

Prof E.K.H.Salje, 1946-2025

Alumni of the Department Earth Sciences will have been greatly saddened to hear of the passing of Ekhard Salje in February, at the age of 78. Ekhard was well known within the University of Cambridge and widely across the international communities of scientists in Physics, Materials Physics and Earth Sciences. He came to the Department as a lecturer in Mineralogy in 1985 and was quickly promoted to a Personal Chair in Mineral Physics before transferring to the established University Chair of Mineralogy and Petrology. He was Head of Department between 1998 and 2008 and maintained his remarkably high level of research productivity after his formal retirement in 2013. He will be remembered by graduate students as a constantly encouraging and inspiring supervisor and by undergraduates for lectures which were usually pitched at a level well above their competence but which were never dull.

A short column is insufficient to describe Ekhard's full contributions to the University or to science and society more generally, but other obituaries have already appeared elsewhere (see below) and there will certainly be more to come as his many friends and collaborators pause to look back on his prolific career.

Ekhard was born in Hannover and would occasionally describe the difficult experience of growing up in severely straitened circumstances immediately after the war. He began to prosper at University where his early scientific interests in group theory evolved into crystallography by the time that he became Professor at a young age in the Institute of Mineralogy, Leibniz University Hannover. Then, as in all the ensuing years, he focussed relentlessly on the relationship between the structure and properties of materials. In particular, he was interested in fundamental aspects of phase transitions that occurred within crystals in response to changes in temperature, pressure and external field.

Ekhard's expertise was in three aspects of modern solid state physics - theory, experiment (including development of new experimental apparatus) and computer simulation. He used physics to help understand minerals and minerals to provide new perspectives on physics, always with strong collaboration across the disciplines. For example, in the 1980's he treated albite as a ferroelastic material with coupling between order parameters for separate displacive and cation ordering effects using Landau theory. This approach has become the accepted means of characterising transformation behaviour in many ferroic and multiferroic materials. In the 1990's he was comparing tweed microstructures in the newly discovered high Tc superconductors with similar microstructures in cordierite and in the 2000's he was using metamictisation of natural zircons to derive a physical law for radiation damage relevant for repositories of radioactive waste from the nuclear industry. More recently, he had been intent on following up ideas for exploiting the unique properties of domain walls in crystals for their potential to provide functioning devices on a nanoscale as "domain wall engineering". His interest applied just as much to twinning in biogenic and inorganic calcite which became a frequent topic of conversation at coffee in the Department, even when his health was clearly failing. In another area, he developed a theory for describing acoustic emission from mild and wild avalanches of crack propagation. This applied equally to earthquakes and to domain wall motion in ferroelastic crystals under stress, with a difference in length scale of ~14 orders of magnitude. Typically, he

was interested in showing that the same power law could be used to inform the manner in which human kidney stones are broken down by laser lithotripsy in a clinical setting.

Ekhard travelled a great deal, particularly in recent years. He loved to work with research groups around the world, including in France, Germany, Spain, Japan, the USA and China. He will be remembered by many young, aspiring scientists who he helped and encouraged, as well as by the lead researchers, in all these groups. Similarly, he and his wife Lisa took close personal care for and interest in graduate students and visitors from all over the world between 2001 and 2008 when he was President of Clare Hall. He loved the arts and was always happy to engage with anyone on topics of art, literature, music and philosophy. It is probably less well known that he was a talented painter.

Ekhard received many honours and medals. He was elected to the Leopoldina, Germany (1994), to Fellowship of the Royal Society (1996), and to Foreign Membership of the Reial Acadèmia de Ciències i Arts de Barcelona (2011). He was Chevalier dans l'ordre des Palmes Academiques, France (2004), and was awarded the Cross of the Order of Merit of the Federal Republic of Germany (2006), the highest order for a scientist. He received the Friendship Medal of the People's Republic of China (2024).

He leaves five children and eleven grandchildren, of whom he was immensely proud.

It was my personal good fortune to have had the privilege of working with Ekhard for 40 years.

Rest in peace.

Michael Carpenter, May 2025

Some links to other obituaries

 $\underline{https://www.clarehall.cam.ac.uk/news/in-memoriam-professor-ekhard-salje-former-president-of-clare-hall/$

https://www.tandfonline.com/doi/full/10.1080/01411594.2025.2491205?af=R

https://www.iucr.org/news/newsletter/volume-33/number-2/ekhard-salje,-frs-1946-2025

https://royalsociety.org/people/ekhard-salje-12222/