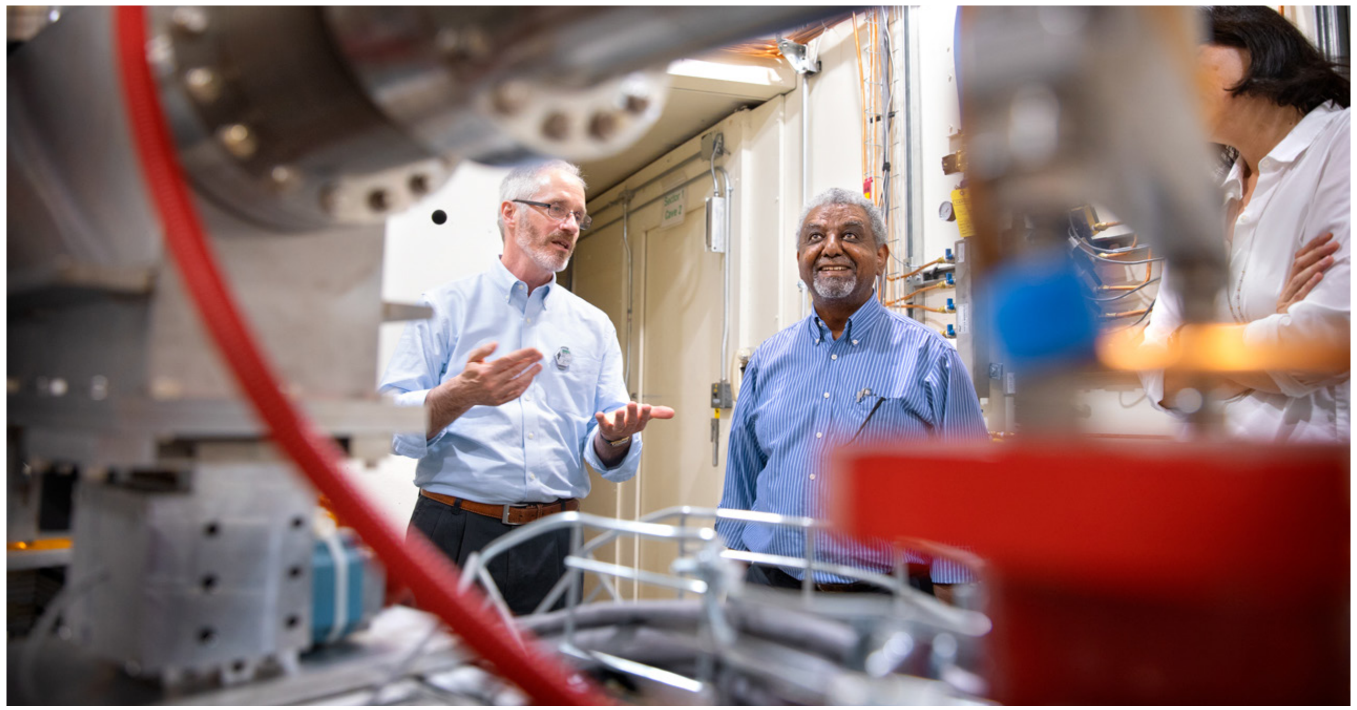
In order to minimize transmission, Cornell University is strongly discouraging and significantly restricting visits to campus by individuals not part of the residential Cornell community, at least through the fall semester.

Going forward, after the pandemic ends, the newly developed ability to control remotely all of our X-ray beamlines will continue to enable the national user community to develop new ways to interact with the facility.

The first 10 months of operation of CHEXS clearly demonstrate both the high quality of the facility, the demand for the facility, the quality of operations, and the productivity. Our response to the COVID-19 pandemic demonstrates our nimbleness and ability to innovate under challenging conditions. The facility staff were asked to meet incredible challenges under extraordinarily difficult circumstances and they delivered.

Paving the way

NSF Partners with CHEXS at CHESS



For more than 30 years, the NSF has been the sole steward of CHESS, providing the funding needed to operate the large facility. CHESS has now transitioned from sole stewardship by the NSF as a national user facility and into a partner-funded laboratory.

In 2019, the NSF awarded Cornell University $54 million to create CHEXS, the Center for High Energy X-ray Sciences. CHEXS is now a sub-facility of CHESS.

The NSF funding is provided by its Division of Materials Research, the Directorate of Biology and the Directorate of Engineering.

CHEXS includes four beamlines and staff to support high-energy X-ray science user operations, X-ray technology research and development, and CHEXS leadership. In addition to research, CHEXS will support education and training, particularly of researchers in biological sciences, engineering and materials research.

"Diverse groups including plant biology, structural materials and advanced manufacturing are eager to utilize a much larger fraction of the nation's available synchrotron resources," said Joel Brock, CHESS Director. "Using X-rays is a highly desirable technique that can transform your research, and this new NSF funding will help us reach a wider user base."

By enabling partners like the NSF to align their support with evolving research needs, CHESS is able to offer its new partners access to the synchrotron radiation facility more rapidly. By diversifying the funding sources, CHESS also hopes to diversify and expand the research of the lab.

While other partners contribute money for research at the X-ray facility, the NSF will remain CHESS's largest funding member of these partner organizations.

CHEXS, and the other partners at CHESS, allow researchers to focus on using the high-flux X-rays that are optimized for time-resolved, high-energy applications. These types of X-rays are ideal for researching quantum materials, fuel cells and high-pressure biological processes.

CHEXS
CENTER FOR HIGH ENERGY X-RAY SCIENCES

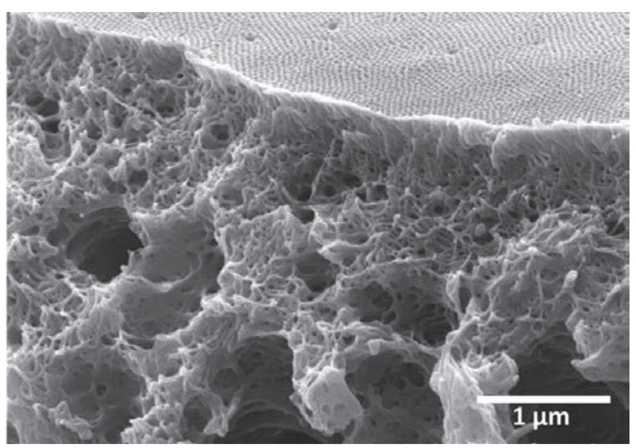
Researching for the Future

Science Shines at CHESS

BIOLOGY

CHEXS at CHESS is a **critical resource** for structure-based drug design supported by the protein structures obtained at the facility. **Research performed at CHESS directly impacts** the development of new therapeutic drugs. Structure-based drug design has created new drugs currently in clinical trials for both HIV and cancer.

