Unusual Photoluminescence in Ultrathin MoS$_2$ LIANG SUN, Phys. Dept., UC Berkeley, ANDREA SPLENDIANI, Phys. Dept., UC Berkeley, Scuola Galileiana di Studi Superiori di Padova, YUANBO ZHANG, Phys. Dept., UC Berkeley, TIANGSHU LI, Chem. Dept., UC Davis, JONGHWAN KIM, CHI-YUNG CHIM, Phys. Dept., UC Berkeley, GIULIA GALLI, Chem. Dept., UC Davis, FENG WANG, Phys. Dept., UC Berkeley, Materials Science Division, LBNL — In this talk we will report optical studies on ultrathin MoS$_2$ layers through optical reflection, Raman scattering, and photoluminescence spectroscopy. Bulk MoS$_2$, a layered transition metal dichalcogenide, is an indirect bandgap semiconductor with negligible photoluminescence. Surprisingly, when the thickness of MoS$_2$ is reduced to a few unit cell thickness, a strong photoluminescence emerges. Further this photoluminescence increases with reduced MoS$_2$ layer thickness, although available materials amount is reduced. We will discuss possible mechanism that can give rise to this surprising photoluminescence behavior in MoS$_2$. 

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