



Six LSU Faculty Receive National Science Foundation CAREER Awards

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May 09, 2023

- ▶ *Current round includes largest NSF CAREER award to LSU in university history.*
- ▶ *Funded research projects support all aspects of LSU's Scholarship First Agenda to lift lives in Louisiana and beyond.*
- ▶ *With a total of 10 projects funded or started this academic year, LSU surpasses own record.*

BATON ROUGE – Six LSU researchers have been awarded the National Science Foundation's most prestigious grant for early-career faculty. Each was chosen because of their potential to serve as academic role models in research and education, and ability to integrate their endeavors within the context of their organization's mission. The highly competitive grant, with funds for five consecutive years of a junior faculty's research program, positions individual investigators for a lifetime of research and academic leadership, or, in LSU lingo, for [Scholarship First](#).

"These NSF CAREER awards represent true research excellence in the faculty we recruit to LSU to develop solutions that serve Louisiana and society at large," LSU Vice President of Research & Economic Development Robert R. Twilley said. "The six recipients recognized this year, combined with the success we've had in recent years in winning these awards, is a testimony to our commitment to achieving the Scholarship First Agenda."

Learn more about the LSU faculty and their research below.

Justin Wilson

Justin Wilson

[Justin Wilson](#), assistant professor in the Department of Physics & Astronomy in the LSU College of Science with a joint appointment in the LSU Center for Computation & Technology, is a theoretical and computational condensed matter expert. His research provides new approaches to understand and manipulate the properties of materials in the quantum realm for information processing and storage. By improving the detection and control of quantum information phase transitions, which indicate the effectiveness of a quantum system's information encoding, or "memory," Wilson's work will advance the development of quantum computers and quantum devices. His current project will involve the creation of a podcast, Quantum Matters, for broad audiences, as well as a new quantum technology course at LSU and career development opportunities for LSU graduate students in collaboration with the Erdős Institute.

"This award tremendously boosts my research and career, and enables us to explore the fascinating connections between condensed matter and quantum information sciences," Wilson said. "Our work has far-reaching implications for the development of quantum devices, while also providing opportunities to educate the public, graduate students and future professionals in the emerging quantum industry. I'm thrilled to play a part in shaping the future of quantum science and its societal impact."

Advances in quantum computing are related to both the defense and energy priorities of LSU's Scholarship First Agenda. They can lead to breakthroughs in cybersecurity through cryptography and help protect the economy, critical infrastructure and people. In the energy sector, quantum technologies have the potential to optimize processes and drive energy resilience and emission reductions that contribute to a cleaner and more sustainable future.



Matthew Chambers

Matthew Chambers

[Matthew Chambers](#), assistant professor in the Department of Chemistry in the LSU College of Science, earned his Ph.D. in inorganic chemistry at MIT and works to make Louisiana's vast chemical industry more efficient and sustainable. He reinvents ways to create commodity chemicals from feedstock hydrocarbons using less energy-intensive methods. His current project will focus on converting small hydrocarbons, usually treated as waste, into valuable chemicals and fuels, such as methane into octane. More sustainable chemical manufacturing methods, including those driven by solar energy and using more efficient photocatalysts, can lead to massive energy savings and waste reduction.

"This award will support my lab's efforts to develop strategies to use energy from light to drive critical chemical-industrial processes and the energy economy," Chambers said. "When light interacts with molecules, the energy of the light is temporarily captured. We're trying to harness this energy to promote some of the most challenging reactions."

In addition, Chambers will lead a major outreach effort to Louisiana K-12 schools through LSU's revamped ChemDemo program. It is expected to reach about 5,000 students per year through hands-on demonstrations.

"Much of the underlying chemistry Louisiana's chemical industry relies on has been effectively unchanged for close to 100 years," Chambers said. "We're trying to modernize the way we convert oil and gas into critical commodities and fuels, and educate students about the challenges and opportunities that exist within these pursuits."

Chambers' work to develop new petrochemical technologies relates to multiple aspects of LSU's Scholarship First Agenda, including, most obviously, energy. By lowering the carbon footprint of the chemical industry, Chambers will help protect coastal environments and

the health of local communities.

Adam Forte

Adam Forte

[Adam Forte](#), assistant professor in the Department of Geology & Geophysics in the LSU College of Science, works to better understand the evolution of landscapes. Along fault lines, especially, the forms and features of land surfaces can be suddenly transformed by earthquakes, both large and small, which over time build topography. Forte works to understand fault zone behavior and the dynamic interactions between tectonics and climatically mediated surface processes, such as erosion caused by rivers. His current project looks to bridge the gap between paleoseismology, which spans hundreds to thousands of years and a few earthquakes, and tectonic geomorphology, which spans hundreds of thousands to millions of years and numerous earthquakes. Forte will build an educational and research resource called the LandscapeLibrary, which can be used to assess long-term impacts of seismicity and better evaluate the risk of earthquakes to people and structures.

