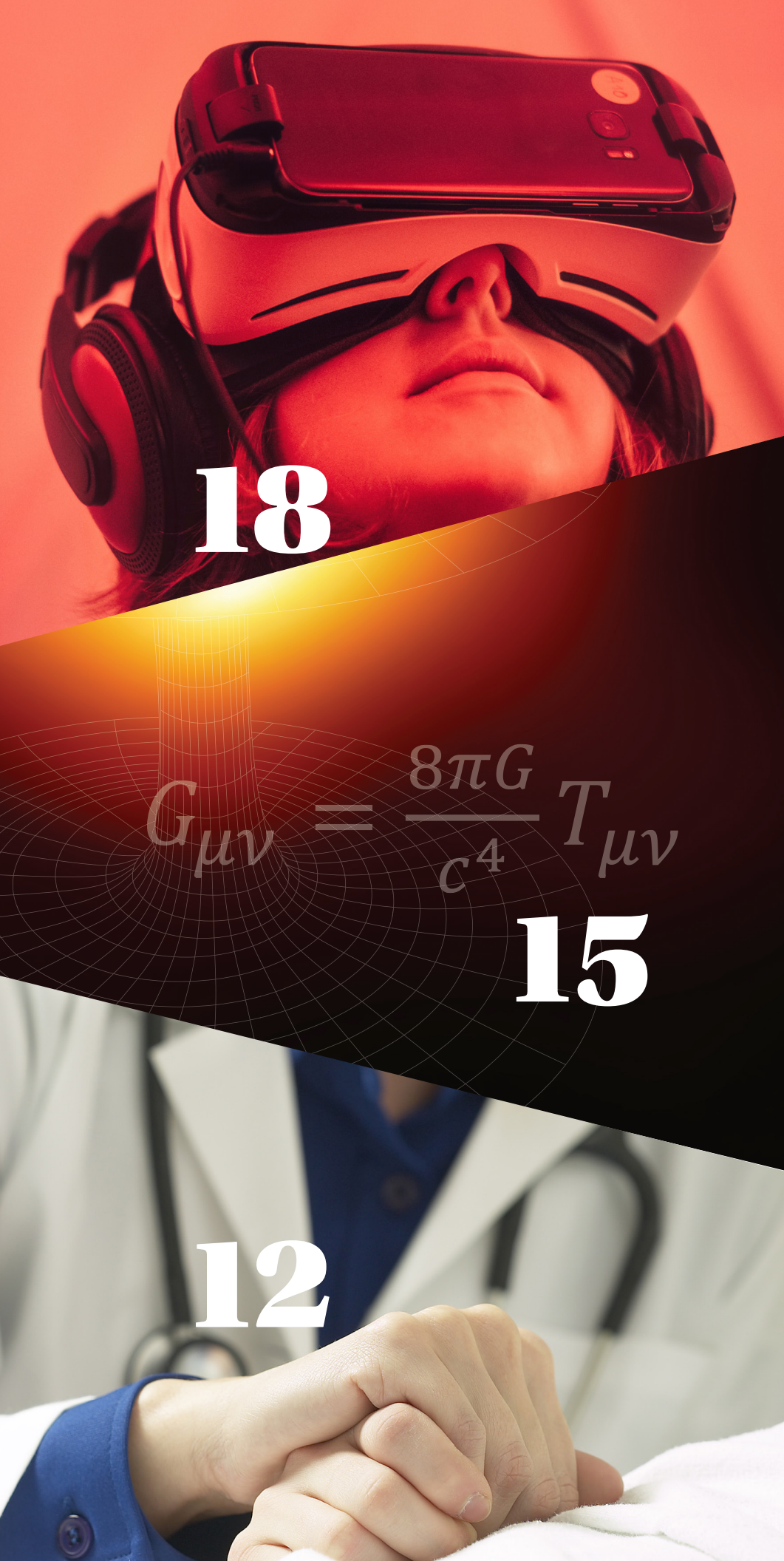

#UARIZONA RESEARCH

INNOVATION & IMPACT

A **Top 20** Research
University

DARING IDEAS.
BOLD ACTION.
COMMUNITY IMPACTS.

