

## Space is Wildcat Country – Here's why

University Communications  
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Space is Wildcat Country.

That's not just a catchy marketing phrase, but a fact, according to the National Science Foundation, the world's largest science funding agency. According to the NSF, when it comes to space science research, the University of Arizona **leads the HERD** <sup>[1]</sup>, literally. HERD, which stands for Higher Education Research and Development Survey, is the primary source of information on research and development expenditures at more than 900 U.S. colleges and universities.

With \$770 million in total research activity in fiscal year 2021, the University once again ranked among the nation's top public research universities.

**For 33 years in a row, the University has ranked No. 1 in the astronomy and astrophysics category, which includes planetary sciences.**

The vast majority of these funds were earned through competition for sponsored awards and contracts from agencies like NASA, NSF and the Department of Energy, as well as from partners in the operation of world-leading research facilities such as the Large Binocular Telescope on Mount Graham.

The University spent more than \$113 million in research funding from all sources (federal agencies, contracts, philanthropic contributions) on astronomy and astrophysics research – more than \$40 million ahead of the runner-up, University of California, Berkeley.

Images are more intuitive than numbers, so picture a pie chart – actually, a pizza pie chart. The pie symbolizes the space science research expenditures of all surveyed public and private universities in the U.S. Now cut it into six slices. One of them would show a big University of Arizona logo on it, while the remaining five would have the logos of *every single other* institution, making them barely legible.

So how do we do it?

### Location, location, location

Few if any universities have access to several astronomical observatories in their backyard. For over a century, the University of Arizona's home advantage of tall mountains and dark night skies (and outdoor lighting ordinances to keep them that way), has nourished its worldwide reputation as a prime destination for those studying – or simply enjoying – cosmic phenomena.

Location alone doesn't bring in big research grants, however. The key to the University's success in attracting top research dollars for space research, according to **Buell Jannuzi**, who directs the Department of Astronomy and Steward Observatory, lies in our ability to attract the talented faculty, staff and students required to develop technology and manage large-scale projects needed to make progress in answering the most exciting and complex scientific questions.

"The quality of what we produce, whether it is innovative hardware, software or research, is what has enabled us to keep earning more financial support for our research," Jannuzi said.

**"The scale of what we do – repeatedly building challenging, large facilities – requires large amounts of external funding. The combination of quality and scale is why we have been No. 1 in research dollars expended for all those years."**

Jannuzi added that the HERD survey looks at all research expenditures regardless of source, from federal funding to contract revenue to donations.

"All these agencies and individuals would not continue to award us grants, contracts and philanthropic gifts if our staff, students and faculty were not demonstrably making great use of those funds," he said.

According to Jannuzi, the scale of the projects in which the University is involved requires equally giant amounts of external funding and only very few universities are capable of managing such efforts.

Through its successful history managing big science projects, like the Large Binocular Telescope or NASA's OSIRIS-REX mission, the University has established itself as a sought-after partner for ambitious projects like the **Giant Magellan Telescope** [2]. Once completed, the GMT will be the largest optical and near-infrared telescope in the world. The University of Arizona Richard F. Caris Mirror Lab produces the telescope's primary mirror segments, each spanning 27 feet.

But "just doing big things" isn't a recipe for excellence, Jannuzzi pointed out.

"Our success fundamentally comes from having faculty in astronomy and planetary sciences who are able to successfully compete for research grants to support their own research and then working together to fully utilize the large projects like the GMT, which is a \$2 billion project," he said.

**Carmala Garzione**, dean of the College of Science, says that the balance of research strengths in theoretical work, observational work, and development of new instruments for observation has the University uniquely positioned among its peer institutions, and the college's hiring strategy is aimed at maintaining that balance.

"Our theoretical astrophysics group is extremely strong, and their work informs the next big wave of opportunity for discovery by providing ideas to observers and the necessary next generation of instrumentation and experiments," she said. "Faculty and research staff focused on instrumentation development really are innovators – scientists who are also engineers, who train students, who then end up going out into the workforce in Arizona and beyond. Companies like Lockheed Martin, Raytheon or Ball Aerospace want to employ our graduates."