Additionally, our staff members and users have developed tools and methods that will enable biologists with minimal X-ray expertise to conduct synchrotron experiments in plant phenotyping.



MATERIALS

Scientists use techniques such as high-energy X-ray diffraction, diffuse scattering, and computed tomography to **examine the positions of atoms** in macroscopic materials under real engineering conditions.

By identifying relevant crystallographic factors, the development of future materials is advanced. High-resolution x-ray diffraction (XRD) is applied to see features as small as hundredths of a nanometer.

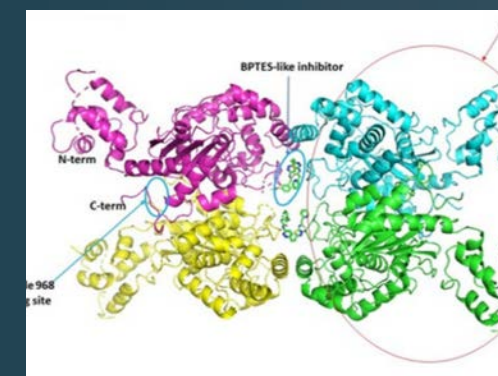
ENGINEERING

Over 90% of metallic engineering structures ultimately fail due to fatigue, but we truly do not know how a crack initiates and grows in materials such as titanium alloys.

CHESS has recently developed the tools that make it possible to measure residual stress within structural materials with good enough spatial resolution and fidelity to be useful for structural designers.

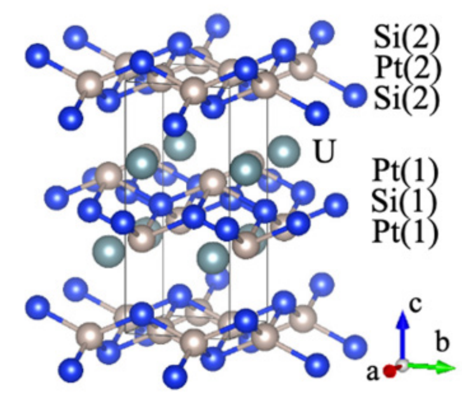
The high-energy X-ray synchrotron radiation enables us to map residual stress in a practical engineering component.

Recent CHEXS Highlights



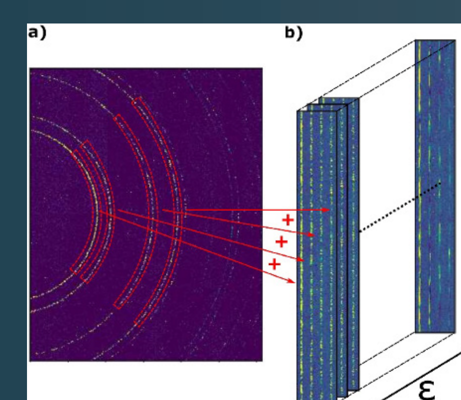
BIOLOGY RESEARCH RELATED TO COVID-19

Reflecting the impact of the COVID-19 pandemic, the research efforts in June at NSF supported beamlines (HPBio/FlexX, HPBio/BioSAXS) focused on Cornell University approved COVID-19 research. A collaboration between CHEXS, MacCHESS and MacCHESS PI Prof. Richard Cerione's (Cornell) research group studied a family of drugs that target enzymes (Glutaminase). These enzymes play an essential role in the metabolism of cancer cells – and, as it turns out, viruses such as SARS-CoV-2, the virus that causes COVID-19.



X-RAYS AND MAGNETIC FIELDS TEAM UP TO UNCOVER NEW QUANTUM STATES

Quantum materials research involves manipulating and measuring the collective quantum states of electrons in materials. The NSF-funded user facilities at CHESS and the National High Magnetic Field Laboratory (aka the MagLab) have long been important resources in this pursuit. We are now collaborating more closely than ever to address targeted questions about the quantum states of materials, as highlighted by a series of recent results involving measurements and/or co-authors from both labs.



HIGH-ENERGY DIFFRACTION MICROSCOPY UNDER PRESSURE

Historically, construction materials were only mechanically tested at the macroscopic scale when subjected to high pressure and there was no means to probe their micromechanical responses through in-situ testing. CHEXS has developed a tri-axial pressure cell for use at the Forming and Shaping Technology (FAST) beamline. This pressure cell is a unique device able to apply compressive loads up to 2 kN in addition to hydrostatic pressures up to 100 MPa, while allowing far-field High-Energy Diffraction Microscopy experiments to be performed.

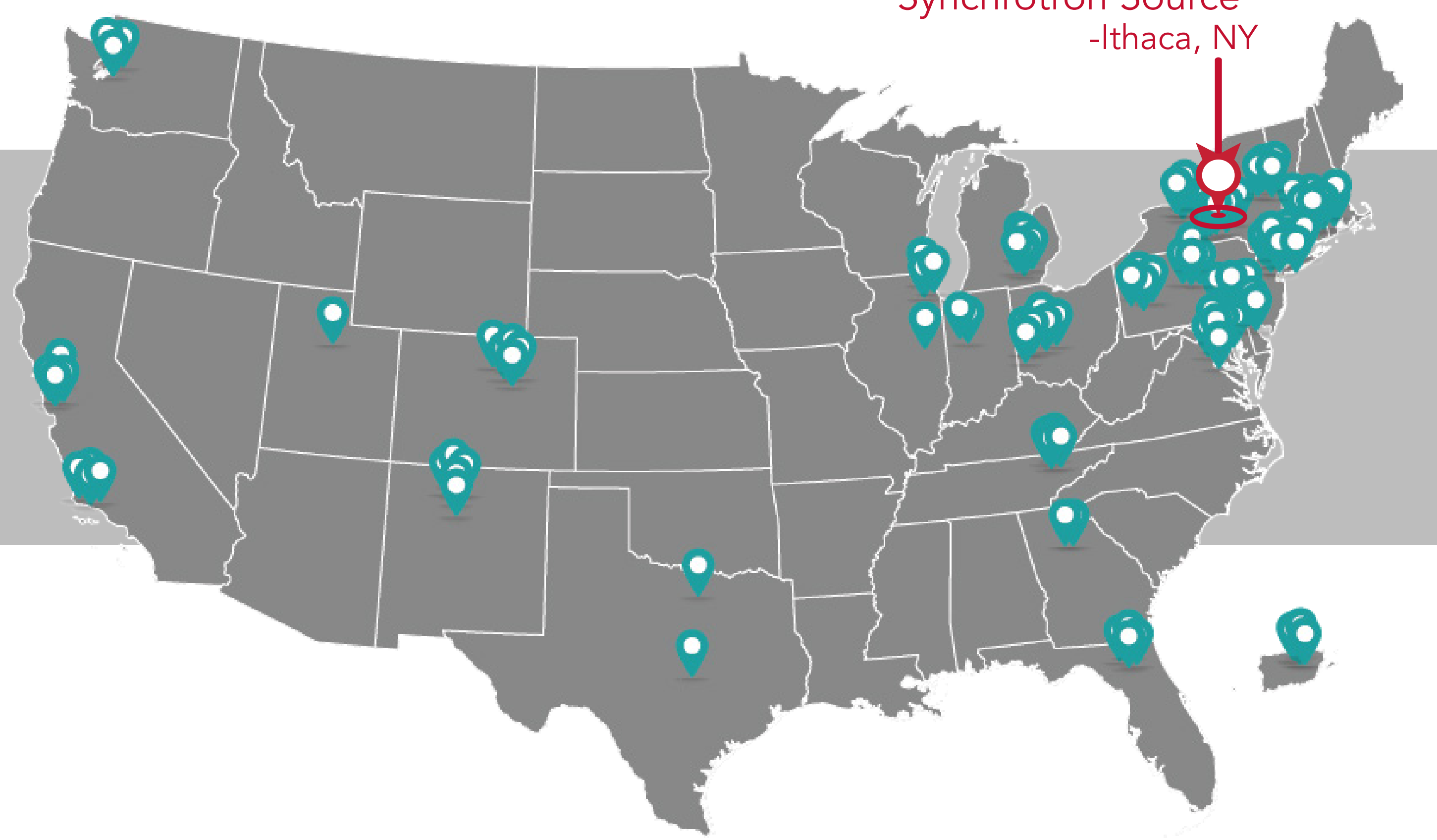
A Community of International Researchers

