



Will state lose its role as astronomy leader?

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Many readers are aware of Arizona's recent initiative to move toward a more knowledge-based, high-tech economy.

For example, with broad support from political, business and philanthropic leaders, investments are being made through Science Foundation Arizona to improve our state's competitive position in biosciences, information communication technologies and fields related to sustainability.

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Largely overlooked in coverage of these exciting developments, however, has been the fact that, in certain areas of science and technology, Arizona is already widely recognized as a national leader. Astronomy and space science are clearly in this category.

Astronomy took root in the Arizona Territory in 1894 with the founding of Lowell Observatory in Flagstaff.

In Lowell's wake came Steward Observatory at the University of Arizona. Steward populated the

mountains around Tucson with telescopes, and the associated UA Astronomy Department has become one of the largest and most respected in the nation. Strong programs also were developed at Arizona State University and Northern Arizona University.

The National Optical Astronomy Observatory and the National Solar Observatory were established in Tucson and built major telescopes on Kitt Peak. The MMT and Whipple Observatories came into being on Mount Hopkins south of Tucson, while the WIYN, MDM and SARA Observatories added to the growing population of telescopes on Kitt Peak.

Elsewhere in the state, the U.S. Naval Observatory Flagstaff Station was built and the Large Binocular Telescope (LBT) and Vatican Advanced Technology Telescope have been constructed on Mount Graham near Safford.

Other observatories also call Arizona home. No other state has as many telescopes engaged in observational research as does Arizona.

The UA Lunar and Planetary Laboratory, the ASU School of Earth and Space Exploration (SESE) and the USGS Astrogeology Team in Flagstaff have all filled important leadership roles in NASA missions. Tucson's Planetary Science Institute is also a significant contributor.

A recent study coordinated by the Arizona Arts, Sciences and Technology Academy (AASTA), and

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conducted by the Economic and Business Research Center at the UA Eller College of Management, has for the first time quantified these contributions. The bottom line: Research in astronomy, planetary science and space science annually brings more than a quarter of a billion dollars and more than 3,300 jobs to Arizona.

Today, astronomy and space science are healthy in Arizona. The LBT is the largest optical telescope in the world. Lowell's Discovery Channel Telescope, under construction on the Mogollon Rim, will be the fifth-largest telescope in the continental United States. The Lunar and Planetary Laboratory is leading the Phoenix Mission to Mars. The Navy Prototype Optical Interferometer near Flagstaff is one of few such facilities in the world. The Steward Observatory Mirror Lab fabricates state-of-the-art giant telescope optics.

While the picture seems rosy now, I contend that astronomy in Arizona is at a tipping point. Arizona can maintain or even grow its leadership in optical astronomy - or we can watch our forefront position slip away. Which way things go will depend on whether our state's leaders are prepared to take action to foster the continued health of astronomy in Arizona. Space Science also would benefit from greater attention.

The AASTA study offers a number of recommendations. The following is my own abbreviated list:

- Open active lines of communication between the astronomical and space-science communities and Arizona's political leadership at both the state and national levels. In this way, our political leaders can be aware of opportunities and threats, and can take action to protect what Arizona already has and to bring new programs and facilities to the state.
- Develop a strategy for encouraging increased economic benefit to Arizona from astronomy and space science, much as has already been done for the biosciences and other disciplines.
- Take steps to effectively control increasing light pollution, particularly in the rapidly growing metropolitan areas of Maricopa and Pinal counties.

The Valley's contribution to light pollution now extends for at least 100 miles. If Arizona fails to address this problem, optical astronomy in Arizona over the next few decades will be seriously compromised. Indeed, some existing major observatories are badly affected now and may ultimately close if sky brightness trends are not reversed.

The depressing recent track record of next-generation telescopes too often bypassing Arizona for Hawaii or Chile will continue. To me, as I approach the end of my more than 40-year career as an Arizona astronomer, such an outcome would be truly sad.

The story does not have to end this way if Arizona has the resolve to adopt and enforce statewide lighting regulations. These would require appropriate types and levels of outdoor lighting, and would mandate effective shielding of all outdoor fixtures.

Flagstaff and Coconino County have demonstrated over the past 20 years that such lighting controls work, do not sacrifice safety and, when uniformly applied, do not adversely impact business.

Tucson and Pima County also have acted to protect observatories, as have a few smaller cities.

If all of Arizona were to follow suit, the night sky will be preserved for everybody to enjoy, energy consumption will drop, and less carbon dioxide will be pumped into the atmosphere.

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Flagstaff prides itself in being the first officially designated Dark Sky City. Could Arizona become the first Dark Sky State?

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