UArizona Research
Responds, Adapts to
COVID-19 Challenges
pg. 10



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$$G_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

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Adapting to a Fast-Changing World

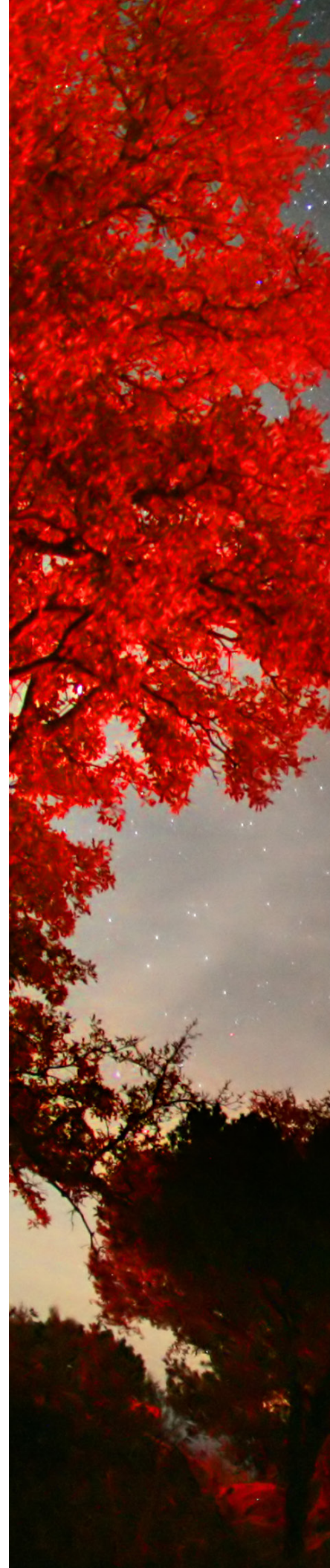


Dr. Elizabeth "Betsy" Cantwell
SVP for Research and Innovation

It's been a complex, fraught, and confusing time for all of us – even for researchers, who are well-schooled in sticky problems. The novel coronavirus has brought unimagined challenges, and yet our experts leaped at the opportunity to bear down, working hard every day to crack the mysteries of COVID-19. The first capture of a black hole image offered proof of Einstein's General Theory of Relativity – and brought the University of Arizona into the global spotlight yet again for its part in an exciting and historic research discovery. Boundary-busting accomplishments are why UArizona is one of the world's leading research universities, with a tradition of excellence and leadership in space and on the ground.

We're proud to be part of a university community with a bold, distinctive and differentiated vision, preparing our students to thrive in a time of augmented intelligence and the fusion of the digital, physical, and biological worlds. As a leading research institution, UArizona will continue to invest in programs and people in signature research areas including space, medicine, and water resources.

We exist not only to educate: the university's land-grant mission has tasked us with service to Arizona and beyond. In these pages, we offer a few exciting glimpses of our mission in action. Explore these stories (and more!) in depth at research.arizona.edu.



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“We are proud of the breadth of our research enterprise and its willingness to tackle global challenges. We’re confident that our research will solve not only the problems of today, but also those of tomorrow as our researchers continue to forge innovative pathways, powerful collaborations, and remarkable discoveries.”

Robert C. Robbins
UArizona President





The core of the new Arizona Institutes for Resilience (AIR) includes the former Institute of the Environment, the Institute for Energy Solutions, and the Water and Energy Sustainable Technology (WEST) Center, plus the Desert Laboratory on Tumamoc Hill and the Bridging Biodiversity and Conservation Science initiative. Building on decades of work at UArizona, and in collaboration with academic and research units across the University, AIR is addressing many of the most complex resilience challenges we face by accelerating knowledge creation and the application of science-based solution options.

Arizona Institutes for Resilience

The University of Arizona is the go-to place for students and faculty who are committed to managing climate and environmental risks, building equitable and effective solutions – **a Roadmap to Resilience** – for the arid regions of the world, and designing real-world solutions to emerging environmental problems that are locally, regionally, and globally applicable.

Strong, interdisciplinary themes link the traditional environmental community to the arts, law, social science, health, engineering, and other disciplines. We are **preparing for a transformation to a low-carbon, environmentally sustainable, and socially just world.**

Agrivoltaics & Exploring the Food Energy Water (FEW) Nexus

Agrivoltaics is a new way of combining renewable energy with agriculture in a hot, arid landscape by positioning elevated solar panels over an understory of plants. At the University of Arizona, scientists are working on agrivoltaics projects just outside of Biosphere 2, the living laboratory where climate change has been the focus of interdisciplinary research in recent years.

