

obituaries

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Laszlo Tisza

Laszlo Tisza, whose career spanned major developments in 20th-century physics, died on 15 April 2009 in Newton, Massachusetts, at the age of 101. He witnessed the birth of quantum mechanics at close hand, knew many of the leading figures, and made significant contributions of his own.

Laci, as he was known to his many friends, was born on 7 July 1907 in Budapest, Hungary. He wryly described his high school in Buda as challenging, but not as challenging as the schools across the river in Pest where Eugene Wigner, John von Neumann, and Edward Teller studied. In 1926 Laci enrolled in mathematics at the University of Budapest. Two years later his studies led him to physics at the University of Göttingen, where David Hilbert was reluctantly becoming engaged with quantum mechanics, Emmy Noether was at the center of modern algebra, and Richard Courant was teaching fluid dynamics.

Laci heard about quantum mechanics from a Danish friend and enrolled in the first-ever course on the subject, presented by Max Born. Laci then moved to Leipzig to work with Teller under Werner Heisenberg. He received his doctoral degree from the University of Budapest in 1932, but then his career was abruptly interrupted. Two months after Laci defended his thesis, the fascist Hungarian government arrested him on the basis of his friendship with communist students and imprisoned him for 14 months.

Upon Laci's release, Teller recommended him to Lev Landau to work in his theoretical group at the Ukrainian Physical-Technical Institute in Kharkov; Laci joined the institute in January 1935. He passed Landau's "theor-minimum" program, making him number 5 of the approximately 35 physicists who passed that legendary examination. In 1937 the political climate at Kharkov deteriorated abruptly. Landau fled to Moscow, where he was arrested the following year. Laci managed to return to Budapest. Once again Teller stepped in and recommended him to Fritz London in Paris. At the Institut Henri Poincaré, London was



Laszlo Tisza

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working on superconductivity and the properties of liquid helium. He arranged a research appointment for Laci in the group of Paul Langevin at the nearby Collège de France. It was there that Laci did his most important work.

In December 1937 superfluidity in liquid helium was discovered by Peter Kapitza in Moscow and John Allen and Don Misener in Cambridge, UK. In one of their long walks together, London described to Laci his idea that superfluidity was a manifestation of Bose-Einstein condensation (BEC). Laci realized that that should lead to two velocity fields in liquid helium. One field would be viscous and carry entropy, and the other would have zero viscosity and zero entropy. His proposal explained how liquid helium could flow through a slit without resistance while also causing damping in a torsional disk oscillator. In 1938 he published a short note in *Nature* establishing for the first time the two-fluid model. His note also pointed out how the model could explain the recently discovered fountain effect. Laci also predicted that in the superfluid phase of the liquid, heat should propagate as "temperature waves," later called "second sound" by Landau. Temperature waves were observed experimentally in 1946.

Despite the successes that Laci's two-fluid model has come to enjoy, London

was initially negative about it. Landau rejected London's BEC proposal and ignored Laci's model. In 1939 Laci published a detailed paper on his theory in *Comptes Rendus*, but World War II intervened, and he did not get to see the published version until peace had returned. In June 1940 part of Langevin's laboratory was evacuated to Toulouse, which was not yet occupied by the Nazis. Once again Laci managed to escape, leaving Marseille in early February 1941 for Madrid and Lisbon and then traveling by boat to New York to join relatives and friends in Cambridge, Massachusetts. A few months later, he obtained the position of instructor at MIT, where he eventually became a professor.

Laci had a warm and generous personality. Despite Landau's indifference to his work, for instance, he always spoke of Landau with reverence and portrayed his time at Kharkov as a golden period in his life. Laci was an outstanding teacher with a broad and deep understanding of physics that reflected his studies with Born, Landau, Teller, and other luminaries. At MIT he was a friend and mentor to Jack Steinberger, and his graduate students included Herbert Callen, Martin Klein, and Quin Luttinger. Laci's intellectual interests centered on the foundations of thermodynamics and quantum mechanics and on the philosophy of science. His major work was his theory of generalized thermodynamics. He liked best to discuss foundational questions, but he also had a great appreciation for hiking, good wine, and good food. Laci retained his zest for life and his passion for fundamental problems, and he continued to work on the foundations of quantum mechanics until shortly before his death.

With Laci's passing, a link to a golden age of physics, but also to an age of unprecedented oppression, is broken. Laci was always cheerful. Perhaps his harrowing political escapes allowed him to appreciate more fully than most the joys of living and working in a free society.

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Yoji Totsuka

Yoji Totsuka, an honorary professor emeritus at the University of Tokyo, died of cancer on 10 July 2008 in Kashiwa, Japan. He will be most remembered for his leadership on the Super-Kamiokande experiment, which discovered that neutrinos have tiny, nonzero masses.



