

Tonomura FIRST International Workshop on “Challenges to New Developments in Electron Microscopy”

Workshop Coordinator’s Report

During these past three days many of the distinguished experts who participated in this workshop have enjoyed a rather unique experience made possible by at least six specific factors :-

1. With the leadership of Akira Tonomura in Japan and his early fellow researcher Hannes Lichte in Germany, electron holography has maintained a rather special status within the more general field of electron microscopy. It is exceptionally demanding of the very best and innovative instrumentation and has continuously been simultaneously at the forefront of the push towards higher spatial resolution, in the exploration of basic principles of physics and in several useful applications particularly in the imaging of electric and magnetic field distributions. However the recent and on-going revolution in electron optics over the successful correction of aberrations and other developments with new detectors and electron tomography and has certainly changed the scenery making very timely a reappraisal of the position and future role of electron holography.
2. Tonomura has recently put forward and received substantial funding for a very ambitious new project in high voltage electron tomography but few details of this have been generally available. This is in marked contrast to the depressingly familiar situation in many countries where a scientist, however distinguished and however bold his ideas, will not receive support in the absence of a detailed almost month by month forecast of the path that will be followed and the timetable of the specific results that will be obtained. The workshop thus provided a valuable forum for at least an outline presentation of Tonomura’s intentions and a chance to comment on them.
3. Amongst the workshop participants there was a stimulating mix of holography enthusiasts and sceptics in which latter category the workshop coordinator initially found himself to lie. By forcefully voicing these concerns in an early session, he and others were gratifyingly successful in goading Professor Lichte and the other holography experts to spell out more

explicitly the continuing importance of electron holography as well as in persuading Dr Tonomura to amplify the rather bland initial account of his project.

4. The new high voltage project will clearly present a formidable challenge in many aspects of instrumentation and addressing this will surely have a wider beneficial spin-off to the rest of electron microscopy. It was also convincingly argued that at least in comparison with high resolution transmission electron microscopy, electron holography retains a much stronger tradition for fully quantitative interpretation of the results. Finally and most notably perhaps in the context of the electron-photon interaction, including pump-probe stroboscopic operation for dynamic studies, there are on-going opportunities for electron holography to explore issues of basic physics.
5. The workshop also covered an impressive range of other recent developments which are described in the summary reports prepared by session coordinators. Particularly reassuring perhaps for many of the foreign visitors was the discovery that via the CREST programme, the Japanese electron microscopy community is also actively pursuing the increasingly attractive course of moving to *lower* operating voltages.
6. Finally and far from least, under the guidance of Dr Ono, the workshop arrangements greatly encouraged open and fruitful discussion. There were few signs of the depressingly familiar conferences where delegates use all the available time to present their results whilst their colleagues in the audience are mainly engaged with their laptops dealing with email and preparing their own presentations. Not only was there ample time for discussion included in the programme but everyone was kept on their toes by unexpected changes in their assignment or even by the laying of ambushes ingeniously constructed to force thinking outside the box.

On behalf of all the participants I warmly thank Dr Tonomura, the workshop organizers and the sponsors for making possible this stimulating and educational experience.

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