The plants, protected from sunburn and dehydration by the solar panels, become little evaporative coolers on the landscape. In turn, the panels perform at a higher level thanks to the microclimate created by the plants. The end result: a higher crop yield and more efficient solar array performance.



Uniting Coffee Stakeholders in Climate Resilience

More than 100 million farmers cultivate coffee worldwide, mostly in developing countries and by families who own small plots of land. Against a backdrop of persistent social, economic, and environmental shocks, the University of Arizona International Research and Applications Project (IRAP) collaborated with Jamaican coffee industry stakeholders and more than 300 smallholder farmers to bolster their resilience to these shocks. Some of IRAP's efforts included developing weekly weather and climate forecasts, conducting training workshops, and researching the dynamics of smallholder vulnerability.



Strengthening the Food Web in Climate-Stressed Ecosystems

University of Arizona faculty and staff are leading the development of the Central Date Palm Laboratory in Oman in support of the One Million Date Palm Trees Project, which aims to increase sustainable date production in the Middle East.



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The Colorado River Conversations Project contributes interdisciplinary science-based ideas for future management of the river, providing a foundation for the renegotiation of the Colorado River Interim Guidelines. The overall objective is to use systems-based science to better understand the physical, social, and environmental conditions in the basin and contribute to innovative solutions.

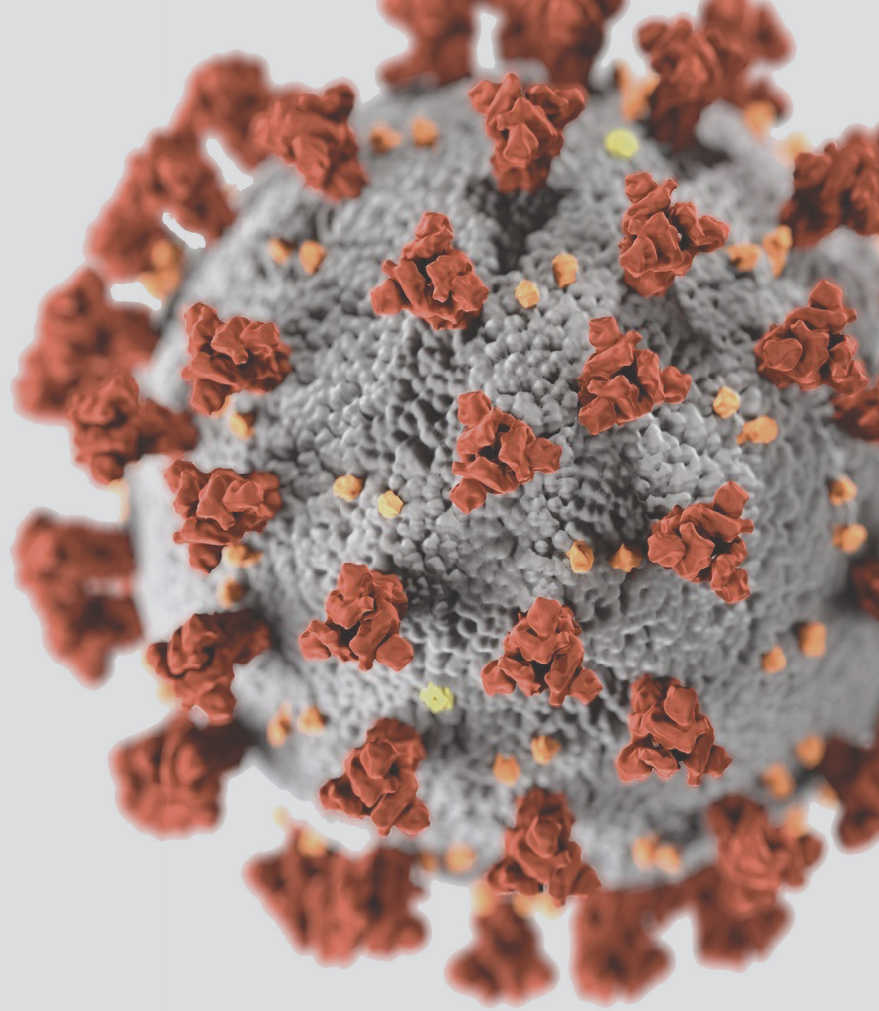
ENVIRONMENT

In the Desert, It's Always Been About Water

The water cycle is central to life on this planet. Climate change, rising populations, evolving social values, technology, urbanization, and changing consumption patterns for water present unprecedented challenges as well as opportunities. The University of Arizona is **ranked Number 1** in water resources in the U.S.

