# QuanTalks

## Title: Quantum Algorithm for High Energy Physics Simulations

Speaker: **Dr. Benjamin Nachman**, Staff Scientist, Group Leader, Machine Learning for Fundamental Physics, Physics Division, Berkeley Lab, California, USA. bpnachman@lbl.gov

**Abstract:** Simulating quantum field theories is a flagship application of quantum computing. However, calculating experimentally relevant high energy scattering amplitudes entirely on a quantum computer is prohibitively difficult. It is well known that such high energy scattering processes can be factored into pieces that can be computed using well established perturbative techniques, and pieces which currently have to be simulated using classical Markov chain algorithms. These classical Markov chain simulation approaches work well to capture many of the salient features, but cannot capture all quantum effects. To exploit quantum resources in the most efficient way, we introduce a new paradigm for quantum algorithms in field theories. This approach uses quantum computers only for those parts of the problem which are not computable using existing techniques. I will explicitly demonstrate such algorithms for simplified quantum field theories on a quantum computer and discuss challenges and opportunities related to error mitigation.

Date & Time
**Wednesday, 28th July 2021**
**at 7:00 PM IST**
Meeting Link
**Click here to join the meeting**

**About the speaker:** Benjamin Nachman completed his Bachelors from Cornell University in 2012 and went on to pursue his Master's with Churchill Scholarship at the University of Cambridge in 2012-2013. He received his Ph.D. in Physics (Ph.D. minor in Statistics) from Stanford University in 2016. He is a Chamberlain Fellow at Berkeley Lab from 2016-2020. At present, he is a Staff Scientist at Berkeley Lab and the Group leader of Machine Learning for Fundamental Physics. He is a founding member of the Quantum Algorithms for High Energy Physics group.