Yoji Totsuka

Born in Fuji City, near Japan's Mount Fuji, on 6 March 1942, Totsuka spent most of his boyhood in the area. After he graduated with a degree in physics from the University of Tokyo in 1965, he entered the university's graduate course in physics under the supervision of Masatoshi Koshihara. Totsuka's thesis work, for which he received his PhD in 1972, was on the underground measurement of the flux of cosmic-ray muon bundles at the Kamioka mine. Thus began his 30-year research career in Kamioka.

From 1972 to 1981, Totsuka worked on the DASP and JADE e^+e^- experiments at DESY, the German Electron Synchrotron in Hamburg. He returned to Tokyo in 1981 and joined Koshihara's Kamiokande experiment, which used a 3-kiloton water Cherenkov detector to search for proton decay; it began operating in July 1983. Because the detector worked so well, two new ideas were soon proposed: the detection of solar neutrinos in Kamiokande and the construction of a 50-kiloton water Cherenkov detector, Super-Kamiokande. From 1984 to early 1987, the detector underwent a major improvement so it could detect solar neutrinos. Luckily, that work was finished one month before the arrival of supernova neutrinos in February 1987.

After Koshihara retired from the University of Tokyo, Totsuka was appointed leader of the Kamiokande and Super-Kamiokande experiments in April 1987. To realize the Super-Kamiokande project, he moved to the university's Institute for Cosmic Ray Research (ICRR) the following year.

Thanks to Totsuka's effort, in 1991 Super-Kamiokande was approved by the Japanese government. A large num-

ber of US collaborators joined the experiment; of the roughly 100 researchers, about 60% were from Japan and 40% from the US. The construction was scheduled for completion on 31 March 1996, the end of Japan's 1995 fiscal year; the Super-Kamiokande experiment came on line as scheduled at midnight on 1 April.

Totsuka's strong leadership kept the construction on track, and his engaging character helped the collaboration work cohesively toward its goal. His warmth and friendliness made him very easy to work with.

From the beginning of Super-Kamiokande, its primary goals were clear: to resolve why experiments detected fewer solar neutrinos than predicted by theory and to explain anomalous observed ratios of atmospheric neutrinos. Through the detailed studies of atmospheric neutrinos, Totsuka and his colleagues in 1998 discovered neutrino oscillations between muon neutrinos and tau neutrinos and thus solved the atmospheric neutrino anomaly. In 2001 they determined, from solar neutrino data gathered by Super-Kamiokande and the Sudbury Neutrino Observatory (SNO) in Canada, that the solar neutrino deficit was due to neutrino oscillations between electron neutrinos and the other types. Those discoveries implied that neutrinos have tiny, nonzero masses, and they were the first experimental evidence for physics beyond the standard model of particle physics. Due to those fundamental contributions to the field, Totsuka was honored with numerous prizes and awards, including the Franklin Institute's Franklin Medal, which he received in 2007 with Art McDonald, leader of the SNO experiment.

Totsuka's excellent leadership skills were especially critical to the collaboration when an accident on 12 November 2001 destroyed more than half of the photomultiplier tubes in Super-Kamiokande. The following day he declared that the detector would be reconstructed. In a letter posted on the home page of the ICRR's Kamioka Observatory, he wrote to his colleagues, "We will rebuild the detector. There is no question." Without Totsuka's guidance, the present, rebuilt Super-Kamiokande could not have been imagined.

As a result of his science and management skills, Totsuka was asked to serve in numerous leadership positions: as director of the ICRR from 1997 to 2001; as director general of Japan's high-energy physics organization,

Recently posted death notices at <http://www.physicstoday.org/obits>:

Wyn Price	1938 – 2009
Ephraim Katzir	16 May 1916 – 30 May 2009
Herbert Frank York	24 November 1921 – 19 May 2009
Toshiyuki Toyoda	1920 – 15 May 2009
Brian W. Galusha	1944 – 16 April 2009
John Maddox	27 November 1925 – 12 April 2009
Stanley L. Jaki	17 August 1924 – 7 April 2009
Jack Good	9 December 1916 – 5 April 2009
Lester S. Skaggs	11 November 1911 – 3 April 2009
Bob Boucher	25 April 1940 – 25 March 2009
David L. Band	9 January 1957 – 16 March 2009
John William Snider	13 September 1924 – 19 February 2009
Sumner P. Davis	18 March 1924 – 31 December 2008
Marcel Weinrich	23 July 1927 – 23 October 2008
Oliver Overseth	11 May 1928 – 17 July 2008
Peter Schlein	18 November 1932 – 26 February 2008
Mineo Kimura	15 November 1946 – 2 February 2008

KEK, from 2003 to 2006; and as director of the Research Center for Science Systems of the Japan Society for the Promotion of Science from 2006 to 2008. He kept working on proposals and making important decisions until right before his death.

Totsuka pushed the next-generation neutrino oscillation experiment, the T2K (Tokai to Kamioka), which is scheduled to start in late 2009. Although he will not see the project through, his younger colleagues continue his dedication by exploring neutrinos to better understand the physics of elementary particles and the universe.

Takaaki Kajita

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