



Riccardo Giovanelli

August 30, 1946 – December 14, 2022

Riccardo Giovanelli, emeritus professor of Astronomy, died on December 14, 2022 after a long battle with Parkinson's disease. Riccardo was born in Reggio Emilia in Italy and spent much of his childhood in Argentina before the family returned to Italy. After graduating from the University of Bologna he left Italy to pursue a Ph.D. in astronomy at Indiana University. His thesis research conducted under Gerrit Verschuur and Bob Brown at the National Radio Astronomy Observatory focused on the origin of the so-called "high velocity clouds" of atomic hydrogen. His graduate work was interrupted by service as a civil volunteer teaching physics at the National University of El Salvador in lieu of the period of military service required of all Italian citizens. Although much of his thesis research had been published, he did not have enough credit hours to graduate, and so he returned to Indiana for a year before returning to Bologna for a brief period before taking up a position on the scientific staff of the Cornell managed Arecibo Observatory in Puerto Rico in 1978. Not long after his arrival in Puerto Rico, Martha Haynes, whom he had met in that final year in Indiana and recently married, also joined the Arecibo scientific staff.

The Arecibo Observatory had recently undergone a major upgrade of its 1,000 ft spherically shaped reflector allowing observations of atomic hydrogen, the main constituent of the gas between the stars in the Milky Way and other galaxies. Riccardo and Martha seized the opportunity to carry out a large-scale survey of what is known as the Pisces-Perseus region of the sky to map out the three-dimensional distribution of hydrogen rich galaxies; the two-dimensional distribution was known from optical observations but not the third dimension, their distance. After hundreds of hours of telescope time over several years, the results were a major breakthrough in our understanding of the distribution of galaxies in the local universe. For this work Riccardo and Martha both received the Henry Draper medal from the National Academy of Sciences in 1989 for "The first three-dimensional view of some of the remarkable large-scale filamentary structures of our visible universe." As an increasingly well-known Italian

astronomer, Riccardo was also given the honorific title of Knight of the Order of Merit of the Italian Republic.

During the 1980s and 90s, Riccardo recognized the potential impact of coordinated campaigns to study both stars and gas in galaxies using different telescopes. He worked with numerous collaborators from around the world to compile observations of thousands of galaxies to explore quantitatively how and why the gas content of galaxies depends on local environment and how large statistical samples could be used to constrain cosmological models on local scales. Several projects exploited the empirical relation between a galaxy's luminosity and its rotational velocity as a distance indicator to show that the distribution of visible galaxies traced the distribution of dark matter on large scales. Driven by scientific questions, he continuously pushed to develop better instruments, better software and better observational strategies.

Riccardo remained on the scientific staff of the Arecibo Observatory for thirteen years during which time he served as head of the radio astronomy group and, towards the end, as observatory director. However, he was not very interested in being an administrator, he wanted to pursue new ideas. In 1991, he moved to Ithaca to take up a faculty position in the Department of Astronomy, joining his wife, Martha Haynes, who had preceded him as a member of the department's faculty.

While at Arecibo, Riccardo worked with Brazilian astronomers on plans to construct an improved version of the Arecibo telescope in Brazil, a great project but construction was never started. Riccardo's next foray into telescope building was to investigate the possibility of building a 25-m diameter mm/sub-mm wavelength telescope that would complement observations with the Atacama Large Millimeter Array (ALMA) being proposed for the 5,000-m high Atacama plateau in Northern Chile. Riccardo made numerous trips to the plateau in the late 1990s and early 2000s to investigate the seeing conditions and possible sites. In 2003, he and Fred Young, a Cornell alumnus, who had expressed interest in supporting the construction of a telescope, visited the plateau to investigate two higher sites, Cerro Negro and Cerro Chajnantor. In 2005, Riccardo and Chilean colleagues walked to the top of Cerro Chajnantor and found a suitable flat area just below the summit at 5,600 m (18,300 ft). A significant number of U.S. and international institutions joined the project, which was ranked the highest priority among medium scale, ground-based projects examined as part of the U.S. National Academy of Science's decadal review published in the report "Astro2010 Decadal Survey: New Worlds, New Horizons in Astronomy and Astrophysics". Unfortunately, raising the funding needed for the telescope proved impossible. This did not deter Riccardo and a smaller and less expensive, but very innovative, wide field-of-view sub-mm telescope, now called the Fred Young Submillimeter Telescope (FTST), was proposed in its place on Cerro Chajnantor. This is being built by Cornell in conjunction with several institutions in Germany and a consortium of Canadian universities. Riccardo was the first CCAT project director and the expected successful completion of the telescope in 2025 will be due to his vision and determination to make the project a success.

Riccardo did not forget his South and Central American roots. He attended conferences in South

America related to encouraging the dreams and hopes of young scientists and he visited El Salvador and Honduras to talk to young people about scientific research. He also served on the advisory committee for the joint Argentinian and Brazilian Large Latin American Millimetric Array (LLAMA) project, a 12-m antenna at almost 5,000-m that is under construction.

In the 1990s, the Arecibo telescope underwent a radical upgrading that resulted in a true point focus for incoming radio waves from space in place of the long, frequency dependent line feeds that had been used due to the spherical shape of the telescope's primary 1,000 ft reflector. This change allowed a multi-beam – seven pixels on the sky instead of one – system, the Arecibo LBand Feed Array (ALFA), at the frequency of atomic hydrogen cutting the time for wide area mapping surveys by a factor of seven. Multiple surveys were proposed including a very large scale one by Riccardo Giovanelli with, of course, Martha Haynes. The observational program called ALFALFA for the “Arecibo Fast Legacy ALFA” survey, was conducted from 2005-11 making use of 4,700 nighttime hours conducted by 99 faculty, postdocs and students over more than 800 separate observing periods. ALFALFA was designed to enable hands-on experiences for students both at the graduate and undergraduate level. It served as the basis for more than 25 Ph.D. theses, including 10 from Cornell. The Undergraduate ALFALFA Team has engaged faculty and undergraduate students at 25 principally undergraduate teaching institutions across the U.S. and Puerto Rico in research centered on the ALFALFA project. ALFALFA has provided the first true census of gas-bearing galaxies over a cosmologically-significant volume of the local universe showing the important differences in the galaxy populations traced by optical and radio surveys. Its catalog of more than 31,000 individual extragalactic sources contains numerous enigmatic discoveries including galaxies with baryonic components dominated by gas not stars. More than 120 papers based on ALFALFA have been published by the survey team.

Riccardo was a kind, warm friend to so many. He had a charming sense of humor and a mischievous twinkle in his eye. He loved to introduce visitors to the culinary delights (most notably prosciutto, parmesan cheese, pasta and sparkling wine) and historical sites of Northern Italy, where he and Martha had a summer home. On July 15, 2023, there was a celebration at Cornell of the life of Riccardo Giovanelli. The large attendance and talks were a testimony to the high regard that Riccardo was held in as a person, colleague and scientist. Included in the attendees were many former students and postdocs who Riccardo had mentored. He will be missed.

Written by Donald Campbell, with the assistance of Martha Haynes