

ALEXEI LIKHTMAN

(1971 – 2015)

Alexei Likhtman, a leading scientist in Theoretical Soft Matter Physics, has died aged 44

Born in 1971 into a family with strong scientific tradition, Alexei was educated in Moscow. He was awarded a Diploma in Physics with honours from the Physics Department of Moscow State University (MGU) in 1994. He remained at MGU for his PhD research, supervised by Professor Alexander Semenov. The topic, his first foray into polymer physics, was the calculation of the extraordinary ordered nanoscale patterns of chemical separation that are spontaneously generated within polymer melts whose molecules contain extended regions of different chemistry but joined together. These systems maintained a lifelong fascination for Alexei, as did the collaboration with the experimental group in Crete that the Russians worked with closely. The relationship with Crete remained strong and close until the end of Alexei's life. A more important lifelong partnership also began in Moscow - it was as students there that Alexei and Katrina met and married in December 1990. The family grew after their daughters Sonya and Asya were born while Alexei was working on his PhD thesis. Helping to look after two little girls however did not stop him from producing a high quality piece of work. Till the end of his days Alexei remained a loving, committed, hands on dad, always reliable and extremely loyal to his family. The family stayed in Moscow for two more years, with Alexei as a Scientific Fellow at Moscow State University, before moving to the U.K, in 1998, where he took up a position as a Research Assistant in the Department of Applied Mathematics at Leeds University, where Semenov, now his colleague, had also moved. That initial one year position marked the beginning of family's long life in the UK

Alexei stayed at Leeds from 1998 until 2007: in 1999 he moved to the Department of Physics and Astronomy, where he worked on theories of fast flow of entangled polymer melts, including theory and simulations of the convective constraint release mo-

del, supervised by Professor Tom McLeish, and working collaboratively with Prof. Scott Milner at an extended international workshop at the Kavli Institute of Theoretical Physics in Santa Barbara. In 2002, Alexei's research had developed to the point where he was awarded an Advanced EPSRC Fellowship, which he held from 2002-2005 in the School of Physics and Astronomy. In this period, Alexei worked on developing new models of polymer dynamics, simultaneous description of rheology, neutron spin-echo, neutron scattering, diffusion, dielectric spectroscopy and NMR experiments, the theory of chemical reactions in polymers and computer simulations. This work has been recognized in many ways, including the best paper award of the Journal of Rheology (2006). From 2005-2007 Alexei held his Fellowship in the Department of Applied Mathematics, also as University Fellow, supervising a team of three postdoctoral researchers working on molecular simulations of polymer melts, slip-links model of entanglements and experimental rheology. Although a theoretician, he worked with experimental colleagues in different laboratories and performed experiments himself, learning and questioning every single detail. As a result, he personally developed the most reliable experimental protocol for measuring the flow properties of polymer melts yet found by the Leeds lab. For an experimentalist, it was a treat to interact with Alexei in this context, a unique experience that led to improved experiments. Co-supervising a PhD student, Richard Graham, the two formulated a now-celebrated non-linear but easily-computable mathematical model for the flow of linear polymers of well-defined length (the ROLIE-Poly model).

He worked hard not only on brilliant new theoretical science, but on making this accessible to others. For example, his foresight and energy led to the creation, with long-time colleague Jorge Ramirez, of a free software tool (called REPTATE) that enabled experimental scientists in universities and industry to sort their polymer flow data and compare it quickly and efficiently to theoretical models, greatly accelerating fundamental research and its application.

In May 2007, Alexei moved to the Department of Mathematics and Statistics at the University of Reading, as Professor of Mathematical Physics. There, together with Prof. Mark Matsen, he created a new group of theoretical polymer physics and within a few years had put Reading 'on the map'. The group focused on the microscopic foundations of the tube theory and using a blend of theory and multi-scale simulation to dig deeper, and with more care, into the underlying physics than any other group in the world. A testimony of Alexei's brilliance is his unique ability to bridge con-

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cepts and methodologies from different fields. He did so in his recent simulation work by using concatenated ring polymers to study polymer entanglements.

Alexei achieved enormous academic distinction, and his achievements came remarkably quickly – testament to his brilliance as a scientist. Several theoretical works on the linear and non-linear viscoelasticity of entangled polymers carry his name, including the famous Likhtman-McLeish model (2002) for slow flows (which was 90% Likhtman) and the GLaMM model (2003) for fast flows (with Graham and Milner). His Advanced EPSRC Fellowship came at the age of 31, and he was appointed Professor of Mathematical Physics in Reading at the age of just 35. Yet while undoubtedly successful himself, Alexei was equally proud of the many achievements of the group he developed. For example, in September this year he spoke glowingly of how two poster prizes out of three available at the Institute of Physics Polymer Physics Biennial Conference were won by post-doctoral researchers from his team. In the same month, he was appointed as the first Mercator Fellow of the Freiburg-Strasbourg-Basel-Mulhouse International Research Training Group on 'Soft Matter Science'. He enjoyed a productive visit to Strasbourg, during which he described himself as "feeling like a PhD student again" (possibly partly due to the position that his former PhD supervisor, Semenov, now holds there!). This is typical of his modesty and enthusiasm.

Alexei was one of those wonderful scientists who remind us that just because something is obvious, doesn't make it true. Alexei would challenge every idea that we had at Leeds – including the ones that we thought were obviously true. But the way in which he demolished your ideas was so kind and so surgically precise that it always felt good somehow. He was a particularly vociferous critic of the bad habit that much of the polymer rheology community had got into, of presenting theory together with data from just one technique, then subtly altering the parameters when data from a different technique was brought into comparison. A wonderful paper from 2005 compared his remarkable 'slip-link model' to data on rheology, NMR and diffusion measurements simultaneously. He leaves us a permanent reminder that you learn more from theory when it disagrees with experiment and that an experimentalist should have a good grasp of theory and vice versa.

Alexei was a wonderful colleague, and all those who were lucky enough to work with him benefitted immensely from his enthusiasm, support and wisdom. Alexei was an intellectual powerhouse, a truly curious

mind, a wonderfully creative thinker, a brilliant teacher at undergraduate and graduate levels, with academic gravitas way beyond his years, yet completely approachable, modest and always friendly in a natural way that charmed anybody who met him. The superb group he built in Reading and the quality of people he brought in reflect his vision and sense of commitment.

He was hugely supportive of those for whom he felt he had a responsibility. His dedication to his PhD students and his research team went well beyond professional duty. He sought to provide a family-like environment for the group, especially supportive for those who were far from home. He presented himself as an exemplary reference figure for all the young people in his group, full of energy and full of life. In this continuous work of hospitality and welcome he was supported by his family, to whom he was utterly devoted as husband and father.

Alexei was so much more than an academic and an intellectual. He truly enjoyed life and always managed to combine professional activities with hobbies and family activities. He did so last summer when he visited friends with his family following a workshop and seminar. He had a passion for so many things ranging from sports (especially swimming and hiking) to photography. A truly happy, free spirited man, full of energy and passion for things he did, he had as infectious a love of life as a tireless desire to find scientific truth. He was a great admirer of nature and outdoors with real care about the world and people around him. He was a great friend, a funny, spirited, yet always serious person, and his daily passionate presence, his enthusiasm for science, his warm friendship, will be sorely missed.

Alexei died on 11 October 2015 following a fall while hiking in Maryland, USA. He is survived by his wife Katrina, and their two daughters, Sonya and Asya.

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