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Hörsaal für Physik

” Optoelectronics in two-dimensional atomic crystals”

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Two-dimensional (2D) atomic crystals are currently receiving a lot of attention for applications in electronics and opto-electronics. In this talk I will review our research activities on electrically driven light emission, photovoltaic energy conversion and photodetection in 2D transition metal dichalcogenides (TMDs) and graphene. In particular, I will present studies of 2D p-n junctions, formed by electrostatic doping using a pair of split gate electrodes, atomically-thin van der Waals p-n heterojunctions and photoconductivity studies of TMD-based field-effect transistors. In the second part of my talk, I will discuss optoelectronic properties of graphene and possible applications in integrated photonics. We envision that the efficient photon conversion, combined with the advantages of 2D crystals, such as flexibility, high mechanical stability and low costs of production, could lead to new optoelectronic technologies.