

MAR15-2014-000571

Abstract for an Invited Paper  
for the MAR15 Meeting of  
the American Physical Society

**Quantum spin Hall effect in InAs/GaSb bilayers subject to exciton condensation and magnetic field**

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Motivated by the recent experiments we study the phase diagram of the bilayer InAs/GaSb quantum wells in the presence of electron-electron interactions. The interactions lead to formation of thermodynamically stable exciton condensate. We show that in the presence of condensate but without external magnetic field the bilayer can be in three distinct insulating phases: trivial, topological, and spontaneously breaking time-reversal symmetry ones. In the applied magnetic field the bilayer remains gapped and undergoes a series of phase transitions changing from quantum spin Hall-like state to trivial insulator. We suggest transport and spectroscopic measurements for future experiments to substantiate our picture.