



Ahmed H. Zewail - Commemoration

Professor Ahmed Hassan Zewail, Linus Pauli Professor at the California Institute of Technology (Caltech), passed away on August 2, 2016 at his home near Pasadena, California, after losing a battle with cancer.

Ahmed Zewail was awarded the 1999 Nobel Prize in Chemistry as the sole winner for his pioneering work on ultrafast chemistry. He became the first science Nobel Prize winner from the Arabic-speaking world. As a native Egyptian, he was honored with the Order of the Nile, the highest honor the State of Egypt can bestow, and received a military funeral in his native country.

In his research, he employed ultrashort laser pulses to develop stroboscopic pump-probe techniques on a femtosecond time scale. In this way, he made it possible to observe the extremely fast dynamics of molecular matter in slow motion and to study elementary processes in complex systems, including bio-molecules. With a shutter time a million times faster than ordinary cameras, it becomes possible to capture the motion of atoms and to resolve transient states during chemical reactions. The observation of such phenomena and the development of appropriate models has led to a deeper understanding of the motion and forces in the microcosm of atoms and molecules, with applications ranging from quantum chemistry to molecular biology. His impressively elegant experiments revealed the important role of coherence much beyond what had long been assumed. With the creation of the new field femtochemistry, Ahmed Zewail has left a towering scientific legacy that will inspire many future discoveries. More recently, Professor Zewail and his team pioneered the powerful technique of 4D microscopy that uses diffraction of ultrafast pulses of electrons to track reactions in space and time on the atomic scale.

Professor Zewail is author of the autobiography *Voyage Through Time: Walks of Life to the Nobel Prize* that reveals in a very personal style his approach to science and life, motivating aspiring young people from around the world to enter the world of science.

Ahmed Zewail was born in Damanhur, Egypt, on February 26, 1946, as the oldest child of a middle-class family. He grew up in Desouk, Egypt, a small town 80 km from Alexandria. He received his bachelor's and masters' degrees from Alexandria University. With a teaching fellowship he moved to the USA to pursue doctoral research with Robin Hochstrasser at the University of Pennsylvania. Working on novel spectroscopies, including optically detected magnetic resonance, he completed his doctorate in 1974. After graduating, he came to California to pursue postdoctoral research on coherence and energy transfer in solids with Charles B. Harris at UC Berkeley. In 1976 he joined the faculty of the California Institute of Technology in Pasadena, and he remained there for the rest of his career. At Caltech, he became the director of the Physical Biology Center for Ultrafast Science and Technology and was named the Linus Pauling Professor of Chemistry in 1995.

It is a privilege for me to have known Ahmed Zewail as a personal friend and an esteemed colleague for more than four decades, ever since I worked as a young Professor at Stanford University. During all this time, I admired his brilliant scientific insights, his elegant experiments, his creative vision, boundless energy and contagious enthusiasm. I was thrilled when we shared the King Faisal International Prize in Science in 1989.

Since then, Ahmed Zewail received countless other prizes and honors. His unique list of distinction includes early prestigious prizes such as the Wolf Prize in Chemistry (1993), the Robert Welch Prize in Chemistry (1997) and the Franklin Medal (1998). Ahmed Zewail was a member, foreign member, or honorary member of many Societies and Academies, including the US National Academy of Sciences, the American Academy of Arts and Sciences, the American Philosophical Society, the Pontifical Academy of Sciences, the Royal Danish Society of Science and Letters, the American Association for the Advancement of Science, the Chemical Society of India, the Royal Society of London, the Indian Academy of Sciences, the Russian Academy of Science, the Royal Swedish Academy of Science, and the Royal Academy of Belgium. He was honored with countless honorary doctorates, including degrees from Heriot Watt University, Lund University, Cambridge University, Complutense University, University of Jordan, University of Glasgow, and Yale University,

Ahmed Zewail was not only a brilliant scientist, but also an exceptionally passionate and influential diplomat and Academic Statesman, who used his stature to advance science and science education in Egypt and the Arabic-speaking world. In 1999, he proposed a new center of learning and research in Egypt with the ambition to become the Caltech of the Middle-East. This center was inaugurated in Giza, 30 km outside Cairo, one year later, and named in his honor "Zewail City of Science and Technology". I have been honored to serve on the

Supreme Advisory Board of Zewail City of Science and Technology since its inception and I am happy to see that Zewail City has begun to grow and flourish despite all the political upheavals in the region. It will add to the lasting legacy of Ahmed Zewail. With his passing, the world is losing a towering scientist, an exceptional statesman, and a passionate human being.

Professor Ahmed Zewail is survived by his wife, Dema Faham, and four children, Maha, Amani, Nabeel, and Hani.

Theodor W. Ha#nsch