A Worldwide Impact on Discovery

NSF CHEXS CENTER FOR HIGH ENERGY X-RAY SCIENCES

648 users traveled to CHESS to perform research between September 1, 2019 and June 30, 2020.

These researchers came from 21 different states, Washington D.C., Puerto Rico, and 9 different countries.



Where did CHESS users come from?

Canada, Denmark, Estonia, Germany, India, Italy, United Kingdom, United States, South Korea

54% of users' funding came from government sources

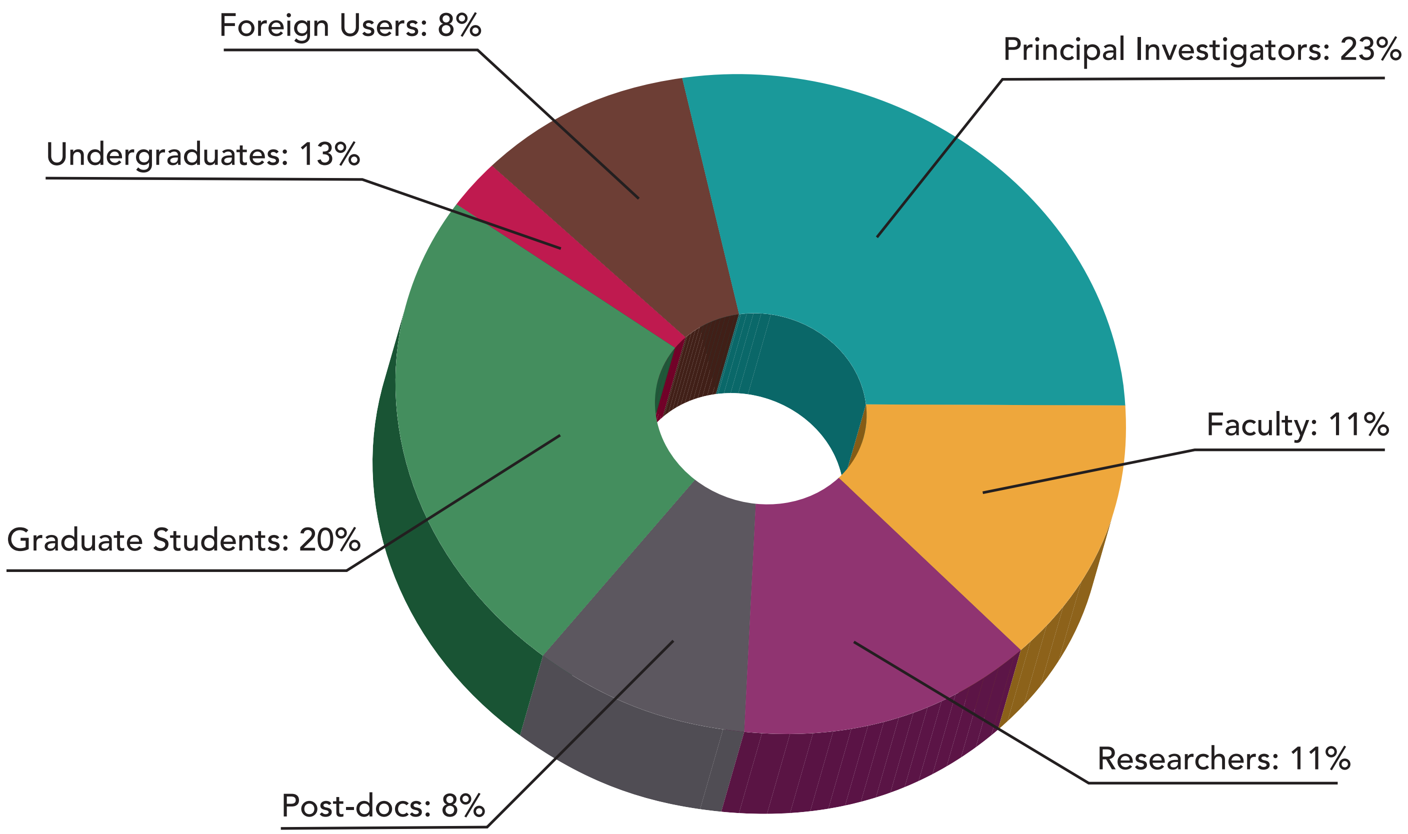
54% of users at PIPOXS were NSF-funded!

A Community of International Researchers

What our users say...

