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## Quantum Metasurfaces for Photonic Many-Body Entanglement

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### Abstract

Entanglement generation is a crucial ingredient for the realization of future quantum technologies, and requires high fidelity quantum gates between atomic and photonic qubits. I will describe the novel concept of quantum metasurfaces which allows for the generation of large-scale atom-photon entanglement, hence constituting a new platform for manipulating both classical and quantum properties of light. These quantum metasurfaces are realized by preparing and manipulating entangled states of atomic arrays which scatter or emit light. I will show that this platform allows for multi-qubit gates between atomic and photonic qubits, and for the generation of photonic GHZ states and highly entangled states suitable for quantum information processing. I will discuss potential experimental realizations and possible new applications. Finally, I will briefly describe an experimental effort to realize large-scale entanglement with atom-like defects in nanophotonic cavities.

\*Refreshment at 12:15

\*כיבוד ב-12:15

ההרצאה תתקיים ביום רביעי, ה-20.11.19 בשעה 12:30\*  
באודיטוריום המכון למצב מוצק, קומת כניסה

**The lecture will take place on Wednesday, 20.11.19 at 12:30\*  
at the Solid State Institute auditorium, entrance floor**

Host: Distinguished Professor Moti Segev