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Excited Biexcitons in Transition Metal Dichalcogenides DAVID ZHANG, Vanderbilt University — Recently, experimental measurements and theoretical modeling have been in a disagreement concerning the binding energy of biexctions in transition metal dichalcogenides.[1] While theory predicts a smaller binding energy (∼20 meV) that is, as logically expected, lower than that of the trion, experiment finds values much larger (∼60 meV), actually exceeding those for the trion. In this work, we show that there exists an excited state of the biexciton which yields binding energies that match well with experimental findings and thus gives a plausible explanation for the apparent discrepancy. Furthermore, it is shown that the electron-hole correlation functions of the ground state biexciton and trion are remarkably similar, possibly explaining why a distinct signature of ground state biexcitons would not have been noticed experimentally.[2]

[1]Y. You, X.-X. Zhang, T. C. Berkelbach, M. S. Hybertsen, D. R. Reichman, T. F. Heinz, **Nat. Phys.** 11 477–481 (2015).
[2]D. K. Zhang, D. W. Kidd, K. Varga, **Nano. Lett.** Article ASAP (2015).

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