CNM WK#11: Hybrid Quantum Systems

Organizers: Xu Han (CNM), Dafei Jin (CNM), and Xufeng Zhang (CNM)

Exploring the exotic non-classical phenomena, quantum science promises revolutionary solutions for complicated tasks in computation, communication, and sensing. In the past few years, many remarkable quantum systems have been demonstrated based on a great variety of physical platforms such as spintronics, nanomechanics, superconducting circuits, and quantum optics. To fully exploit the advantages of quantum technology, it has become increasingly pressing to coherently integrate different quantum platforms and establish high-fidelity transduction among them. Such hybrid systems can link distinctively different degrees of freedom and enable distributed quantum computing and sensing as well as quantum information networks at large scales. Nevertheless, developing hybrid quantum systems is a challenging task since it requires efficient interactions between different quantum excitations with extremely low loss and low noise. To achieve this goal, expertise and efforts in multidisciplinary fields have to be combined together.

In this workshop, we aim to bring together researchers working on various hybrid quantum systems to discuss pathways towards addressing the grand challenges in quantum computing and networking. This topic is highly interdisciplinary and involves efforts from a broad community. The diverse background of the speakers and audience will enable in-depth discussions and novel opportunities for QIS research. It will also help create synergies between Argonne/CNM and the worldwide scientific community. With CNM's efforts towards developing a high standard user facility to support the increasing need for quantum infrastructure, this workshop will be a great opportunity for outreach to potential users and obtaining valuable feedback.