

# Applications of Machine Learning to Lattice Quantum Field Theory

## Snowmass 2021 White Paper

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There is great potential to apply machine learning (ML) in the field of numerical lattice quantum field theory (LQFT), but full exploitation of that potential will require new resource allocation strategies. In this white paper, we discuss the unique requirements of ML for LQFT research and what is needed to enable exploration in the near future.

# Structure/Outline

[\* Section titles / structure preliminary]

## Introduction

- LQFT applications where ML can make an impact: faster algorithms, new ideas; emphasis on experimental relevance

## Novel Aspects of ML for LQFT Research

- Similarities of ML for LQFT and other ML applications: ease of adoption, potential for cross-cutting impact and interdisciplinary collaboration
- Differences: challenges to deploy ML
- Projected work required: exploratory research, software development

## Strategies to Enable ML for LQFT

- Access to computing: need new computing allocation policies
- Need for workforce development:
  - Interdisciplinary hiring and admissions
  - Support for computational/ML specialization in grad programs, curricula
  - Career paths: technical roles, academic jobs

## Outlook

- Great potential, LQFT needs to be positioned to take advantage
- Many people in early-career pipeline *now*, need to retain them