

# Physics Colloquium

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Monday, February 24, 2020 / Pupin Hall Theory Center, 8<sup>th</sup> Floor / 12:30 PM

Lunch will be available for attendees

## "Entangling Many Atoms: Spin Squeezing Clocks and One Hundred Atomic Qubits"

Vladan Vuletić - MIT



Atomic clocks, surpassing a mind-boggling precision of one part in  $10^{18}$ , are the most accurate instruments ever made by mankind. The performance of the best clocks and other quantum sensors is limited by the quantum projection noise in the final readout measurement (standard quantum limit), but entanglement can be used to overcome this limit. A particularly simple form of entanglement is spin squeezing, where the quantum noise for the variable of interest, e.g., the phase of an atomic clock, is redistributed into another variable. I will explain how spin squeezing in an optical clock can be generated via light-atom interaction. I will also discuss the deterministic preparation of a large array of individual atoms with controlled interactions for quantum simulation, and potentially, quantum computing.