We take water seriously. We examine the critical intersections between groundwater and surface water, climate change and water supply, wildfire and water quality, conservation and quality of life, emerging contaminants and wastewater reuse. We are actively exploring the connections between human health and water quality and quantity, including work on detecting COVID-19 in wastewater.

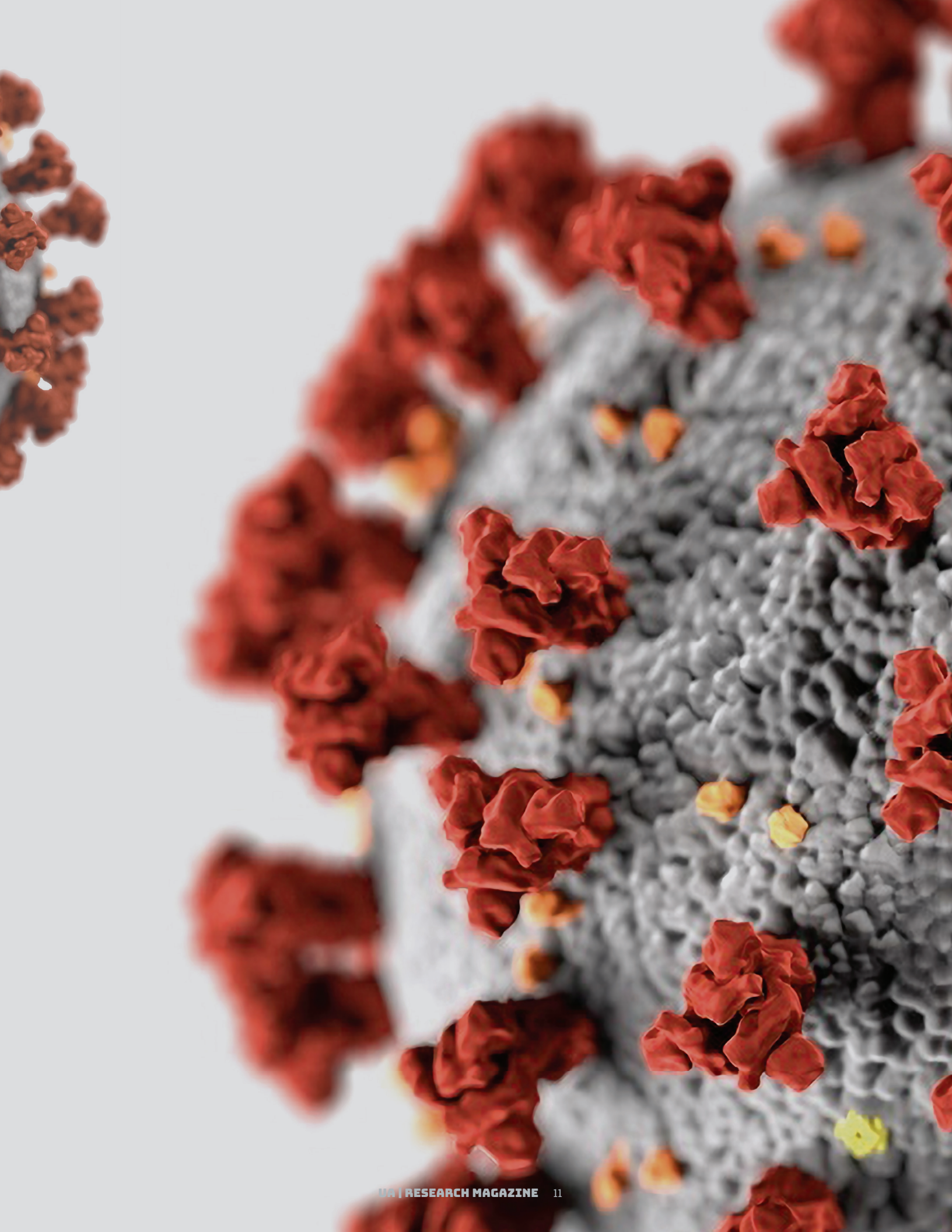
Every year, UArizona advances new management approaches, technologies, tools and data to build resilience, water security, and water safety for the future.

