

obituaries

To notify the community about a colleague's death, subscribers can visit <http://www.physicstoday.org/obits>, where they can submit obituaries (up to 750 words), comments, and reminiscences. Each month recently posted material will be summarized here, in print. Select online obituaries will later appear in print.

Lev Kofman

Lev Kofman, a theoretical physicist who made fundamental contributions to our understanding of both cosmological inflation and large-scale structure (LSS) in the universe, died from cancer on 12 November 2009 in Toronto at the height of his creative and administrative powers.

Born in Siberia on 17 June 1957, Lev received superb Soviet physics training; he earned his MSc in 1979 and his PhD in 1984 in Tartu, but his thesis adviser was Alexei Starobinsky of Moscow's L. D. Landau Institute for Theoretical Physics. With Starobinsky and Andrei Linde, then at the P. N. Lebedev Physical Institute, Lev forged a career-long collaboration on inflation, the subject of his thesis. The path for Jewish students was far from easy in the Soviet Union. Even so, in 1987 Lev received the Soviet Academy of Sciences' medal in physics for those under 35 years of age, a supreme honor that recognized his early accomplishments and future promise. He became a fellow, then a senior fellow, at the Institute of Astrophysics and Atmospheric Physics of the Estonian Academy of Sciences in the six years after receiving his PhD there.

I met Lev in Hungary at an International Astronomical Union symposium in 1987, the first opportunity for many of us to meet our Soviet counterparts because travel was so restricted. Lev and I had a very close relationship, as scientists and as friends, ever since. At our next meeting in Leningrad for the 1988 Aleksandr Friedmann centenary, Lev ushered me from room to room and party to party at the hotel where Soviet scientists were; each event was filled with intense physics discussion and much camaraderie. We then went to Moscow for the famous Yakov Zel'dovich seminar and spirited "kitchen table" meetings that ranged over the full intellectual panoply—physics included. Throughout his subsequent career in the West, he imported that ideal—the highly interactive seminar and the fun social-scientific get-together—in conferences, talks, and lectures; during office meetings; and, most memorably, at the celebratory feasts he graciously hosted.



Lev Kofman

In the mid-1980s, scientists became increasingly interested in vacuum-dominated cosmologies, the so-called lambda cold dark matter (Λ CDM) model that later emerged from the data to become cosmology's "standard model." Lev and Starobinsky in 1985 were the first to calculate the cosmological constant's enhancement of the large-angle cosmic microwave background (CMB) power. Lev also pioneered nonstandard variations of inflation—exploring what was possible within hybrid two-field models—with Starobinsky, Linde, and Lev's first graduate student, Dmitri Pogosyan. The inflation theme continued throughout Lev's career.

Lev joined the Canadian Institute for Theoretical Astrophysics (CITA) in 1991; he was part of an influx of illustrious Russian cosmologists that also included Starobinsky and Sergei Shandarin, Lev's LSS collaborator and future father-in-law. Lev spent a brief but productive period at Princeton University, where he further pushed Λ CDM cosmology in response to the recently announced fluctuation discovery by the *Cosmic Background Explorer*. Throughout the rest of his career, he was a key member of the Canadian Institute for Advanced Research's cosmology and gravity program, a distinguished Canadian and international network. From 1993 to 1998, he had a five-year appointment on the University of Hawaii faculty, and he became a full professor at CITA and a fellow of

CIFAR on his return.

Lev's work to understand LSS through various approximate physical schemes culminated in the idea of the cosmic web, with Pogosyan and me. Our semianalytic picture, verified by observation and numerical simulation, has clusters joined by groups of galaxies beaded along filaments, with membranes that connect the filaments being less visually and structurally important, and with most of the volume in vast voids that, along with the clusters, define the overall architecture.

Perhaps Lev's most influential body of work was on preheating, the creation of matter and entropy from nonlinear interactions of the coherent inflation energy with other fields. In 1993 he surprised his coworkers Linde and Starobinsky with his observation that the preheating process could be accelerated through parametric resonance. The beautiful connections of the chaotic field behavior Lev found were highlighted in a very successful 2008 interdisciplinary workshop on nonequilibrium field dynamics that he co-organized at the Kavli Institute for Theoretical Physics. Preheating grew into a major field of study, with Lev, the excellent group of graduate students and postdoctoral fellows he mentored, and a few senior colleagues in the vanguard. In his final decade, he embraced supergravity and superstring cosmology, using compactified extra-dimension and brane-world ideas to create well-received inflation models, but always with an eye to CMB and LSS and to gravity-wave testability.

Lev's graduate students remember him as a cosmic soccer player—and a gifted real one—deftly moving the research ball forward with his team and scoring often. The ball is now passed to us. In his final year, undaunted by his spreading illness, he grew to become an impressively wise acting director of CITA. It is the indomitable, fun-loving, deeply philosophical spirit who felt physics to his very core, a gourmand of life in all its manifestations, whom we miss so much.

J. Richard Bond

*Canadian Institute for Theoretical Astrophysics
University of Toronto
Toronto, Ontario, Canada ■*

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

H. G. Stever

24 October 1916 – 9 April 2010

Glenn Alexander Stewart

14 January 1941 – 7 April 2010

Wynne Calvert

4 March 1937 – 10 November 2009