infectious cheerfulness. We remember him as an invaluable colleague and a wonderful friend.

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Philadelphia, Pennsylvania
Moo Young Choi
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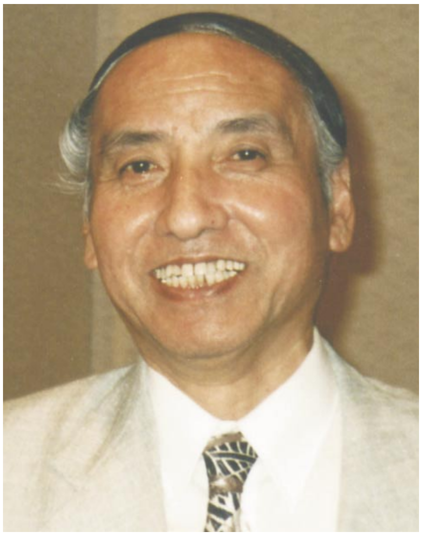
Yutaka Uchida

Yutaka Uchida, a leading research worker in solar physics and plasma astrophysics, died suddenly on 17 August 2002. Tragically, he suffered a cerebral hemorrhage just at the conclusion of his closing thanks at his son's wedding ceremony.

Uchida was born on 27 March 1934 in Tokyo. He earned his undergraduate (1958) and graduate (1963) degrees in astronomy at the University of Tokyo, and then received his first professional appointment there. Takeo Hatanaka and Wasaburo Unno jointly supervised his PhD thesis, "The Effect of the Magnetic Field in the Shock Wave Heating Theory of the Solar Corona."

In 1965, Uchida joined the Tokyo Astronomical Observatory as a research assistant, eventually becoming a professor (in 1978). At that time, the observatory was a research unit of the University of Tokyo and was located in the western suburb of Mitaka. He returned to the university in 1988 to become chairman of the department of astronomy, remaining until his statutory retirement in 1994. A second career then ensued at the Science University of Tokyo. There, he established the Frontier Research Center for Computational Science for computer simulations. He also developed tools for general application and for astrophysical plasmas.

Uchida's entire career was marked by extensive collaborations with international colleagues, including M. K. Vainu Bappu, Attilio Ferrari, one of us (Hudson), Boon Chye Low, Don Melrose, Colin Norman, Robert Rosner, Peter Sturrock, and Zdenek Svestka. His readiness to participate in such collaborations made him an ideal project scientist for the *Yohkoh* (Sunbeam) satellite observatory, which, at its launch in 1991, was Japan's most international satellite project. Uchida continued as project scientist into his retirement until the scientific program ended. But in that



Yutaka Uchida

position, he faced a diplomatic problem. In the NASA-sponsored solar physics program in the US, there was the expectation of free data exchange. That system was incompatible with Japan's expectations at that time. Following the satellite's launch, astronomers continued to use it for more than a decade—almost half of a Hale cycle. During those years, Uchida presided over the adoption of a general open data policy for Yohkoh. The Yohkoh data and software thus became a model for international cooperation. The Yohkoh program inspired Japan's current solar observatory project, Solar-B, which is scheduled to be launched in 2006, and Uchida's support of that program was a vital contribution.

One of Uchida's best-known contributions is his theory of global coronal waves as weak fast-mode hydromagnetic shocks. That innovation, which he introduced in 1968, led to an explanation of Moreton waves—that is, chromospheric disturbances with seemingly inexplicable high speeds. Uchida identified them as the skirts of the global coronal waves already known to radio astronomers as the causes of type II bursts. His theory has survived the test of time, and the subject of large-scale waves in the corona is again an active area of research. New types of waves and large-scale oscillations were discovered recently using the Solar and Heliospheric Observatory (SOHO), Transition Region and Coronal Explorer (TRACE), and Yohkoh satellites. Uchida's interest was reawakened, but he died before he could share his insights into the nature of these waves and their exciters. It is now generally accepted that solar flares launch blast waves of the Uchida type and that the process of their formation probably contains vital clues to the nature of flares and coronal mass ejections.

In his later years, Uchida broadened his scientific interests. His move to the Tokyo Astronomical Observatory, where he worked with Tatsuo Takakura and Keizo Kai on gyrosynchrotron physics, had brought him to solar radio astronomy. That work in turn led him to broader applications of plasma theory. His own favorite recent research area had to do with astrophysical jets and the nature of their magnetism. In June 2002, the *Publications of the Astronomical Society of Japan* published an article, which he coauthored, on the helical nature of the jet in 3C 273. Such phenomena have their solar counterparts in the coronal x-ray jets, which also often have helical flow fields. These solar jets were discovered by Yohkoh in 1991. Magnetized plasmas are like bread and butter for solar physicists; Uchida was one of the pioneers of plasma astrophysics in more general applications.

The hospitality of Uchida and his wife was known to many astrophysical visitors to Tokyo. The Uchidas frequently hosted parties in Tokyo and at their summer home. He delighted in discussing scientific problems, often argumentatively, but with insight and humor. He is missed by his colleagues both in Japan and around the world.

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Leon Van Speybroeck

Leon Van Speybroeck, a master designer of x-ray telescope mirrors and the telescope scientist for the Chandra X-ray Observatory, died in Newton, Massachusetts, on 25 December 2002, shortly after learning that he had metastatic melanoma.

