

DEPARTMENT OF PHYSICS

Condensed Matter Seminar

Thursday, February 28, 2019

11:30 A.M.

**1080 Physics Research Building
Smith Seminar Room**

Jiwoong Park

University of Chicago



“Atomically Thin Integrated Circuits”

Manufacturing of paper, which started two thousand years ago, simplified all aspects of information technology: generation, processing, communication, delivery and storage. Similarly powerful changes were in the past century through the development of integrated circuits based on silicon. In this talk, I will discuss how we can realize these integrated circuits thin and free-standing, just like paper, using two-dimensional materials.

In order to build these atomically thin circuits, we developed a series of approaches that are scalable and precise. They include wafer-scale synthesis of three atom thick semiconductors and heterojunctions (Nature, 2015; Science 2018), a wafer-scale patterning method for one-atom-thick lateral heterojunctions (Nature, 2012), and atomically thin films and devices that are vertically stacked to form more complicated circuitry (Nature, 2017). Once realized, these atomically thin circuits will be foldable and actuatable, which will further increase the device density and functionality. The fact that these circuits could be realized and function without any substrate will allow them to be used tether-free (or wirelessly) in environments not previously accessible to conventional circuits, such as water, air or in space.



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