Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Interface exciton at lateral heterojunction of monolayer semiconductors[1] KA WAI LAU, The Univ of Hong Kong, ZHIRUI GONG, Shenzhen University, HONGYI YU, WANG YAO, The Univ of Hong Kong — Heterostructures based on 2D transition metal dichalcogenides (TMDs) have attracted extensive research interest recently due to the appealing physical properties of TMDs and new geometries for forming heterostructures. One such heterostructure is the lateral heterojunctions seamlessly formed in a monolayer crystal between two different types of TMDs, e.g. WSe2 and MoSe2. Such heterojunction exhibits a type II band alignment, with electrons (holes) having lower energy on the MoSe2 (WSe2) region. Here we present the study of an interface exciton at the 1D lateral junction of monolayer TMDs. With the distance dependent screening, we find that the interface exciton can have strong binding even though the electron-hole separation is much larger compare to the 2D excitons in TMDs. Neutral excitons are studied using two different approaches: the solution based on a real-space tight binding model, and the perturbation expansion in a hydrogen-like basis in an effective mass model. We have also used the latter method to study charged excitons at a MoSe2-WSe2-MoSe2 nanoscale junction.

[1]The work is supported by the Research Grant Council of Hong Kong (HKU705513P, HKU9/CRF/13G), the Croucher Foundation, and the HKU OYRA.

Ka Wai Lau
The Univ of Hong Kong

Date submitted: 04 Nov 2015 Electronic form version 1.4