Finite-range interactions and cluster Bose metals

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Quantum phases of matter are usually characterised by broken symmetries. Identifying physical mechanisms and microscopic Hamiltonians that elude this paradigm is one of the key challenges in many-body physics. In this talk we discuss a robust mechanisms for the realization of a Bose metal, an example of phase breaking no symmetries, for particles with simple two-body finite-range interactions and discuss how the latter may be engineered with Rydberg gases. This may open the way to the observation of spin-liquid type behaviour in artificial quantum materials.