Center for Artificial Low D Electronic Systems

2020 Fall Seminar
with CALDES, IBS & SRC, POSTECH

- ✓ **Date&Time:** December 11 (Fri), 3:00PM~
- ✓ **Venue:** Online (Zoom)
- ✓ **Speaker & Title**

1) 3:00PM~ Prof. Young-Woo Son (KIAS)

Theory of ground and excited states in layered magnetic materials

2) 4:10PM~ Prof. Seyoung Kim (POSTECH)

Deep Learning Acceleration with Resistive Crosspoint Array

Organized by Prof. Jun Sung Kim (js.kim@postech.ac.kr, 054-279-2098)
Dr. Jewook Park (jewookpark@ibs.re.kr, 054-279-9893)

- **3:00PM~**

Theory of ground and excited states in layered magnetic materials

Young-Woo Son
Korea Institute for Advanced Study, Seoul, Korea

In this talk, I will present my recent two works related with layered magnetic materials. First, to compute accurate electronic structures of large scale low dimensional systems having both p and d orbitals and to compare their total energies appropriately, we have developed a new first- principles method exploiting self-consistent evaluations of on-site and inter-site Hubbard interactions simultaneously [1]. It turns out that the new method captures a local Coulomb repulsion, covalent hybridization and their coexistence very well. With this, we investigate the ground states of various chromium trihalides compounds [2]. Second, within the configuration interaction theory, we compute resonant inelastic scattering spectroscopic signals for a layered antiferromagnetic NiPS3 and obtain excellent agreement with an experiment [3]. Based on this, we explore a possible ordering of excitons with a background magnetism that may explain the observed anomalous optical absorptions and photoluminescence [3].

[1] S.-H. Lee and Y.-W. Son, arXiv:1911.05967.
[2] S.-H. Lee and Y.-W. Son, in preparation.
[3] S. Kang, K. Kim, B. H. Kim et al., Nature 583, 785 (2020)

- **4:10PM~**

Deep Learning Acceleration with Resistive Crosspoint Array

Seyoung Kim
Department of Physics, POSTECH

Cross-point arrays of novel synaptic memory devices have been studied as an alternative computing architecture to significantly accelerate neural network training for deep learning applications. While rapid progress has been made to develop an ideal synapse device, non-ideal switching characteristics of previously studied devices prevent one from achieving software-level neural network performance. In this talk, I will introduce the motivation and advantage of neuromorphic computing architectures with novel synaptic memory devices for deep learning applications, and discuss the specifications of required synaptic devices.