Scientific Report on the short visit within framework of the ESF activity entitled 'Arrays of Quantum Dots and Josephson Junctions'.

The purpose of this visit was the exchange of practical information on the operation of traps for free electrons, localized on surface of liquid helium. The aim is to form a quantum dot by trapping a single electron in pre-fabricated trap covered with a film of liquid helium. The further aim is to use such localized electron as a qubit. The helium film provides a neutral layer, which supports the electron far away from the substrate, reducing effect of disturbances originated there.

In the beginning of the visit the experiment was already cold. However, a problem with the experimental line fill-up capillary required warm-up of the cryostat. This was done extremely quickly, due to experience and hard work of my hosts. After that the experiment continued. Rather soon we identified a flaw in the sample design, which made it quite difficult to control amount of helium on the sample with sufficient precision. We continued the experiment anyway, to use the available cryostat time in an attempt to trap the electron without the modifications to the samples. We used precise helium metering to achieve the goal. The procedure succeeded after my departure. On the whole the visit was quite useful – a problem with the sample has been identified and corrective measures developed. In our experiment at Saclay we are trying ideas, suggested by our host, Sergey Kubatkin, during the visit. I hope that the cooperation with the Chalmers university, within framework of present ESF Action and as well as through other European and national instruments.