

Spin-photon interactions in solids for quantum information research

Sang-Yun Lee

Department of Physics and Photon Science, GIST, Gwangju 61005, Korea

Spin-active color centers in wide bandgap semiconductors are key systems for quantum technology, providing single photon sources, quantum memories, processors and registers in the same physical system. Well-isolated color centers mimic atom-like behavior, with excellent quantum optical behavior and outstanding spin properties. When efficient and high-fidelity transfer between photonic and spin states is feasible, color centers can serve as a spin-to-photon interface which is a building block for various quantum applications. In this presentation, I will introduce the basic principles about how one can use such color centers as quantum bits and quantum interfaces, and how they can be used for well-known applications such as quantum computing, quantum-repeaters, and quantum sensing. Also, a brief summary about the recent progress on studying spin-photon interactions in emerging materials for quantum applications, e.g. silicon carbide, will be given as well.