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Defects physics in emergent 2D material SnSe with binary black phosphorus lattice

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时间：5月31日（星期四）15:00—16:30
地点：北京大学物理大楼中212教室

•**摘要：** In this talk, we will show the pronounced effects of various defects in determining the physical properties of the emergent 2D material SnSe with binary black phosphorus lattice. SnSe has been reported with record-breaking thermoelectric conversion efficiency very recently. However, to date a comprehensive understanding of the electronic structure and most critically, the self hole-doping mechanism in SnSe is still absent. We for the first time fully unfold the highly anisotropic electronic structure of SnSe by angle-resolved photoemission spectroscopy, which reveals a unique pudding-mould-shaped valence band with quasi-linear energy dispersion. We prove that p-type doping in SnSe is extrinsically controlled by local phase segregation of SnSe2 microdomains via interfacial charge transferring. The multivalley nature of the pudding-mould band is manifested in quantum transport by crystallographic axis-dependent weak localisation and exotic non-saturating negative magnetoresistance. Strikingly, quantum oscillations also reveal 3D Fermi surface with unusual interlayer coupling strength in p-SnSe, in which individual monolayers are interwoven by peculiar point dislocation defects. The fingerprinting pudding-mould multivalley band structure is well reserved in bismuth-doped n-type SnSe, which suggest the feasibility of an all-SnSe functioning device.

•**报告人简介：郑毅** 浙江大学特聘百人研究员 / 2014年第十一批青年千人。2008年博士毕业于新加坡国立大学物理系，研究方向为金属—有机半导体界面的弹道电子发射谱（BEEM）研究。博士后期间，和Prof. Barbaros Ozyilmaz合作，在石墨烯-铁电异质结及其电子器件原型方向做了一些原创性的工作，其研究在非挥发性存储器件，透明电极，触摸屏以及低电压晶体管等方面均有潜在的应用前景[1-4]。其间，在二维晶体及石墨烯-铁电电子器件研究领域发表高质量论文20多篇，论文他引数超过2500次。在石墨烯-铁电电子器件领域拥有发明专利16项，其中3项为国际专利。相关研究被科技媒体广泛报道，并且多次在国际会议上做邀请报告。2015年4月加入浙江大学物理系，研究方向为新型二维材料的物性与新型电子器件，以及强自旋—轨道耦合的拓扑量子材料 。

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