[QMS2020 invited talk]

Novel spectroscopic method for studying 2D correlated electron systems

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The multitude of emergent phases in the quantum Hall (QH) and superconducting (SC) regime that develop from the dominant electron-electron interactions have fascinated researchers for decades. While traditional transport measurements have played monumental roles in initially discovering many of the quantum phases, more conclusive identification of the theoretically proposed models of these states requires the development of new experimental methods because the signatures of certain wave functions are often very subtle to distinguish in transport experiments.

In this talk, I will introduce our efforts on developing novel experimental probes employing ultra-sensitive electric and magnetic field sensing of low-dimensional electron systems, mainly focusing on spectroscopic measurements of correlated electrons in the quantum Hall regime [1, 2], and discuss how further improvement of these tools, when combined with conventional transport devices, can help unravel definitive "clues" and advance our understanding of the strongly interacting phenomena and various exotic quantum phases.

References:
[1] Joonho Jang et al., Nature Physics **13**, 340 (2017)
[2] Joonho Jang et al., Science **358**, 901 (2017)