### **Why nerds are good for the economy**

The University has managed to grow its overall research portfolio by nearly \$170 million over the last six years. Like a good gardener, the University has a "sprinkler effect" that benefits the communities beyond campus.

"Research universities, through their expertise, reputation, and specialized facilities, attract new businesses into their community and state," says **Lisa Romero**, assistant vice president for marketing and communications in the Office of Research, Innovation and Impact.

As an incubator for startups, the University also helps launch innovative business ventures as well as helps researchers file patents, license intellectual property, and sell their technologies to other companies. Last but not least, Romero says, by hosting national and international guests at meetings and conferences, the University creates revenue for local businesses.

**Mark Marley**, director of the Lunar and Planetary Laboratory, says that success in rankings and attracting NSF funding also rests on a long history of support from the University, and the personnel who are attracted to that kind of institutional investment in continued success.

**"We all want to be here and do great things, and I am amazed daily by some of the things that our faculty and students are doing," Marley said. "They're not just resting on their laurels."**

Marley points to LPL's Kuiper Materials Imaging and Characterization Facility, which was just awarded a \$3 million grant from NASA, as the latest example.

The University's storied research prominence and associated funding in many important and interesting disciplines also create a strong institutional brand, Romero said, boosting everything from faculty and staff retention and student enrollment to business partnerships, media coverage and philanthropy and funding opportunities – all of which play a role in cementing the University as critical to the success of the larger geographical community.

"The University, city and state all benefit from research programs that focus on timely and important subjects," she says. "We attract attention, and that leads to greater institutional visibility and reputation."

Garzione says being a mover and shaker in the space sciences also feeds local industry.

"All of this revenue coming through our institution fuels an economy within and attached to the University," she says. "Arizona has a stronger space industry and more vibrant economy because of it."

### **University staff – a key ingredient**

All this requires an ecosystem in which scientific research is only the starting point. Contributions of staff with unique experience and skills – often acquired in jobs outside the higher education setting – are critical in driving progress and innovation, and let researchers focus on what they are trained to do, Romero says.

In addition to the approximately 600 employees directly involved in space science research and funded by sources outside of the University or the state, there are many staff members who are critical partners to researchers. Their work involves tackling goals that are specific to projects but also to the University as a whole, and takes the form of communications and

marketing, web development, project management, event and conference support, grant management, business affairs and fostering relationships with philanthropic donors.

Many people outside of the University don't understand the "why" or "how" of research, Romero says, and staff members bring critical skills to the table to tell that story in relatable and compelling ways that amplify scientific accomplishments. When successful research initiatives are communicated more broadly, they attract more research funding, she explains.

## Eyes on the future

Garzione is convinced that the University could be at the center of an expanding space industry hub in Southern Arizona, especially in payload development: In a marketplace where space flight and suborbital missions are increasingly run by the private sector, having the capability to design, build and test scientific payloads for high-altitude balloons, satellites and crewed orbiters in house is a very competitive advantage.

The recently completed **Mission Integration Lab** [3] and the **Applied Research Building** [4], currently under construction, will offer "high bays" where flight hardware can be suspended and tested under realistic conditions.

Fundamentally, however, even the most daring scientific idea or sophisticated instrument is the result of something less tangible: wonder.

"How far we see into space, how deep we see into time, it's just mind-blowing," Garzione says, adding that every person has a capacity to wonder about their origins and ask questions such as "How did we get here?" and "Is our existence in our universe unique?"

"I think space research captures that innate wonder," she says. "It makes us feel both small but large at the same time. It keeps our vitality very real and present."

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**Source URL:** <https://uaatwork.arizona.edu/lqp/space-wildcat-country-heres-why>

## Links

[1] <https://news.arizona.edu/story/uarizona-research-again-ranks-among-nations-top-public-universities> [2] <https://news.arizona.edu/story/sixth-mirror-casting-brings-giant-magellan-telescope-closer-completion> [3] <https://research.arizona.edu/facilities/mission-integration-lab> [4] <https://research.arizona.edu/facilities-units/applied-research-building>