"This CAREER award will allow my student and postdoctoral collaborators and I to merge two formerly disparate aspects of my research program, one focused more on tectonics and one focused on landscape evolution," Forte said. "By combining them, we hope to provide some insight into the styles of earthquakes that influence an area just from remotely sensed data."

Forte's work connects with the coastal science, defense and energy priorities of LSU's Scholarship First Agenda.

"In an increasingly connected world, helping to easily characterize seismic hazard is important to ensure the safety of both populations and critical infrastructure, like those related to defense and energy," Forte said.

Christine Lattin

Christine Lattin

[Christine Lattin](#), assistant professor in the Department of Biological Sciences in the LSU College of Science, investigates neophobia in house sparrows. Neophobia is fearful behavior toward anything new or unfamiliar. While some birds stay away from food, objects or environments they haven't encountered before, others are willing to approach and explore. Lattin is discovering what this difference means in terms of neurobiology, especially in a brain region called the hippocampus. As some birds are able to learn from others to be less fearful—by watching them eat or interact with new things—Lattin also looks at how social learning experiences can change the brain. Her work holds ecological and evolutionary relevance for birds and other animals, as neophobia can help predict which species will survive in a changing environment. The research also impacts humans, as knowing the molecular mechanisms behind neophobia may reveal new ways to diagnose and treat anxiety and other mental illness in people.

"A key aspect of my CAREER proposal is the development of a new lab through LSU's highly successful course-based undergraduate research experience, or CURE, program," Lattin said. "This lab will involve first-year LSU undergraduates in research, and—I hope—inspire and engage a new generation of future scientists in animal behavior and neurobiology."

Lattin's award, over \$1 million, is the largest CAREER award in history to LSU. Her work connects with various aspects of LSU's Scholarship First Agenda; particularly with the university's biomedical science and health priorities, as well as in developing solutions to sustain life in changing coastal landscapes.

"Understanding more about neophobia and how we can alleviate it could lead to interventions to help people cope with new things in their environment that cause them stress," Lattin said.

Shyam Menon

Shyam Menon

[Shyam Menon](#), assistant professor in the Department of Mechanical Engineering in the LSU College of Engineering, works to understand and control how solid particles in high-speed gas flows impact material surfaces. He uses measurements of particle velocity and temperature, coupled with high-speed visualizations, to develop a regime map for particle-surface interaction outcomes as well as techniques to control them. Menon's work has the potential to improve the safety and sustainability of both aerospace travel and power generation. It can also lead to the optimization of materials and component design to reduce maintenance requirements for aircraft, gas turbine engines, helicopter rotors, wind turbines and spacecraft.

"This award will allow our lab to make fundamental contributions to our understanding of high-speed multiphase flows while advancing LSU's research capabilities in energy and defense through the development of unique experimental facilities, installation of advanced diagnostics and training of students on these capabilities," Menon said.

Menon's award supports the defense and energy priorities of LSU's Scholarship First Agenda. His project will promote aerospace research and STEM education to K-12 students and the general public across Louisiana. He will engage high school students through



summer camps, middle school students through a summer mini-course as well as the general public in hands-on demonstrations of aerodynamics and shockwave propagation.

Paul Miller

Paul Miller

Paul Miller, assistant professor in the Department of Oceanography & Coastal Sciences in the LSU College of Coast & Environment, studies coastal meteorology. His current project will investigate the masses of dust that gather in the atmosphere above the Saharan Desert and travel across the Atlantic Ocean, sometimes as far as Baton Rouge, Louisiana, where the dust was observed last year. While this phenomenon has been linked to the development of droughts in the Caribbean, Miller will investigate the direct relationship between the dust, the hot, dry air layer around the dust and drought dynamics. By focusing on Puerto Rico, a U.S. territory and island in the Caribbean Sea that experienced lots of Saharan dust and unprecedented drought in 2015—severely impacting its agricultural, ecological and municipal water needs—Miller will develop a new undergraduate field course at LSU and create demonstrations for outreach, including at LSU's Ocean Commotion event for K-8 students.

"Caribbean islands, including U.S. territories like Puerto Rico, don't have large rivers and reservoirs and instead rely on rain for freshwater resources," Miller said. "This CAREER award will help us understand the causes of rapidly developing drought conditions in water-vulnerable landscapes."

By providing new insight into climate-related phenomena, drought and particulate matter in the atmosphere, which all impact agriculture, coastal areas and human health, Miller's work connects with multiple aspects of LSU's Scholarship First Agenda.

"Beyond their effects on food systems through drought, Saharan dust outbreaks can influence North Atlantic hurricane activity and cause respiratory irritation as far away as the Gulf Coast," Miller said.



Publish Date:
5-9-2023