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Roger Linfield (1954–2020)

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Roger Linfield died on Monday, the 9th of November 2020.

Roger Linfield was one of the key contributors to the first successful Very Long Baseline Interferometry (VLBI) experiment using ground telescopes together with the orbiting Tracking Data and Relay Satellite in the 1980s, and went on to a successful career at Jet Propulsion Laboratory and Ball Aerospace.

Roger was born in 1954 in Watertown, Massachusetts. As a gifted high school junior he was admitted to the National Science Foundation's Summer Science Program. There he learned about astronomy and was impressed with a life-long love of the science. He received his Bachelor's degree from Michigan State University in 1975 and went on to receive his Doctorate at California Institute of Technology in 1981. While a graduate student he worked in the VLBI group at Caltech, led by Marshall Cohen and Tony Readhead. His Ph.D. thesis, under the supervision of Marshall Cohen, was entitled *Studies of Compact Extragalactic Radio Sources*, and involved VLBI imaging and modeling of the cores and one-sided radio jets of four radio galaxies. The thesis was an important contribution to addressing the long-standing question of whether radio galaxies with one-sided VLBI jets were intrinsically one-sided or had superluminal jets pointed near the observer's line of sight.

Like other graduate students from his era at Caltech, Roger made use of the Owens Valley Radio Observatory and became familiar with the details of radio astronomical hardware along with making use of astronomical data, which served him well in the rest of his career. Roger went on to a postdoctoral fellowship at U.C. Berkeley for two years before moving on to Jet Propulsion Laboratory (JPL), where he became a member of the technical staff in 1983.

At JPL, Roger worked in the Tracking Systems and Applications Section, where he contributed to the developing technique of navigating interplanetary spacecraft using VLBI observations relative to quasars. Soon after his arrival, he became involved in planning Space VLBI experiments to use



Photo credit: unknown.

orbiting radio telescopes observing in concert with ground telescopes. Roger was one of the key designers of the first successful Space VLBI experiments led by Gerry Levy, using a satellite of the Tracking Data and Relay Satellite System (TDRSS) working together with 64-meter ground radio telescopes in Japan and Australia. He helped design the frequency transfer link that provided time and frequency stability for the spacecraft data, and collaborated with staff of JPL and the MIT Haystack Observatory to input these data to a developmental VLBI correlator at Haystack. The first space-ground VLBI detections were made using 2.3 GHz observations of the quasar NRAO 530 (1730-130) and then several other objects in July and August 1986, with effective baseline lengths greater than the Earth's diameter [1]. Subsequent detections of more than 20 objects on baselines as long as 2.1 Earth diameters at 2.3 GHz, and detections of more than 10 objects at 15 GHz, resulted in the first direct VLBI measurements of brightness temperatures above the inverse Compton limit.

The TDRSS Space VLBI experiments led to a dedicated mission, the VLBI Space Observatory Program, led by the Institute of Space and Astronautical Sciences in Japan. Roger was more interested in investigations of complex and interesting technical problems than in ongoing mission operations, so he moved on to planning for more ambitious Space VLBI missions as well as investigating methods for achieving high-precision VLBI astrometry using techniques such as water vapor radiometry calibration of the troposphere. He also began applying his knowledge of radio interferometry to calibration of optical interferometers and coronagraphs that could be used for extrasolar planet detection and imaging.

In 2001, Roger moved to Ball Aerospace in Boulder, where he applied his newly developed expertise in optical systems to conceptual design work for spaceborne optical and infrared telescopes. Those prospective telescopes were aimed at detections of transit spectroscopy of extrasolar planets. Perhaps the most ambitious project Roger worked on while at Ball Aerospace was Sentinel: space telescopes whose specific mission was to detect potentially hazardous Near-Earth Objects. He also gave seminars at Ball to help teach staff members to make effective presentations and to communicate complex technical activities at a level understandable by astronomers, engineers, and managers alike. In 2015, Roger retired from Ball Aerospace and became a mission analyst for the B612 Foundation, an organization dedicated to protecting the Earth from potential asteroid impacts.

Roger pursued his hobbies with the same drive and enthusiasm that he applied to his technical work. While living in Southern California, weekends were often spent on hard-core climbing expeditions in Joshua Tree, where he was an expert climber and pioneer on multiple routes. He made many adventurous ornithological expeditions, including one to the Aleutian Islands, to find bird species that had been blown across the Bering Strait. Roger came into his own as a peak-bagger, transitioning from rock climbing, after moving to Boulder. In 2013, he became only the seventh person to both summit all of Colorado's 14,000-foot peaks and sight 400 bird species in Colorado (his wife Brenda was the eighth),

an accomplishment reached by only 12 people since 1981. Roger finished climbing all of Colorado's peaks higher than 13,000 feet (623 peaks total) in 2018 and had just one peak left to complete Colorado's highest 900. Roger was well known in the Colorado mountain community for placing registers atop a variety of mountain peaks for others to sign.

Roger taught many of us that anything worth doing at all was worth doing to the best of our abilities and with enthusiasm and passion; those who knew him are richer for having encountered him in our lives.

Roger Linfield passed away in Boulder, Colorado, from Burkitt lymphoma. He is survived by his wife Brenda, his brother Ken, his nephew Cory, and niece Kristen.

Citations

1. Levy, G. S., Linfield, R. P., Ulvestad, J. S., Edwards, C. D., Jordan, J. F., di Nardo, S. J., ... Kunimori, H. (1986). Very Long Baseline Interferometric Observations made with an Orbiting Radio Telescope. *Science*, 234(4773), 187–189. <https://doi.org/10.1126/science.234.4773.187> ↵