Hawkes' Day • Gazette QEM2025

Peter Hawkes (1937 - 2024)

Peter Hawkes carried out his PhD on the fundamentals of electron optics in the Cosslett group at the University of Cambridge. He studied the relationship between system symmetry and permitted aberrations, with the ultimate goal of proposing ways to correct for lens aberrations, and, in particular, the dominant spherical aberration of round lenses. He discovered that whilst quadrupoles have an unwanted linear focussing effect, sextupoles have no linear focussing effect and have aberrations of exactly the same nature as the spherical aberration of round lenses. Unfortunately sextupoles do suffer from second-order effects and that was sufficiently problematic that Peter did not pursue the sextupole design further. Of course, some years later, first Beck and then Crewe, Rose and others, showed that sextupole doublets could indeed provide correction.

During this time, computers were beginning to make their mark in the world of electron microscopy, initially in the design of new electron optical systems. Peter proposed to Cosslett that the group needed to also embrace the ideas of computer-based digital image processing (of electron micrographs) and purchased a mini-computer to enable this : a PDP-8 computer with 20 kilobytes of memory the size of a large fridge. Using this computer, Owen Saxton, together with Ralph Gerchberg, devised the Gerchberg-Saxton algorithm to solve the ‘phase problem’ by using an image and diffraction pattern from the same specimen area; this remarkably successful approach has now spread across many scientific fields.

Peter was a prolific writer of articles, books and reviews. His seminal multi-volume book ‘Principles of Electron Optics’, writting with Erwin Kasper was first published in 1989 with a second edition in 2017. Peter’s collaboration with John Spence led to the books ‘Science of Microscopy’ and ‘Springer Handbook of Microscopy’. He has written extensively on the history of electron microscopy and electron optics, including the history and development of aberration-corrected microscopes. Peter was also for nearly 40 years the Editor-in-Chief of Advances in Electronics and Electron Physics (AIEP) – a highly successful book series that has highlighted, through substantial review articles, the key developments across a wide range of subject matter. Indeed, Peter provided the biographical material on distinguished microscopists for the QEM gazette.

Beyond all his professional achievements, Peter was known for his kindness and unwavering commitment to scientific excellence. His legacy will continue to inspire future generations of scientists and researchers.

by Martin Hÿtch

Today's Program

9:00 ***Tomography***
by Robin Girod

11:00 ***Electron Holography***
by Martin Hÿtch

13:30 Cup of TEM

14:00 ***Extra***
Tomography by Robin Girod

15:00 Senior Special : Popularization

16:00 ***Practicals***

21:30 Break Party !!!

Image of the Day

Pic of Yesterday

Teacher's Interviews

Robin Girod

Best memory of electron microscopy?

My first independent sessions as a TEM operator. Quite thrilling :)

How a microscopy lab will look like with AI in 20 years?

AI: More automated? I'm not sure AI will bring a major revolution, but it will surely help increasing the throughput of acquisition and analysis.

Aside from Cathodoluminescence which techniques you always wanted to learn and didn't?

Technique: Ptychography, but this is on the way!

Wave or Particle?

Both are useful for tomography, so definitively both!

Martin Hÿtch

Best memory of electron microscopy?

Going to the microscope and seeing whether a crazy idea for an experiment actually works in practice. For dark-field holography, the initial results were a mess, just blurry indistinct images. I left in a huff, completely demoralised. Half an hour later, my colleagues called me back to the microsope and there it was: a beautiful hologram with bendy interference fringes.

How a microscopy lab will look like with AI in 20 years?

A) All the boring bits of microscopy have been taken over by the machine and enthusiatic scientists gaze at their exciting results.

B) Scientists driven by an AI boss perform meanial tasks impossible for the machine, then discarded.

Aside from Cathodoluminescence which techniques did you always wanted to learn and didn't?

Like Sandra, I was quickly banned from touching an actual microscope.

Wave or Particle?

Wave! Beach not bullets.

Lecture Support Material

The sample Preparation Side is open !

Come see Laetitia to discuss sample preparation and possible Demo.

How to do 4D STEM

Oh Osiris! Give us atomic resolution!

