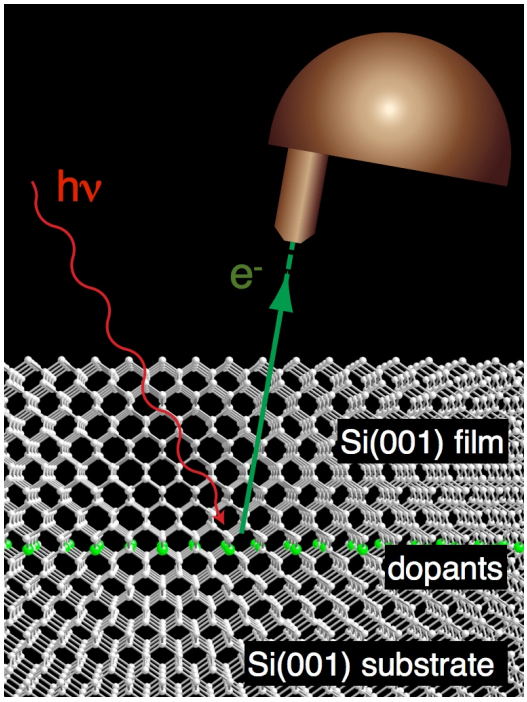
Quantum wells for silicon based quantum computers

We have demonstrated nanoscale control of dopant positioning in silicon. This allows us to make nanoscale structure (such as sheets, wires and dots) which are metallic, in a host material which is semiconducting. Such structures act as model “particle in a box” systems which show quantum electronic properties. Furthermore, the quantum states can be controlled by the dopant density and the size and shape of the doped region.

In this project, we will make quantum wells in silicon using this method. We will characterise them using XPS, LEED and angle resolved UPS. The growth and basic characterisation will be done in our home lab at NTNU, and the advanced characterisation will be done at synchrotron facilities in Denmark, Sweden and possibly other locations.



Photoemission spectroscopy of a buried dopant profile in silicon - giving information on the quantum confined electronic states.

The student will be involved in the sample preparation, characterisation (at home and at the synchrotron), and data analysis. Our group is experienced with all of these steps and assist the student with the project. Finally, we strongly encourage a fun and productive atmosphere in the group, which the student should contribute to.

A basic understanding of solid state physics, and an interest/aptitude for experimental techniques is required.

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