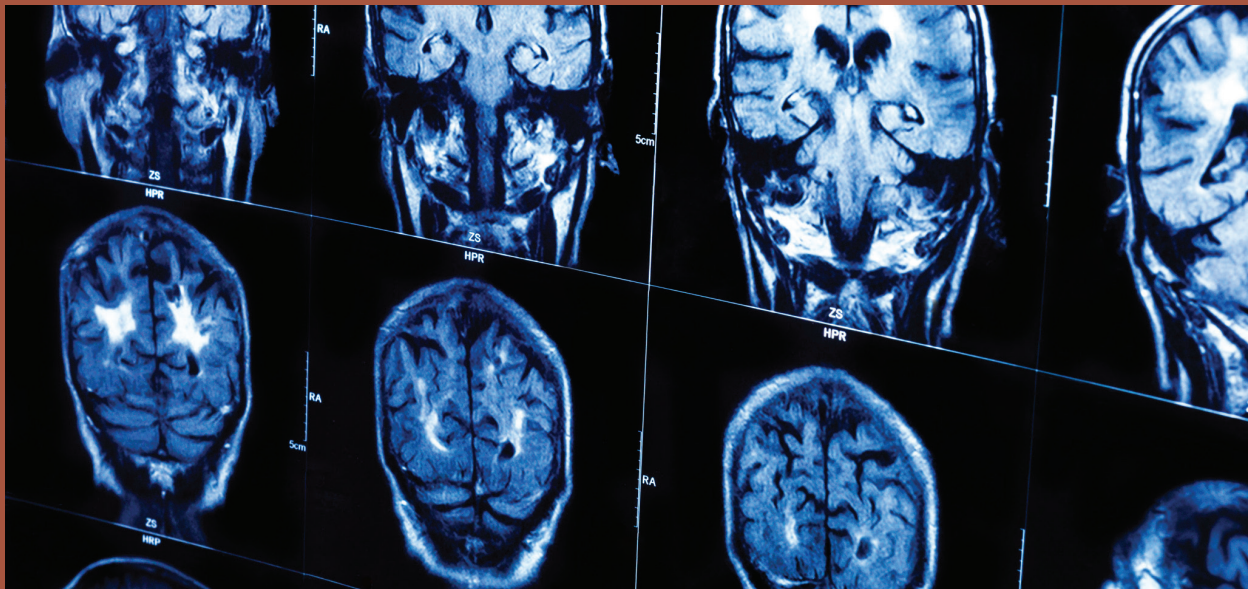


HEALTH

Science-driven in an Age of Uncertainty

We have developed a serological blood test for our campus community to measure immunity from COVID-19. This breakthrough may be a prerequisite for returning to school or work until there is a vaccine, helping to ensure a safe and healthy workplace and learning environment at the university and elsewhere moving forward. This screening may also be a valuable tool to protect health workers, allowing hospitals and other facilities to prioritize use of personal protective equipment like masks for those who do not show the presence of antibodies from a previous immune response.





HEALTH

Unlocking the Secrets to Lifelong Cognitive Health

University of Arizona researchers have proposed a precision aging model designed to help researchers better understand and treat **age-related cognitive decline** on an individual level:

- The **Center for Innovation in Brain Science** is home to researchers studying the role of gender in Alzheimer's disease and developing precision medicine interventions to prevent – and potentially reverse – the course of the disease in women and men.
- Scientists at **The Evelyn F. McKnight Brain Institute** is working to discover the mysteries of the normally aging brain to achieve a lifetime of cognitive health. Founded in 2006 at the University of Arizona, the institute is one of only four McKnight Institutes nationwide.

- The **Behavioral Neuroscience Clinic** was developed to evaluate and treat a wider range of neurobehavioral disorders than is usually offered by health care institutions. Behavioral neuroscience is a relatively new medical discipline that incorporates neurology, neuropsychology, and psychiatry to offer patients a broader range of evaluation and treatment than was previously possible.
- The **Alzheimer's and Memory Disorders Clinic** offers evaluation of various types of memory dysfunction through the use of neuropsychological testing.
- In collaboration with these and other centers, institutes, and departments across the university, **BIO5 Institute** researchers blend scientific disciplines and expertise to tackle critical research, discovery, and innovation needed to understand the processes of normal and healthy aging; determine the complex causes of age-related diseases; and develop and test drugs, devices, and other interventions to support a higher quality of life.