CHEXS
CENTER FOR HIGH ENERGY X-RAY SCIENCES

CHEXS's capabilities help attract new users and develop new user proposals for facility beamlines



46% of undergraduates are female

Undergraduates who are underrepresented minorities **23%**

9.8 out of 10

The user community's satisfaction with the assistance provided by CHESS technical staff. (with 10 being the best)

"Consistent willingness to help and to get things done by everyone (on every visit to CHESS). "
-CHESS User February 2020

"In a league of their own. There is no support group (or support model) at any other synchrotron or neutron source that's even 10% as good as the CHESS operations group. When something is going wrong, you want to be at CHESS."
-CHESS User February 2020

"I just want to say the support from the beamline scientists - Drs. Darren Pagan and Kelly Nygren, were amazing. They were extremely helpful and ensured the data and experiment was successful."
-CHESS User December 2019

"Good training. Helpful on check in. Timely email reply."
-CHESS User February 2020

"Richard and his staff were great! Everyone was very friendly and helpful. Useful online tools before arrival."
-CHESS User February 2020

"Great facilities. Easy to use. Software worked well for real time data analysis."
-CHESS User February 2020

BEAMLINES OF CHEXS

CHEXS CENTER FOR HIGH ENERGY X-RAY SCIENCES

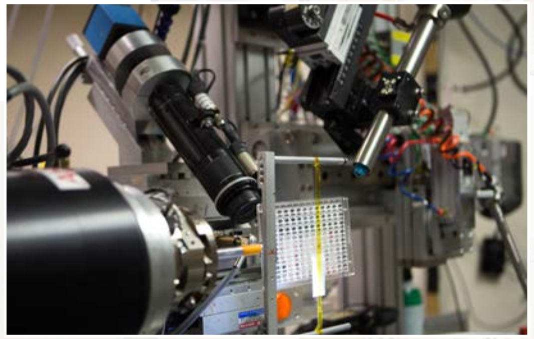
Photon-In, Photon-Out X-ray Spectroscopy Beamline **PIPOXS**

PIPOXS provides high intensity x-ray beams for use in various X-ray spectroscopic techniques—including X-ray absorption, X-ray emission, and resonant inelastic X-ray scattering—over an energy range of 3.5 – 60 keV. The large PIPOXS hutch allows for a wide variety of spectrometers and sample environments to be accommodated.

Q-Mapping for Quantum Materials - **QM²**

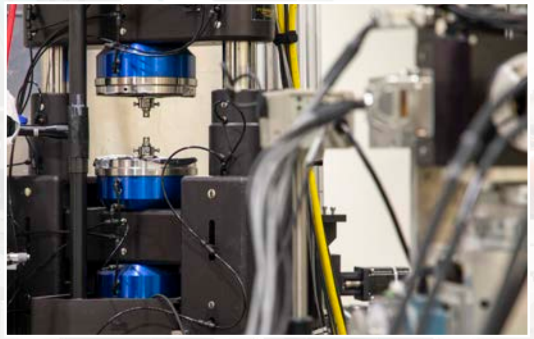
The QM2 beamline (at CHESS endstation 4B) is dedicated to high throughput characterization of quantum materials in reciprocal space ("Q-space"). The beamline is optimized for both resonant scattering studies and high-dynamic range mapping with high energy photons. The ability to switch easily between these configurations for each sample under study enables comprehensive measurements, performed quickly.

High-Pressure Biology Beamlines - **HPBio**

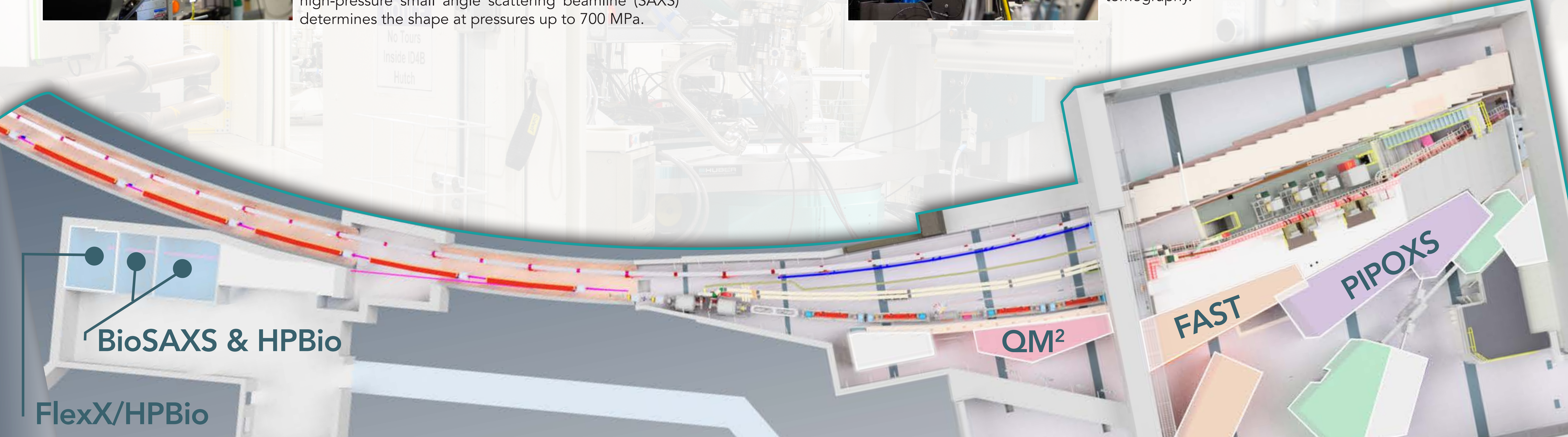


These beamlines are devoted to monitoring the structure of the building blocks of life at the molecular level under high pressure, e.g. found at the bottom of the ocean, an important regime not previously accessible to biologists. The macromolecular crystallography (MX) beamline determines the atomic structure of macromolecules in a diamond anvil cell at pressures up to 400MPa. The high-pressure small angle scattering beamline (SAXS) determines the shape at pressures up to 700 MPa.

