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# **Bruce E. Woodgate (1939–2014)**

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**Bruce Woodgate died on Monday the 28<sup>th</sup> of April 2014.**

Bruce E. Woodgate was the principal investigator (PI) of the Hubble Space Telescope Imaging Spectrograph (STIS). His work had a profound impact on Hubble's science program.

Woodgate was born in 1939 in the town of Eastbourne, East Sussex, England. He earned his PhD at the University College London. After holding positions at Columbia University and Goddard Institute for Space Studies in New York, Bruce came to Goddard Space Flight Center in 1975, where he remained for the rest of his career. Bruce had a remarkable career, spanning nearly 40 years as a civil servant at Goddard. He retired recently and was still working on ultraviolet detectors as an emeritus scientist. Bruce had very broad interests, in subjects ranging from earth science to stellar atmospheres to exoplanets to the large-scale structure in the universe — and of course, instrumentation of all sorts. Here are a few highlights.



*Photo courtesy of David P. Friedlander*

In 1974, Bruce served as co-PI and experiment manager for the Ultraviolet Spectrometer and Polarimeter (UVSP) on the Solar Maximum Mission (SMM). In this capacity he was responsible for the design, development, testing and post-launch operation of the instrument. A number of important results were obtained with the UVSP. Bruce was also the SMM Project Scientist from 1983 to early 1986, leading the science team through the preparations for and aftermath of the 1984 SMM repair mission on STS-41C — NASA's first in-space satellite repair. Bruce was best known as the PI for STIS, a second-generation instrument for the Hubble Space Telescope. In this capacity he led the design and development of the instrument, including preparation of flight-worthy large-format CCDs and Multi Anode Multi Array detectors. STIS dramatically advanced the state of the art over the previous Hubble spectrographs. STIS was installed on Hubble in 1997 and operated for seven years, until a power-supply failure occurred. STIS was repaired in 2009 during the final Hubble servicing mission, and it

operates well to this day. STIS has proved to be a very versatile instrument and played a key role in several of Hubble's most famous discoveries including, for example, spatially resolved spectroscopy of the nuclei of galaxies that indicated the presence of supermassive black holes and the first detection of the atmospheric composition of a planet around another star (HD 209458), in which sodium, carbon, oxygen, and hydrogen were discovered. STIS has also enabled new discoveries about the nature of proto-planetary disks, supernova remnants, massive stars, and the intergalactic medium.

Bruce was a tireless inventor of new technologies. Early in his career, he developed a technique for making conically shaped mosaics of thin crystals to produce large-area x-ray spectrometers. The two crystal-cleaving machines developed to produce thin crystal wafers are known worldwide. Bruce was co-inventor of the earlier of these two machines, holding a U. S. patent. More recently, he was developing a next generation photon-counting UV detector, employing advances in solid-state physics and nano-fabrication techniques.

A measure of Woodgate's research impact is his publication record: he published 188 scientific and technical journal papers that have over 5300 citations. He received Goddard's Award of Merit and the NASA's Distinguished Service Medal. However, descriptions of Bruce's scientific and technical accomplishments do not tell the whole story of his impact on the profession of astronomy. He mentored legions of students and young scientists and was a friend to everyone.

Bruce was an exceptional man, kind, thoughtful, and generous with his time and his ideas. Those of us who had the pleasure of working with him on various projects will always remember his clarity of vision and purpose, and his insatiable desire to innovate. Bruce's legacy to the field of astronomy is broad and enduring, represented not only by the scientific papers he authored, but also the research of the thousands of astronomers who have used — and continue to use — the instruments Bruce built to explore the universe. He was a master instrument builder, on whose shoulders we stand. Bruce will be sorely missed.

Bruce died on 28 April 2014 after suffering several strokes. He is survived by his wife, Patricia, and their two daughters, Cathy and Nina.