Arizona State Museum (ASM) is the only institution in the U.S. to have three separate collections designated as **National Treasures**.

Treasuring Arizona's Heritage

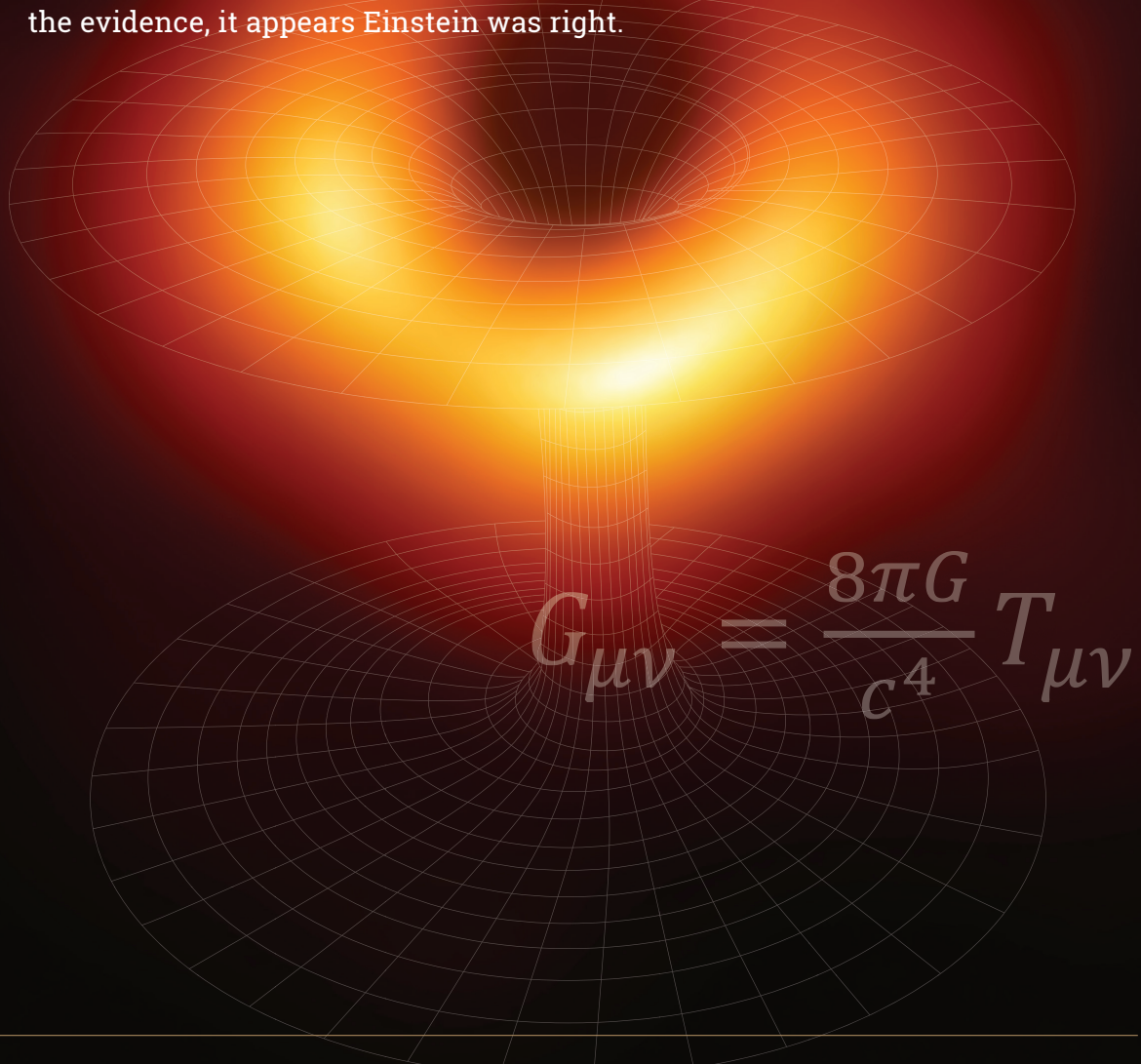
In 2019, the Arizona State Museum's (ASM's) photographic collection of more than half a million prints, negatives, and transparencies was awarded American Treasure status by the National Park Service. The photos document 13,000 years of Native American activities and traditions across the southwestern US and northern Mexico. Funds from the Save America's Treasures program support the preservation of nationally significant historic properties and collections throughout the country.