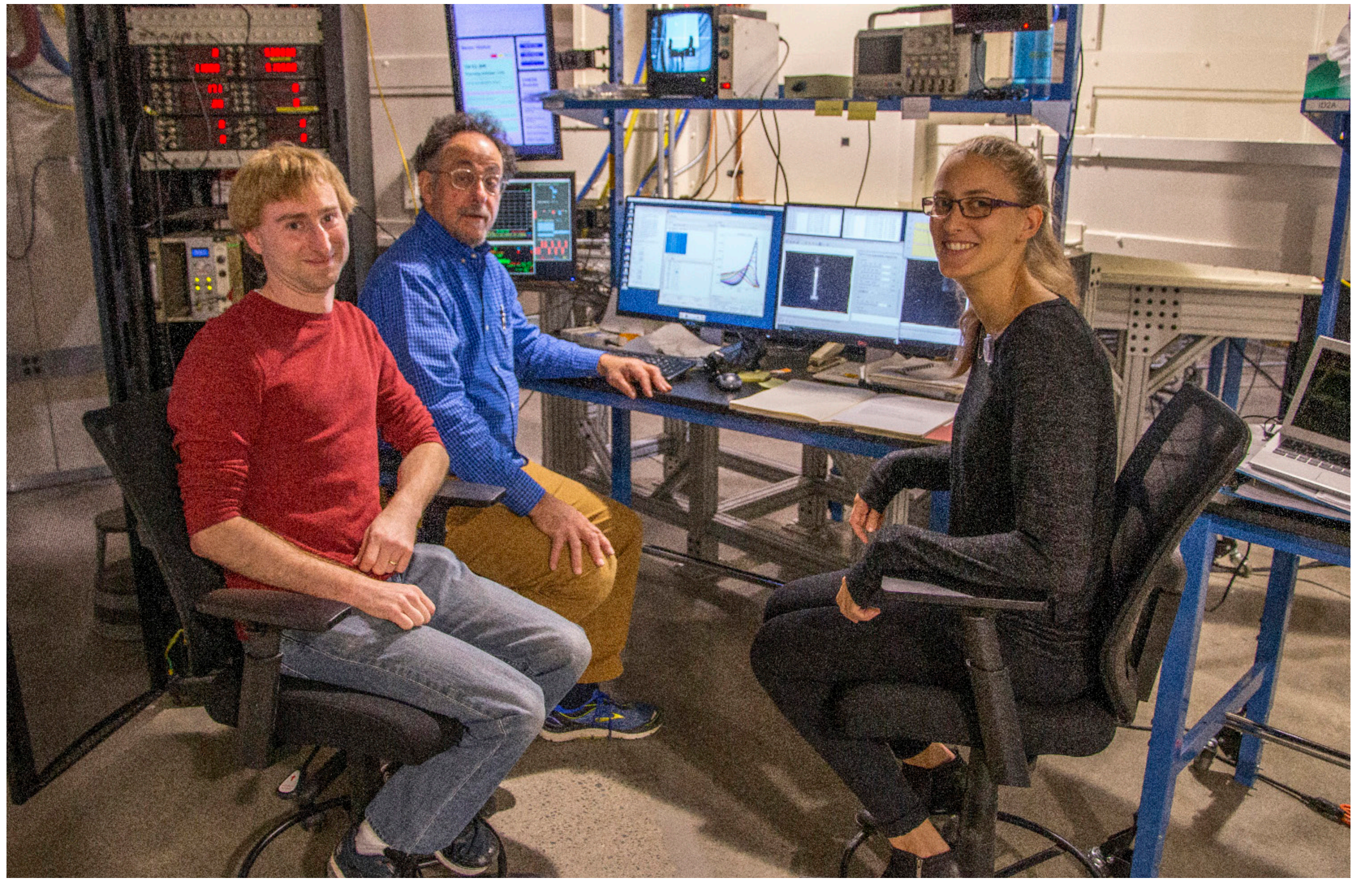
Forming and Shaping Technology - **FAST**



The Forming and Shaping Technology (FAST) beamline is designed to study the processing and performance of structural materials with a focus on in-situ experiments. Users are able to perform a wide-range of high-energy X-ray diffraction and imaging measurements including near-field and far-field high-energy X-ray diffraction microscopy, powder diffraction, and micro-computed tomography.



Behind the Shielding Wall



CHESS Welcomes Users After CHESS-U

October of 2019 marked the official start of user operations at CHESS after the CHESS-U upgrade. This also marked the start of all three partner programs: The NSF funded CHEXS, MacCHESS supported by NIH and NYSTAR, and the Materials Solutions Network at CHESS, or MSN-C, funded by the Air Force Research Lab (AFRL). All partner programs welcomed users to new hutches and beamlines.

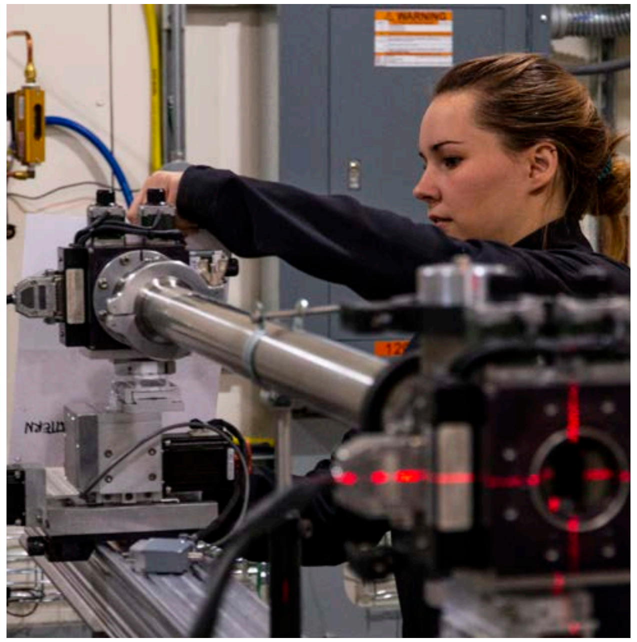
The production of brilliant X-rays at CHEXS, MacCHESS and MSN-C, is a result of the CHESS-U upgrade project funded by New York state. This project started with the removal of the CLEO detector in the summer of 2016. The removal of CLEO marked the conversion of the lab's decades-long particle detection program to a new era of X-ray production, underscored by eliminating one of the counterrotating beams needed for particle collisions.

The accelerator team is now able to focus solely on positrons for the creation of some of the world's brightest X-rays.

While the storage ring is currently operating at 100mA, users will see an increase in current to 200mA over time. This increase in current, combined with an increase of energy from 5.3GeV to 6.0GeV and reduced emittance, will significantly enhance the capabilities for users here at CHESS.

Moreover, users will see an extraordinary enhancement in beam quality in the insertion devices that are available at each of the beamlines. The storage ring is now outfitted with seven Cornell Compact Undulators, CCUs, that have replaced the bending magnets of many of the stations at CHESS. Now, hutches like PIPOXS are seeing X-rays that are approximately 20 times brighter than those produced prior to the upgrade.

CHESS director Joel Brock says that users will enjoy everything that the new facility has to offer, while still appreciating the uniqueness of the lab that they have grown to admire. "CHESS has always been a flexible lab that is able to tailor experiments for a particular need," Brock says. "I always like to say, 'bring us your hardest problems', and now that we are brighter than ever, those problems can be even more challenging."

