GRAPHENE: SETTING NEW STANDARDS

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We shall report recent progress in engineering and ultra-precise quantum Hall resistance measurements of epitaxial graphene devices on SiC.
Any new material to be practically employed as an embodiment of a quantum resistance standard needs to satisfy stringent requirements not only with respect to quantisation accuracy, but also its robustness over a range of temperature, magnetic field and measurement current.
Quantisation of the Hall resistance in epitaxial graphene on silicon carbide accurate to 3 parts in a billion was previously demonstrated [1]. Now we shall show that encapsulated and photochemically gated epitaxial graphene devices [2] demonstrate extraordinary robustness of the $h/2e^2$ plateaux. We attribute it to the pinning of ν=2 filling factor provided by charge transfer between the SiC surface and graphene layer [3]. This robustness makes epitaxial graphene ideally suited for quantum resistance metrology and facilitates even more precise measurements that ever before.
We believe that the new results on graphene reported at this conference will help expand the horizon of quantum metrology and advance the understanding of both graphene and QHE.

References

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