

# Spring 2025 Physics Colloquium

Friday, January 31<sup>st</sup>

3:00 PM

PAS 201 or Zoom

(<https://arizona.zoom.us/j/81283840289>)

## Ronen Weiss

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### Short-range correlations in nuclear systems

**Abstract:** An accurate description of short-range physics is a significant challenge in the study of strongly interacting quantum many-body systems. In nuclear physics, large short-range correlations (SRCs) hinder the use of different numerical methods for obtaining a complete picture of nuclear systems and supporting beyond-Standard-Model searches. Nuclear SRCs have been studied extensively in the last decades using both large momentum transfer quasi-elastic reactions and ab-initio calculations. In this talk I will present an asymptotic theory of SRCs in quantum many-body systems, providing a systematic framework for analyzing experimental data and numerical calculations and for utilizing our understanding of SRC properties to make progress in the description of nuclei. I will show how it captures quantitatively the impact of correlated pairs on various nuclear quantities, and how it reformed the way experiments are analyzed and designed. I will also discuss first results regarding the properties of triplets and the calculation of matrix elements for neutrinoless double beta decay experiments. I will highlight connections to other many-body systems and the universal nature of SRCs.

*\* Refreshments served in PAS 218 at 2:30 PM – 3:00 PM \**