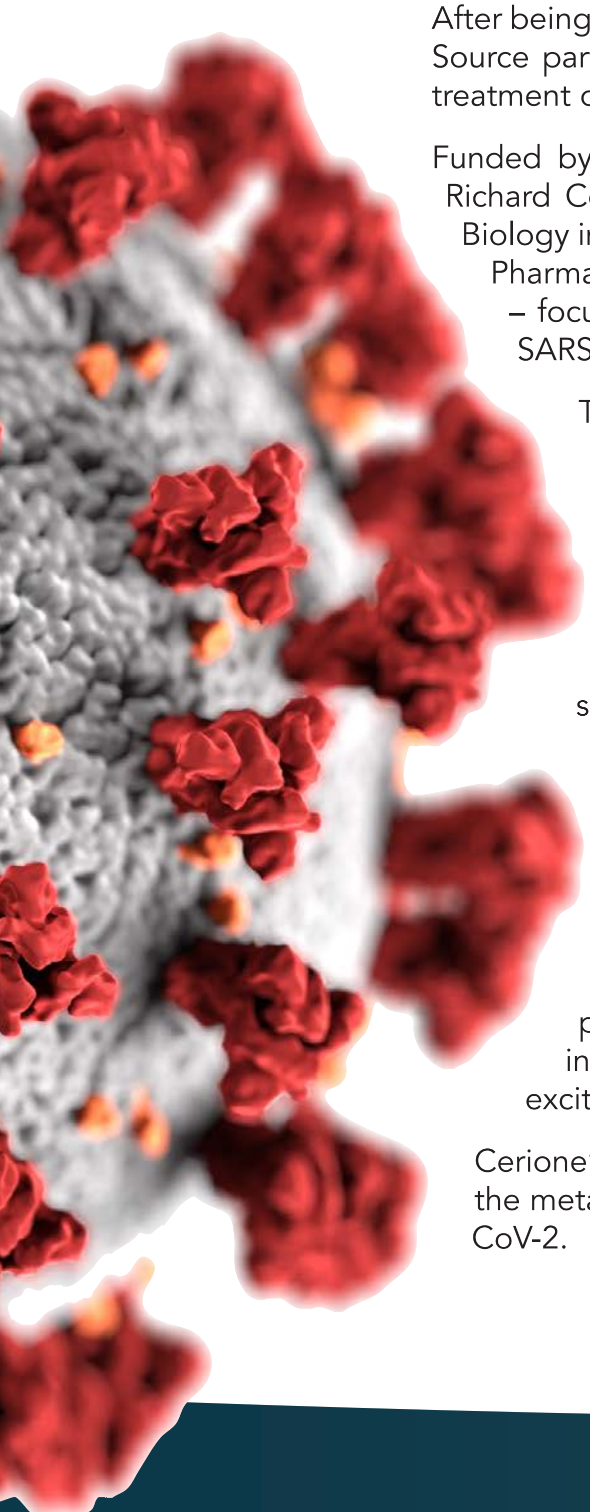


"User demand and the quality of proposals have both been exceptionally high," says Joel Brock, director of CHESS.

The new scientific capabilities and the diversification of funding are reflected in the wider communities of researchers who will benefit from CHESS-U. However, despite changes, CHESS remains committed to its core goals: "CHESS will continue its practice of supporting and training new users, developing X-ray technologies and supporting world-class X-ray studies," says Brock.

Essential Research at CHESS

Restarting to Combat the COVID Crisis



After being shut down due to COVID-19, the Cornell High Energy Synchrotron Source partially restarted operations in June to conduct research related to treatment of SARS-CoV-2, the virus that causes COVID-19.

Funded by the National Institutes of Health, the research – to be led by Richard Cerione, the Goldwin Smith Professor of Chemistry and Chemical Biology in the College of Arts and Sciences, and Goldwin Smith Professor of Pharmacology and Chemical Biology in the College of Veterinary Medicine – focuses on cancer-fighting enzyme blockers, which have potential as SARS-CoV-2 inhibitors.

The experiments took place at the X-ray crystallography beamline of CHEXS – funded by the National Science Foundation, the NIH and Empire State Development's Division of Science, Technology and Innovation (NYSTAR) – to determine the structures of drug-enzyme complexes, which help to inform drug potency, dosages and reliability.

On May 1, Cornell granted CHESS permission to restart the synchrotron after the facility was shut down quickly in mid-March due to the coronavirus pandemic. The Cornell Electron Storage Ring (CESR) was carefully restarted in order to conduct the X-ray crystallography experiment.

Joel Brock, director of CHESS, said safety is a top priority.

"We are practicing strict distancing protocols and other measures," he said. "It definitely takes us longer [than usual] to prepare for the experiment, but being able to restart the machine in order to research a potential drug for COVID-19 is extremely exciting."

Cerione's lab studies a family of enzymes that plays an essential role in the metabolism of cancer cells – and, as it turns out, viruses such as SARS-CoV-2.

"These enzymes are necessary for the altered metabolism of cancer cells, which the tumor cells critically need much, much more than normal cells," Cerione said. "We have been developing inhibitors that block these enzymes as anti-cancer drugs. It turns out viruses need the same enzymes for their infection, replication and transmission."

A particularly useful feature of this particular beamline at CHEXS is that X-ray crystallography can be done at room temperature, which will reveal structural differences in the complexes Cerione is studying. They look identical in cryogenic X-ray crystallographic imaging, he said.

According to Mike Forster, CESR's director of operations, this restart is slower than usual. Typically, teams of specialists – from cryogenics and electrical systems to radiation safety and vacuum – work hand-in-hand to ensure a safe start-up. Now, crews need to carefully schedule their activity while also maintaining six-foot distancing.

"CESR is fortunate to have a very talented, dedicated and meticulous technical staff," Forster said. "We are working remotely as much as possible and working with our outstanding safety team to make sure any entrance to the lab meets and exceeds strict health guidelines."

Cerione said no live or infectious cultures of COVID-19 are involved in his research. He also said the results his team achieves at CHESS will help scientists prepare for infectious diseases experts think may be just over the horizon.

"We need better structural pictures for our enzyme-drug complexes so as to design more potent drug candidates in anticipation of the next wave of viral infections," Cerione said. "We are betting that, at room temperature, we will be able to obtain crystal structures that much better distinguish between our drug samples and will help us, and others, do better rational drug design in the future."

Mind The Gap

Cornell Compact Undulator Development

Researchers at CHEXS are working to further improve the already impressive CHESS Compact Undulator, or CCU. Within the new NSF-funded CHEXS award, Sasha Temnykh is developing a new driving mechanisms that will add variable gap control and even better tuning of the device, both desirable qualities for a variety of experimental needs.

Undulators are critical devices for the creation of brilliant X-rays at CHESS and other lightsources around the world. With the recent CHESS-U upgrade, the Cornell Electron Storage Ring, CESR, is now outfitted with seven new insertion devices. As the beam circulates around CESR, it passes through a series of alternating magnets in the undulators, resulting in X-rays that are roughly 20 times brighter than those produced prior to the upgrade, making CHESS an even more powerful X-ray source.

The CCUs are about ten times more compact, lighter, and less expensive compared to conventional insertion devices typically used at other lightsource. They also require a significant shorter fabrication time. Nine CCUs have already been constructed in industry from the Cornell-held patent, and according to KYMA, the manufacturer of the CCU, other labs are starting to show interest in the device.

While the CCU displays many advantages, there are two features of these insertion devices that its inventor Sasha Temnykh would like to improve further: Increasing the peak magnetic field between the magnets of the device and decreasing the magnetic field errors when the magnetic field is adjusted to a low level.