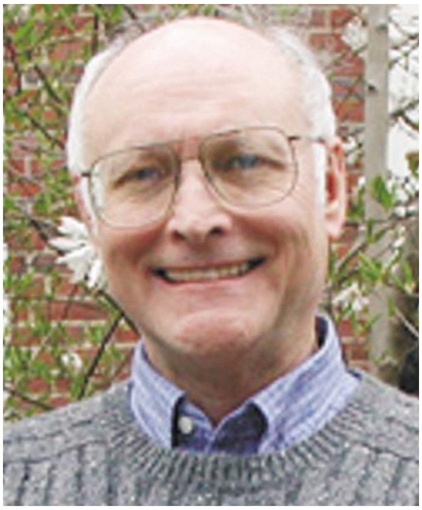
Leon was born on 27 August 1935 in Wichita, Kansas. He received a BS in 1957 and a PhD in 1965, both in physics, from MIT. His PhD thesis, "Elastic Electron–Deuteron Scattering at High Momentum Transfer," was carried out under the supervision of Henry Kendall and Jerome Friedman. Leon spent two more years at MIT as a research associate.

In 1967, he was hired by American Science and Engineering (AS&E) in Cambridge, Massachusetts, and joined the x-ray astronomy group led by Riccardo Giacconi, who received the 2002

Nobel Prize in Physics for contributions to astrophysics that led to the discovery of cosmic x-ray sources. Leon soon became involved in the design and construction of high-resolution, grazing-incidence x-ray telescopes, starting with the Apollo Telescope Mount flown on NASA's Skylab from 1973 to 1974. A series of high-resolution x-ray images of the solar corona led to dramatic changes in ideas about the solar corona, with new emphasis on magnetic dynamo processes.

When the Smithsonian Astrophysical Observatory and the Harvard College Observatory morphed into the Harvard–Smithsonian Center for Astrophysics (CfA) in 1973, Leon, with Giacconi and other senior x-ray astronomers from AS&E, joined the CfA and formed the high-energy astrophysics division. Leon guided the design and development of the x-ray mirrors on NASA's Einstein Observatory, which was flown from 1978 to 1981 as the first cosmic x-ray observatory with an imaging telescope. Along the way, he helped the team to solve numerous technical challenges—for example, floating the heavy optics in a mercury bath so that their roundness could be measured without gravitational distortion. The Einstein data, which showed that virtually all classes of astronomical sources are x-ray emitters, opened the door for x-ray astronomy to join the other wavelength domains as an equally important discipline. In recognition of his accomplishments, Leon received the George W. Goddard Award in 1985 from SPIE–The International Society for Optical Engineering.

While the Einstein Observatory was still operating, work began on a successor with a larger effective area and substantially higher angular resolution. Leon led the technology development and then the flight program for the optics on this Advanced X-ray Astrophysics Facility (AXAF). He insisted on systematic analyses and thorough understanding of all the processing steps and metrology data. He negotiated the establishment of incentives and goals for mirror smoothness, and achieved an increase in the fraction of 6-keV x-rays encircled in a 1-arcsecond diameter from 20% to 60%. With his guidance and the efforts of many superb engineers and scientists, polishing and metrology equipment was designed, built, tested, and used at Hughes Danbury Optical Systems Inc, located in Danbury, Connecticut. The equipment was used to fabricate x-ray mirrors at the 0.5-arcsecond level of performance—10 times better than any previous x-ray optic.


Leon Van Speybroeck

Following the successful fabrication of the optics, Leon worked with the team at Optical Coating Laboratory Inc, in Santa Rosa, California, to establish a process for depositing iridium coatings that provide a relatively high efficiency up to 10 keV and a very stable final surface. The AXAF telescope comprises four pairs of mirrors nested one inside another to increase the collecting area. A major challenge involved assembling the eight cylindrical optics into a single high-resolution telescope. Leon and the team at Eastman Kodak Co in Rochester, New York, designed a 50-foot-high vertical assembly tower that satisfied demanding environmental controls. The mirror elements were held as stress free as possible, maneuvered into alignment, and bonded into place with a slow-curing epoxy to a precision of a few tenths of an arcsecond.

Following its launch aboard the space shuttle Columbia in July 1999, AXAF was renamed the Chandra X-ray Observatory. Up to the time of his death, Leon had been leading a team that used Chandra plus microwave observations of galaxy clusters to determine the cosmic distance scale. His colleagues expect to publish their results later this year. In recognition of his leadership and extraordinary contributions to Chandra, Leon received the 2002 Bruno Rossi Prize of the American Astronomical Society's high-energy astrophysics division. He died two weeks before he was scheduled to deliver his acceptance speech. Despite his illness, he had crafted a marvelous talk illustrating the tremendous advances enabled by the Chandra telescope. One of us (Tananbaum) presented his talk, which received an enthusiastic response from approximately 1000 AAS members.

Leon was an amazing individual, respected by his colleagues as an outstanding physicist, mathematician, programmer, and engineer who could solve just about any problem. He set and met incredibly high standards in his professional and personal endeavors. He was modest about his accomplishments, but would acknowledge that "Chandra had a pretty good mirror" when colleagues would share exciting new results made possible by his dedicated efforts and unique skills.

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