



## **Lena F. Kourkoutis**

June 6, 1979 – June 24, 2023

Lena Fitting Kourkoutis, associate professor in Applied and Engineering Physics, died far too soon on June 24, 2023.

Lena Fitting, and her twin sister Sylvia, were born in Rostock, East Germany on June 6, 1979. When they were six years old, her family moved to Eritrea so the children could experience life outside the Soviet Union, where her father taught physics at the university in Asmara. In 1988, with the civil war heating up, the family moved back to Rostock. The fall of the Berlin wall in 1989 and the subsequent reunification of Germany opened new opportunities. These formative experiences may have helped reinforce Lena's strong sense of fairness and her willingness to speak up on behalf of students, staff and colleagues when things needed to be addressed.

Lena attended the University of Rostock for her undergraduate diploma in physics from 1997-2003, with an Erasmus Fellowship for a semester abroad at Lulea University of Technology in Sweden in 2001, and a Fulbright Fellowship supporting her studies at the North Carolina State University in Raleigh, North Carolina from 2002-2003. In 2003 she started her Ph.D. at Cornell University in Applied Physics as the first graduate student to join David Muller's group, who had also just joined Cornell from Bell Labs. Even in her second year as a graduate student, she had made enough progress to give a talk at an international meeting in Germany, where (and not for the last time) given her poise and knowledge, she was mistaken for a postdoc. By her third year, she was training the postdocs in the group. In 2006, she was selected by the Microscopy Society of America for a scholarship to attend the International Microscopy Congress (IMC16) in Sapporo Japan. Given her egalitarian streak, she declined the opportunity as an awardee to meet at dinner with the Emperor of Japan, passing the invitation on to a more senior colleague, and preferring to eat with her friends.

Despite her hard work in the lab, she still found time for outside activities including music and volunteering for Loaves and Fishes. Here she met, and later married, Chris Kourkoutis and

became embedded in the Ithaca community. She wanted to stay in Ithaca, so after the birth of her son Quinn and completing her Ph.D. in 2009, she stayed on as a postdoc while the department arranged plan to bring her on board as a faculty member.

This was an incredible recruiting opportunity for the department, as she already had a stronger publication record than some of the more senior faculty. To learn a set of skills to differentiate herself from the physical sciences work of her graduate advisor, she took up a Humboldt Fellowship for Postdoctoral Research at the Max Planck Institute of Biochemistry in Martinsried from 2011-2012. There she learned cryo electron microscopy methods used to preserve and prepare the native state of biological systems for imaging in the vacuum of an electron microscope.

After returning to Ithaca, Kourkoutis joined the Cornell faculty in 2013 as an assistant professor in the School of Applied and Engineering Physics, where she became a Rebecca Q. and James C. Morgan Sesquicentennial Faculty Fellow and was promoted to associate professor with tenure in 2018. She built her research program around combining the cryogenic methods she had learned for biology with the focused-beam approach of materials physicists to study a class of materials problems that was previously inaccessible to electron microscopy. Her group developed new cryogenic scanning transmission electron microscopy techniques to gain access to lowtemperature electronic states, to study processes at liquid/solid interfaces, and to image thick biological specimens. Her successes inspired the electron microscopy community and U.S. Department of Energy to begin large-scale investments in new designs of cryo-microscopes optimized for materials science.

With her new methods, she was able to identify why some lithium-ion batteries were failing, and she was able to show that they were doing so in a different way than anyone had previously imagined. A key method paper that she published in 2016 won Best Paper of the Year from the Microscopy Society of America and has opened the floodgates to a host of new studies on liquid/solid interfaces in materials, including bone-tissue interfaces. The transfer and impact to industry—including Apple’s battery group—has been rapid. Her approach has also been adopted in the biological electron microscopy community as it leads to thinner, less damaged samples.

The recognition of her work by her colleagues in the broader scientific community is reflected in her awards. Kourkoutis was a fellow of the American Physical Society, the American Association for the Advancement of Science and the Microscopy Society of America, which awarded her its prestigious 2013 Albert Crewe Award and the 2018 Burton Medal. She also was the recipient of the Microanalysis society’s K.F.J. Heinrich and the Cosslett awards. Among other recognitions, she received a 2014 Packard Fellowship for Science and Engineering, a 2016 Presidential Early Career Award for Scientists and Engineers and a 2017 National Science Foundation Faculty Early Career Development Award.

Her teaching and advising of undergraduates was recognized with the Dorothy and Fred Chau

Excellence in Teaching Award 2017, and the Canaan Family Award for Excellence in Academic Advising in 2022. She had served as director of undergraduate studies in Engineering physics until her illness, and also was taking on research leadership roles, including co-director of Cornell's National-Science-Foundation funded Materials Innovation Platform, PARADIM.

She will not only be remembered for her research but also for her passion, kindness and mentorship. She was a very effective and popular teacher and advisor, an outstanding citizen of the department and the university, and was deeply loved and admired by her students and faculty colleagues. Lena faced her cancer diagnosis and progression with her characteristic bravery and strength, remaining engaged even to the point of attending the thesis defense of her student the day before she entered hospice.

Kourkoutis is survived by her husband, Chris Kourkoutis; their two children, Quinn and Elise; her twin sister Sylvia Fitting; her younger brother, Martin Fitting; and her parents, Hans-Joachim and Tatjana Fitting. She will be greatly missed by all who knew her.

Written by David A. Muller and Chris Xu