ASM previously received American Treasure awards for its pottery and basketry collections and is the only museum in the country to have three such designations. The collections support archaeological and anthropological studies and document the culture and ingenuity of generations of American Indian peoples.

Chasing Einstein's Shadow

On April 10, 2019, the first-ever photograph of a black hole in space was released by the Event Horizon Telescope (EHT) project. A total of 36 project team members were from the University of Arizona.

By examining more closely than ever the role of black holes in the universe, the EHT project is an unprecedented test of whether Einstein's ideas about the very nature of space and time hold up in extreme circumstances. From the evidence, it appears Einstein was right.



With the help of two radio telescopes coordinated by the UA, astronomers in the Event Horizon Telescope collaboration captured the first direct image of a black hole, a prediction of Einstein's General Theory of Relativity. Credit: Event Horizon Telescope Collaboration.

Reaching the Stars ... and Beyond



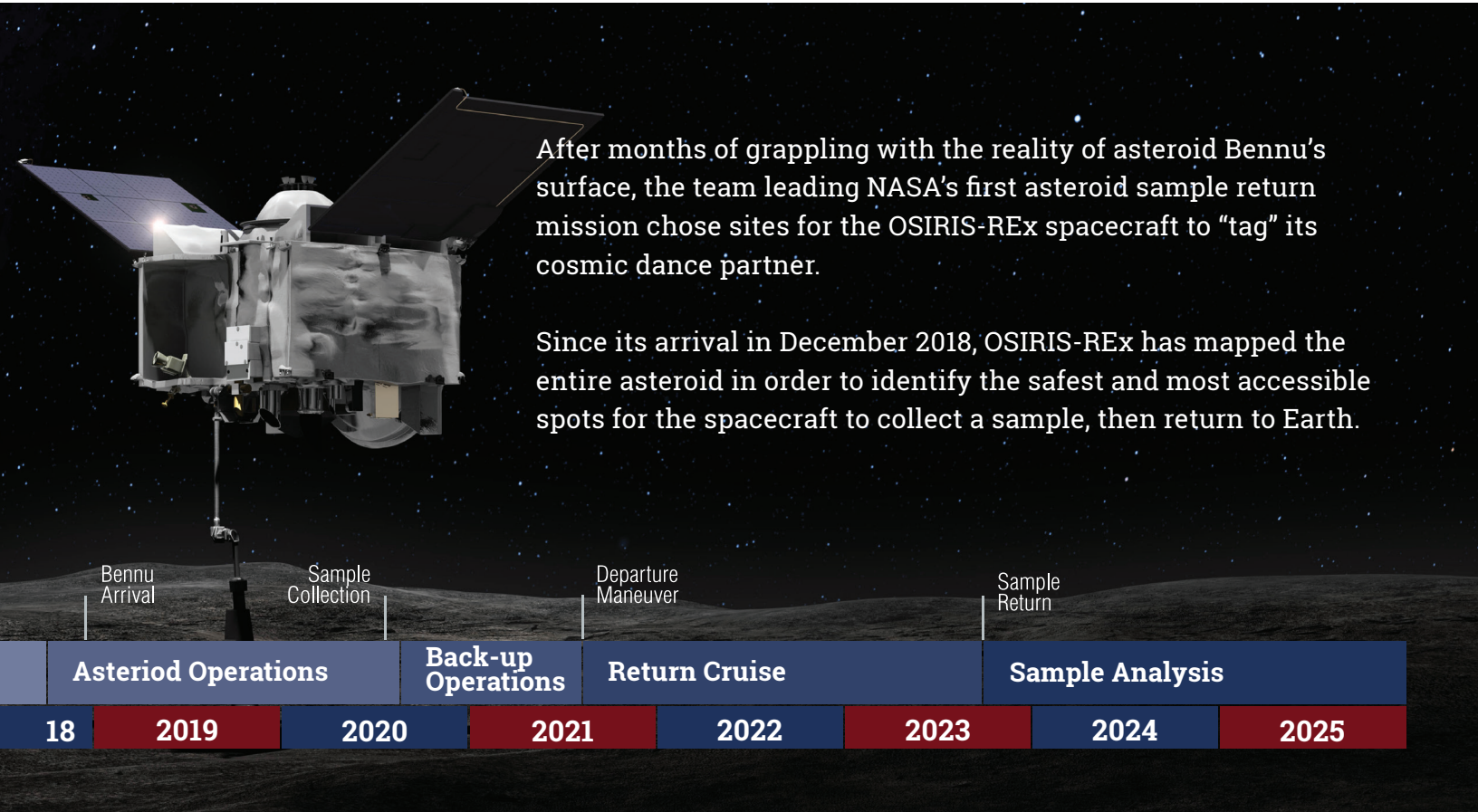
Tagging an Asteroid

OSIRIS-REx MISSION Operations Timeline





The Giant Magellan Telescope (GMT) will be one of the next class of super giant earth-based telescopes. The GMT project is the work of an international consortium of universities and science institutions – including the University of Arizona, where mirrors are cast and polished at the Richard F. Caris Mirror Lab.



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Every day at the University of Arizona, we're creating new technologies – from a new generation of cardiac image mapping to lasers with x-ray vision – and collaborating in bold, innovative ways that give our corporate and business partners a competitive edge in the global marketplace.

COMMUNITY

Nurturing & Integrating Innovative Technology Partnerships



Tech Launch Arizona (TLA) ensures that technologies and innovations originating with university researchers and staff find impactful applications in the real world through commercial pathways. TLA maximizes the value of UArizona inventions by protecting them and licensing them to existing companies or forming well-prepared startups to take them forward into the marketplace, reinforcing a culture of innovation across the regional ecosystem.

Tech Parks Arizona brings together university, industry, and community, creating interactive ground that advances technology commercialization. Tech Parks Arizona directs the University of Arizona Tech Park at Rita Road, the University of Arizona Tech Park at The Bridges and the University of Arizona Center for Innovation – with the highest priority of recruiting companies with connections to the University of Arizona to locate here.

