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**Probing the Interlayer Coupling of Twisted Bilayer $MoS_2$ Using Photoluminescence Spectroscopy**[1] SHENGXI HUANG, XI LING, Massachusetts Inst of Tech-MIT, LIANGBO LIANG, HUMBERTO TERRONES, VINCENT MEUNIER, Rensselaer Polytechnic Institute, JING KONG, MILDRED DRESSELHAUS, Massachusetts Inst of Tech-MIT — Two-dimensional molybdenum disulfide ($MoS_2$) is a promising material for optoelectronic devices due to its strong and stable photoluminescence emissions. In this work, the photoluminescence spectra of twisted bilayer $MoS_2$ are investigated, revealing a tunability of the interlayer coupling of bilayer $MoS_2$. For the twisted angle 0° or 60°, the photoluminescence from the trion and exciton of bilayer $MoS_2$ shows the highest intensity ratio, and the trion binding energy reaches its maximum value. For the twisted angle 30° or 90°, the situation is the opposite. These experimental observations are mainly attributed to the change of the interlayer coupling with the twisted angles. The first-principles density functional theory analyses further confirm the change of the interlayer coupling with the twisted angle, and these analyses interpret and support our experimental results.

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