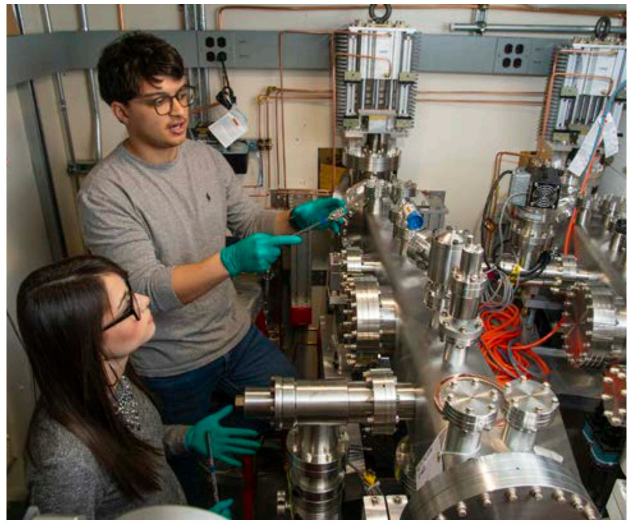
Sasha and his colleagues are pursuing aims to overcome both of these issues by developing a hydraulic assisted driver for the insertion device, allowing for precise control of the insertion device gap while maintaining the same lightweight compactness of the existing CCU.

This method involves installing a number of compact hydraulic cylinders along the device, all being activated by the same pressure and maintained through a computer-controlled closed-loop feedback system. The hydraulic cylinders compensate for over 90% of the strong forces generated by the magnetic field, reducing the load applied to the mechanical driver to less than 10% of the total load.

This elegant approach maintains the millimeters-wide gap with a precision of 1-2 microns across the span of the 1.5 meter device. The long term stability of the hydraulic system was tested over a five-day period, with no more than a 2 micron deviation from the target.

PREM Partnership

A Promising Approach with UPR



In 2019, CHESS was fortunate to have three graduate students visiting from Puerto Rico. Supported by the NSF-PREM CiE2M – the Center for Interfacial Electrochemistry of Energy Materials – a partnership of The University of Puerto Rico, Rio Piedras Campus (UPRRP), Universidad Metropolitana (UMET) and Universidad del Turabo (UT), and CHESS.

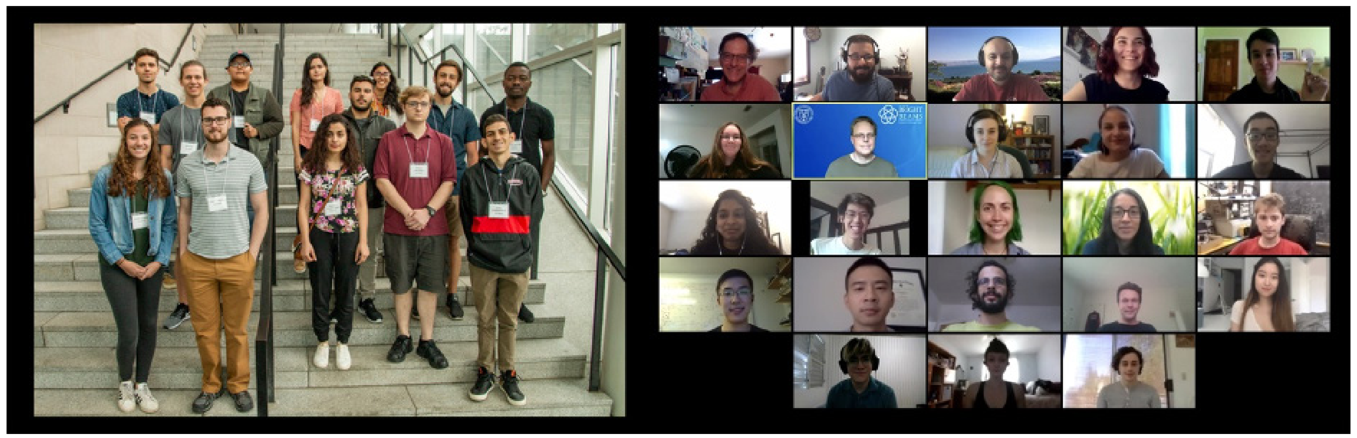
This past summer, CHEXS hosted four undergraduate students during the summer of 2020 as part of the virtual Partnerships for Research and Education in Materials (PREM) program. Thanks to grant funding from the National Science Foundation, students from Puerto Rico have access to the experimental resources and expertise available to them at CHESS. The grant, awarded under the NSF Division of Materials Research's Center for Interfacial Electrochemistry of Energy Materials, was given to principal investigator (PI) Carlos R. Cabrera, Ph.D. '87, and colleagues from Puerto Rico, and Joel Brock, director of CHESS.

This funding is evidence of the collaboration between CHESS and Hispanic-serving institutions in Puerto Rico to promote this educational and innovative collaborative materials research initiative. The Partnerships in Research and Education in Materials (PREM) award provides the support to advance the research and education goals of the partnering institutions, which include the University of Puerto Rico, Río Piedras Campus (UPRRP), Universidad Metropolitana and Universidad del Turabo.

Funds provide interdisciplinary researchers with access to synchrotron X-ray techniques for the study, characterization and enhancement of energy storage and conversion devices. Of equal importance to the NSF, PREM funds support the training of a diverse and talented community of underrepresented minorities. Partnerships are the key ingredient of this PREM award, described by Abruña as an evolving "symbiotic" relationship among the participating institutions.

Training the Next Generation of Synchrotron Scientists

Undergraduate research experiences



An important part of the mission of CHEXS, as a national user facility, is its role training the next generation of students to fill roles in the varied fields in science, technology, engineering and math (STEM) fields. The current CHEXS award supports undergraduate students through both formal and informal programs. Summer Engineering Research for Community College Students (SERCCS) and Summer Undergraduate Research in Science and Engineering (SUNRiSE) are supported by the CHEXS award. The Partnerships for Research in Education and Materials (PREM) that includes CHESS and the NSF Research Experience for Undergraduates (REU) are high value summer research programs where students contribute to the growing body of scientific knowledge generated by the staff.

During the summer of 2020, CHEXS supported 4 SERCCS students, 4 SUNRiSE students, and 2 PREM students. 13 REU students (supported by separate NSF awards) were also working at CLASSE, with 2 REU students and an additional 2 PREM students mentored by CHEXS scientists as well. All summer students are mentored by CHESS staff or closely allied researchers affiliated with Cornell University science departments. Professors Joel Brock (AEP), Carl Franck (Physics), Matthias Liepe (Physics), and Matt Miller (MAE) continued to serve as the summer student faculty advisors for the PREM, REU, SERCCS, and SUNRiSE programs.

As a result of COVID-19, mentors were especially creative with the summer program this year. The facility transitioned into an innovative and exciting virtual program, which was a huge success. Our students continued to interact with their mentors (via video conferencing) and analyzed data. The student take-a-ways were resoundingly positive. Students worked directly on research projects related to X-ray and accelerator technologies, working side-by-side with staff, faculty, and mentors to virtually conduct studies on such topics as photocathode sources, electron beams measurements and laser optics, for use in the future accelerator, X-ray optics and X-ray detectors, and remote operation. In addition to conducting research, students developed numerous technical skills, including familiarity with programming languages and techniques, (Unix/Linux, LaTeX, Matlab, Python and Fortran90) and technical skills (spectroscopy, chemical-bathing, use of digital oscilloscopes, etc.).

