The Vice-Chancellor of the
University of Cape Town
**Professor Mosa Moshabela,**
invites you to a

# Vice-Chancellor's Open Lecture

with guest speaker
**Professor Joachim Frank**

#UCTVCOpenLecture

## About our speaker

Professor Joachim Frank is a German-born American biochemist who won the 2017 Nobel Prize for Chemistry for his work on image-processing techniques that proved essential to the development of cryo-electron microscopy. He shared the prize with Swiss biophysicist Jacques Dubochet and British molecular biologist Richard Henderson.

Frank received a bachelor's degree in physics from the University of Freiburg in 1963. He then received a master's degree from the University of Munich in 1967 and a doctorate from the Technical University of Munich in 1970. From 1970 to 1972, he had a postdoctoral fellowship that allowed him to travel to the United States, where he worked at the Jet Propulsion Laboratory in Pasadena, California; the University of California, Berkeley; and Cornell University, in Ithaca, New York. He was a visiting scientist at the Max Planck Institute of Biochemistry in Munich from 1972 to 1973 and a senior research assistant at the Cavendish Laboratory from 1973 to 1975. He then joined the Wadsworth Center of the New York State Department of Health at Albany as a senior research scientist in 1975. In 2008 he assumed his current professor position at Columbia University.

Frank devised a way to observe individual molecules that were only faintly visible with electron microscopy. The problem with observing a group of individual molecules with electron microscopy is that the intense electron beam destroys the specimen. Frank and his colleagues devised computational methods for averaging and combining the poor-quality images that resulted from employing a low-intensity electron beam. In 1978 Frank and his colleagues successfully used this approach to image the enzyme glutamine synthetase. Another milestone was the first three-dimensional reconstruction of the ribosome in 1986. Today the single-particle approach to structure determination he developed is practiced in many laboratories all over the world.

## Topic
## Cryo-electron microscopy, a new foundation for molecular medicine and drug design


### Abstract

Cryogenic electron microscopy (cryo-EM) has transformed the way we can study biological molecules as it enables us to determine structure of molecules freely suspended in solution (as "single particles"), and to gauge the way they change their shape as they interact with one another in the cell during life processes.

Freezing, by plunging the sample into a cryogen at liquid nitrogen temperature, is necessary to trap the molecules in a fixed position during imaging and to reduce the damage inflicted by the electrons in the process.

Following the introduction of novel cameras for detecting single electrons, near-atomic resolution has been achieved for many molecules and molecular machines of biomedical relevance, including ion channels and receptors. Thus cryo-EM has evolved to become a major technique in drug design. Most recently it has contributed in a crucial way to the development of vaccines and cures for COVID-19 and other pandemics.


**Date:** Tuesday, 20 August 2024

**Time:** 18:00 SAST

**Venue:** New Lecture Theatre (NLT)
Residence Road
Upper Campus
University of Cape Town

**Register Here**