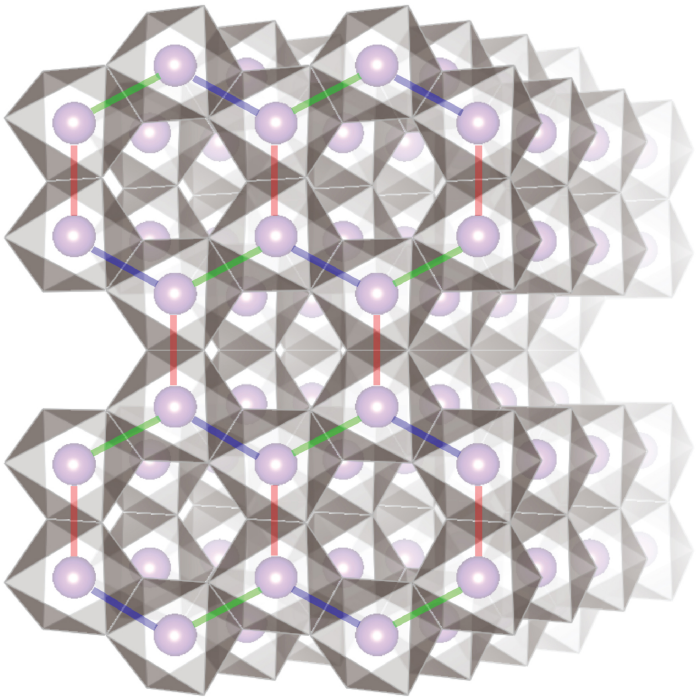
Young-June Kim

Quantum Spin Liquid: An Experimental Perspective



Young-June Kim is a Professor of Physics at the University of Toronto. He received his Ph. D. degree from Harvard University and was a Goldhaber Fellow at Brookhaven National Laboratory before joining the University of Toronto in 2004. His research focuses on synthesizing novel quantum materials and studying their physical properties using advanced x-ray and neutron scattering techniques. In particular, he played a major role in developing resonant inelastic x-ray scattering (RIXS) and its application to study a wide range of materials including cuprates and iridates at the Advanced Photon Source. He is also the Director of the HEATER Program, a multi-institutional research and training program in thermoelectric materials. He is a Fellow of the American Physical Society, and author/co-author of over 110 publications.

Matter exists in three states, or so we were taught. But things are not that simple when quantum mechanics are in play. For example, helium does not become solid even at temperatures close to absolute zero. Instead, it remains in a liquid state due to strong quantum effects. Such quantum fluids can also be found in a gas of cold atoms or neutron stars, but they are very rare in nature. However, in recent years, there have been extensive efforts from condensed matter physicists to find another example of quantum fluid called quantum spin liquid in ordinary-looking magnets. Such a spin system is described by a macroscopic quantum state in which billions and billions of spins are all highly entangled, a very useful property for building a quantum computer. In this talk, I will give a brief overview of quantum spin liquid research and present recent advances in the search for a quantum spin liquid phase in materials with strong spin-orbit coupling.

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