Arizona FORGE is building bridges between academia and industry. It's a business innovation hub that combines startup incubation, experiential education, and corporate innovation. Startups grow in FORGE incubators with a curated team of coaches, mentors, and industry experts. Students engage in hands-on learning and launch careers. Corporations expand their potential with an inspiring workspace for disruptive technology with the aim of bringing it to market.



ARIZONA

@UAZRESEARCH



The **second largest Hispanic-Serving Institution** in the nation.



The only NCI **Comprehensive Cancer Center** headquartered in Arizona.



The first university to lead a **NASA mission** to an asteroid and back.



270 industry partners for **\$120 million** in annual research activity.



The University of Arizona is ranked in the **top 20** by the **National Science Foundation** in FY18 research and development expenditures among public universities and had **\$732M** in total funding in FY19.



71 Startups representing **\$585.7 million** in positive economic impact to Arizona over 2016-18.



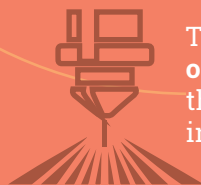
Arizona Institutes for Resilience (AIR): 10 Centers, Institutes & Programs Working to **Solve the Climate Crisis.**



Global leader in running **more than 20 unique telescopes** around the world.



COVID-19 antibody test is the **most sensitive and accurate** of all such tests available on the market.



The **James C. Wyant College of Optical Sciences** offers the largest optics program in the U.S.



Top 20 for **cultural arts research spending** at the Arizona State Museum, the Center for Creative Photography, and the University of Arizona Museum of Art.



UA Arizona was recognized as the **world's #1 program in water resources** in 2018 and 2019 by the Shanghai Academic Ranking of World Universities.



Established in 1885, the University of Arizona, the state's super land-grant university with two medical schools, produces graduates who are real-world ready through its 100% Engagement initiative. Recognized as a global leader and ranked 16th for the employability of its graduates, UArizona is also a leader in research, bringing in more than \$732 million in research investment in FY19. UArizona is advancing the frontiers of interdisciplinary scholarship and entrepreneurial partnerships, and is a member of the Association of American Universities, the 62 leading public and private research universities.



Research
Innovation & Impact

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