On a weekly basis, students participated in virtual formal lectures, informal seminars, social and recreational events, as well as outreach and public speaking activities. A forum at the end of each summer provides participants with the opportunity to present their results to their peers, mentors and staff scientists - this year conducted virtually. Through informal presentations to mentors and colleagues, summer students reveal their insights and uncertainties surrounding their assigned projects. These talks provide young scientists and engineers with the opportunity to communicate their own understanding of their work to others. This communication helps to solidify their own understanding and stretch their abilities to express this knowledge in a clear, digestible manner. Researchers must be skilled at transmitting their message so that others recognize the value and implications of their work. In order to be an effective scientist, students must practice being effective communicators and conveyors of knowledge for public consumption.

"The exposure to this high level research reinforced my decision to continue my graduate studies in Chemistry"

"I'm interested in Diagnostic Radiology so the experience of working with x-rays will really help me in my field."

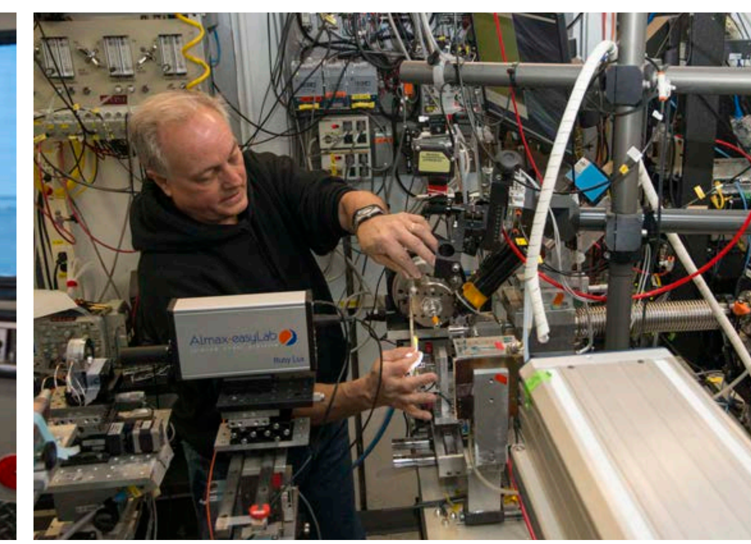
Beyond the Lab

At CHESS, we are more than just scientists, technicians and engineers. We are life-saving volunteers, home-building carpenters, and marathon runners… just to name a few.

In Beyond the Lab, we highlight the people of CHESS and the impact they make on the lab as well as their own community.

Elisabeth Bodnaruk, Research Support Specialist, and volunteer for the Habitat for Humanity.

With previous experience working in a physics lab at the National Institute of Standards and Technology (NIST) and in the HVAC industry, Elisabeth says she feels like she belongs at CHESS, doing whatever it takes to make things work - from building experimental hutches to working with sensitive vacuum equipment. When she is not at CHESS though, she is working with her other construction crew: Habitat for Humanity. It is apparent that the skills needed at the lab easily translate to her volunteer responsibilities.



Bill Miller, Research Support Specialist, and volunteer Critical Care Technician

"We are always ready to go at a moment's notice," he says. "And it's a lot like CHESS. You are solving problems, troubleshooting… it's just a little bit more intense. People entrust you with the lives of their loved ones," he says. "Sometimes it is life and death, and my job is to get them to the ER Doctor, hopefully in better shape than when I picked them up."

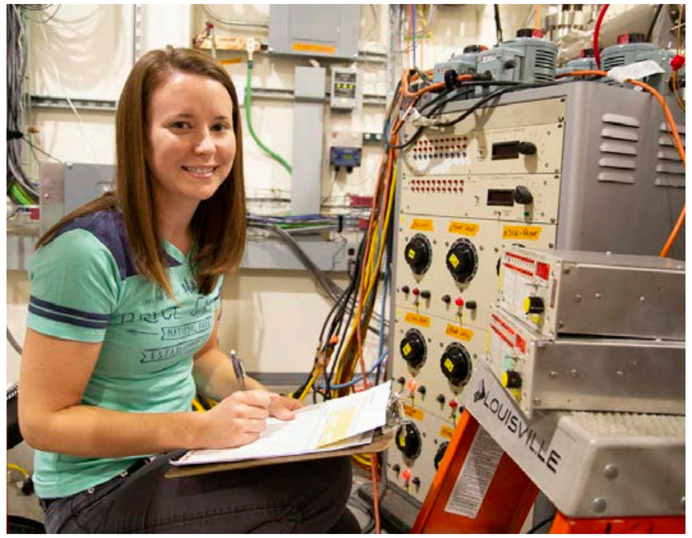
Bill says that he never knows when the call is going to come in, and he needs to be ready. "I can be at work, and then all of a sudden the pager goes off. Or I can be in the back of an ambulance, and I can get a call from someone at CHESS."

Beyond the Lab

NSF CHEXS CENTER FOR HIGH ENERGY X-RAY SCIENCES

Ken Finkelstein, Staff Scientist and volunteer with the Friendship Donations Network (FDN).

Ken connects his passion for reusing materials at the lab, with being able to provide food that would normally be discarded to the people that need it. "Working with FDN is a natural for me," says Ken. I find, with help from others, lab equipment that other people may have overlooked. A good example is the new double focusing mirror system now in Sector 2A hutch. These mirrors had been stashed away for several decades, now they deliver a powerful 100 micron beam for experiments."



Katie Moring, Operations Manager, and bike-riding enthusiast.

Katie has a lot of responsibilities at the lab, but is still able to find the time to help organize a weekly bike ride and enjoy what the Ithaca area has to offer, while also encouraging others to do the same. "I love introducing new people to riding," Katie says. "Some people want to go out and get started, but they may feel safer going with others, and having someone nearby that is able to fix their bike, or help introduce them to good safe routes around the area. I am happy that I can help coordinate that."

Kurt McDonald, Research Support Specialist, and Micro brewery owner/operator.

Outside of the lab, Kurt has turned what was once a hobby, into a full blown business operation. After years of home brewing beer in small five-gallon batches, Kurt with his wife Megan and his parents, have started Summerhill Brewing, a local craft brewery, located about 10 minutes from Cortland and Homer, and roughly 30 minutes from CHESS.

NSF | CHEXS
CENTER FOR HIGH ENERGY X-RAY SCIENCES

At-a-Glance

CHESS
CORNELL HIGH ENERGY
SYNCHROTRON SOURCE