



## Quantum phases of Rydberg atoms on Shastry - Sutherland lattice



**Dr. Vahagn Mkhitarian**

*Senior Research Associate*

**The Elmore Family School of Electrical and Computer Engineering**

**Date: Wednesday, October 2nd @ 2.00 pm in BRK 1001**

*Coffee and snacks served before seminar*

**Zoom Link: <https://purdue-edu.zoom.us/j/95283400606>**

### **Abstract:**

We explore the phase diagram of Rydberg atoms in a frustrated Shastry-Sutherland lattice. Using the density matrix renormalization group, we map out a rich phase diagram in a three-dimensional parameter space that is naturally realizable in current Rydberg atom platforms. In particular, besides a plethora of classical phases, we show the presence of phases stabilized exclusively by quantum fluctuations. We employ order parameter symmetry analysis to show the presence of novel quantum critical points. Lastly, we tested all the theoretical predictions experimentally using QuEra's Rydberg atom array quantum simulators.

### **Bio:**

My academic journey began with a bachelor's degree in electrical engineering (2006-2010) at Yerevan State University, Yerevan, Armenia, followed by a Master's degree in Plasmonics and Photonics (2010-2012) at the same institution. Upon completing my Master's degree, I pursued a PhD at ICFO – The Institute of Photonic Sciences in Barcelona, Spain (2013-2017) under the supervision of Valerio Pruneri and Javier García de Abajo. I received my PhD from UPC - Universitat Politècnica de Catalunya, to which ICFO is affiliated. My research focused on periodic nanophotonic structures and devices based on multilayer thin films of phase changed materials, encompassing both experimental and theoretical work.

After completing my PhD, I continued as a Postdoctoral Researcher in the Nanophotonics Theory group at ICFO (2017-2021) under the supervision of Prof. Javier García de Abajo, where I worked on electron energy loss spectroscopy and plasmons in atomically thin metals.

In 2021, I moved to the United States for my second postdoctoral position at Purdue University, joining the group of Prof. Vladimir Shalaev where I am currently working as a Senior Research Scientist. In this role, I contribute to research initiatives in the fields of light-matter interaction and condensed matter physics, combining both experimental and theoretical approaches. Recently, I have developed a strong interest in topological quantum materials and quantum simulations using Rydberg atom array-based analog quantum simulators.