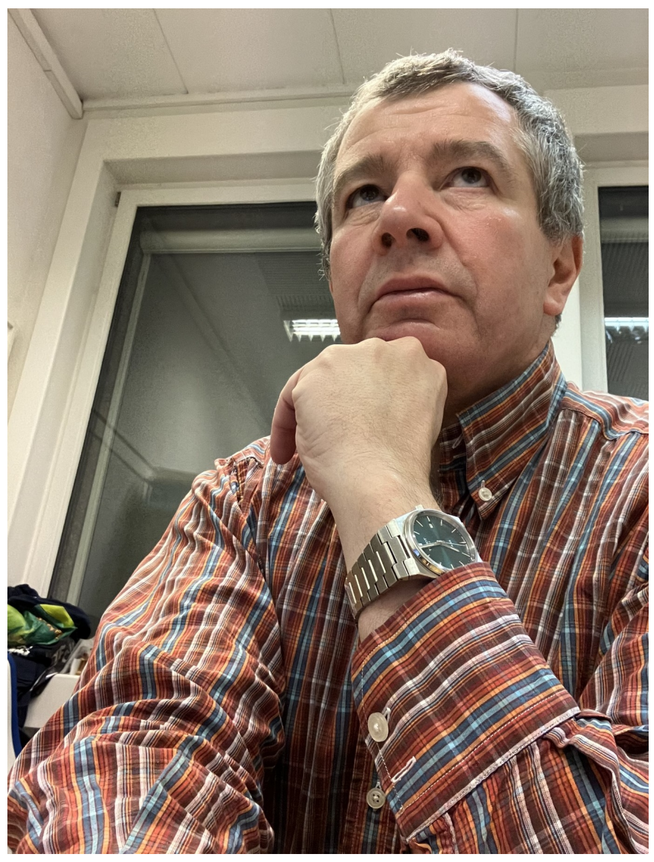
physikalisches Kolloquium



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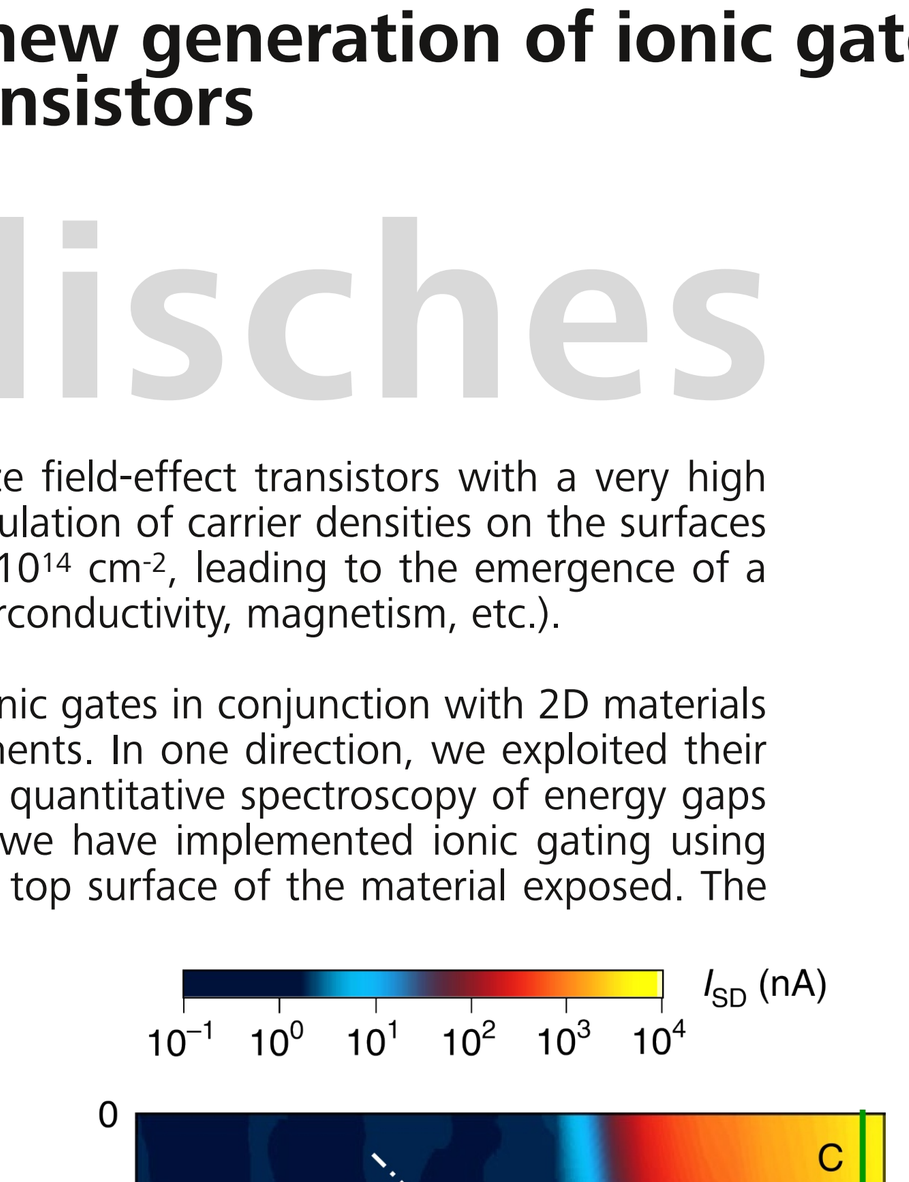
A new generation of ionic gated transistors

Mo. 1.7.24
16:00 Uhr
Ort: H34

Ionic gating is used to realize field-effect transistors with a very high capacitance, enabling accumulation of carrier densities on the surfaces of different semiconductors in excess of 10^{14} cm^{-2}, leading to the emergence of a cornucopia of new phenomena (e.g. superconductivity, magnetism, etc.).

Over the last years, we have developed ionic gates in conjunction with 2D materials to broaden the scope of possible experiments. In one direction, we exploited their huge geometrical capacitance to perform quantitative spectroscopy of energy gaps in semiconductors. In another direction, we have implemented ionic gating using solid electrolytic substrates that leave the top surface of the material exposed. The technique enables the realization of double ionic gated devices, which allow the accumulated electron density and the perpendicular electric field to be controlled independently.

With these devices we can apply perpendicular electric fields larger than 3 V/nm onto bilayer WSe_2 – a semiconductor with a 1.65 eV band gap – enough to fully quench the bandgap, and to transform the bilayer from a semiconductor into a semimetal. I will conclude by briefly outlining the direction for future work.



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