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【624】Nature of 2D XY antiferromagnetism in van der Waals monolayer

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Studies of ultrathin antiferromagnets are highly challenging due to difficulties in probing atomically thin samples with no net magnetization. Here, we present a systematic investigation of magneto-transport in 2D layered van der Waals XY-type antiferromagnet. We observe spin-flop transition and anisotropic magnetoresistance down to bilayer thickness, which are clear indications of long-range magnetic order with weak in-plane easy-axis magnetic anisotropy. We find that monolayer samples undergo a phase transition from the paramagnetic phase but show no magnetoresistance or in-plane magnetic-field-driven phase transitions unlike thicker counterparts. We interpret such behavior as the absence of the long-range magnetic order, which points towards the Berezinskii-Kosterlitz-Thouless transition in monolayer 2D XY antiferromagnet.

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