Rosaling Franklin : Usefull Clarifications

The Gazette of Thursday talked about the contribution of Rosalind Franklin to the discovery of DNA. She is usually acknowledged for her X-ray diffraction measurement of DNA, and for the fact that her result was stolen by Crick and Watson. However she did not acquire it alone, she did it with her PhD student Raymond Gosling (and not one talks about him!). The diffraction pattern is presented in p.66 of his PhD thesis “X-ray diffraction of deoxyribose nucleic acid” (accessible online). The experiment is very clever. In order to make monocrystals of DNA, Rosalind Franklin and her student Raymond Gosling first precipitated the DNA in crystalline form, then sheared the crystal in order to make the crystalline orientations rotate towards a single stable orientation (a well-known result of crystal plasticity). A good reminder of how frequently people forget to mention the PhD students!

Arthur Després

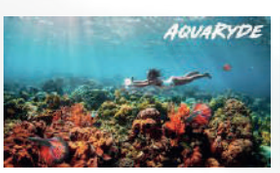
What to do in the Weekend

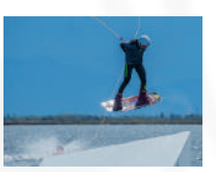
Allée des Arts, Port-Barcarès

Port-Barcarès is a Seaside Resort created in the sixties aside the town of Barcarès. The *"Allée des Arts"* was conceived as a sculpture museum, named “Musée des Sables” (Sand Museum) by the architect Georges Candilis, who was responsible for the development of the seaside resort. A collection of contemporary sculptures is displayed along the entire length of the avenue. Among the works and artists on display :

– *Don Quichotte*, Michel Guino
– *Lieu dit*, Michael Grossert
– *Le Lutin*, Victor Roman
– ...

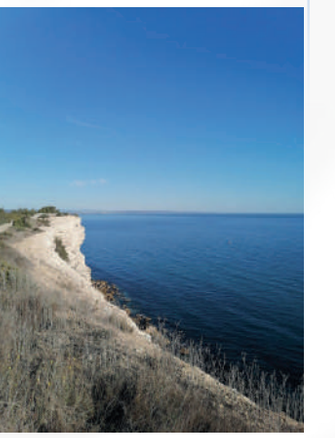
Come and have a look !





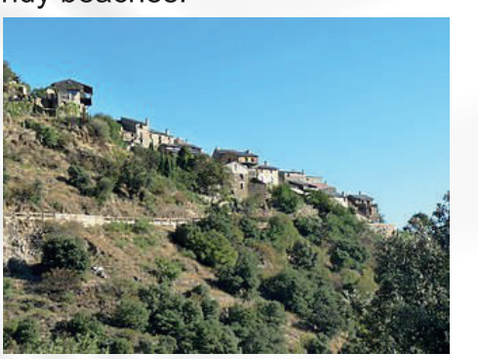

L'*Étang de Leucate* is worldy known for it wind and sea activities. You should be able to easily find some places for trying, renting & enjoying !

Falaises de Leucate



A former island, now a peninsula, set between sea, pond, plateau and cliff - that's the setting! Leucate and its authentic, contrasting nature has everything to offer! Leucate is part of the Parc Naturel Régional de la Narbonnaise, as well as the Parc Naturel Marin du Golfe du Lion for its maritime section.

Dazzling limestone cliffs dominate iridescent lagoons brightened by pink flamingos and fine sandy beaches.



Canaveilles

This small town on the orad for Canigou Mountain, is hosting one of the magnificent natural hot spring of the area (that contains a llot). Seek for hot or ask staff for precise llocation.

Weather Forcast

24 °C and a lot of Sun

Advertisement and News :

Looking for a DJ tonight!
Open Bar for the DJ !

JEOL is a TEM Manufacturer settled 75 years ago in Japan. It is supporting QEM since 20 years, a long part of its life already, our whole life, simply THANKS !

And Thanks to Guillaume who is managing that from 3 edition now, to Régis who is one of the few who attended all QEM editions, to Christophe who is always taking care of the installation of the machine.... and to the whole JEOL crew !

!! BIG UP JEOL !!