Accessing the bandstructure of buried dopant structures and the relevance to quantum computation applications

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Angle Resolved Photoemission Spectroscopy (ARPES) is known as a powerful tool for measuring the electronic structure of surface-localised phenomena. However, the bandstructure of sub-surface layers, which garner increasing interest for real devices, is more difficult to access due to the short mean-free path of the emitted photoelectrons.

Here I present recent ARPES measurements of surface and sub-surface layers. In the latter case, a resonant enhancement facilitates the measurements, and this mechanism will be described.

Finally, the relevance of such buried-layer systems in the current drive to realise a quantum computer will be described.

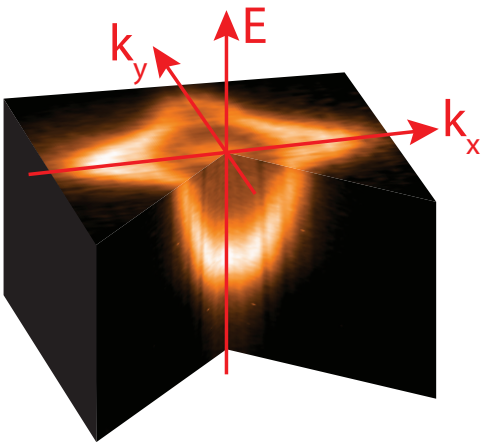

Figure: ARPES measurement of a 2D electron gas buried >1 nm beneath the surface of Si(001), formed due to an atomically thin layer of dopants