

subMIT

Getting physics things done at MIT

subMIT Annual Workshop Summary

2025

Matt Heine



Project Team Contributions

Workshop on Basic Computing Services in the Physics Department - subMIT

Thursday Jan 30, 2025, 9:00 AM → 5:00 PM America/New_York

• 26-414 (Kolker room)

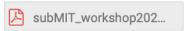
Project Team Information / Tutorial Sessions

- System Overview
- Resources & How to Access Them
- Software Management
 - Environment / Package managers (Conda)
 - Containers (Docker/Podman, Singularity/Apptainer)
- Batch Jobs

User Talks

Emulating the atomic nucleus

Speaker: Antoine Belley (Massachusetts Institute of Technology)



Symbolic Learning Nuclear Relations

related to https://arxiv.org/abs/2404.11477

Speaker: Jose Miguel Munoz Arias (Massachusetts Institute of Technology)

The needle in a haystack problem of homology-directed DNA repair

related to https://www.nature.com/articles/s41594-023-01065-w

Speaker: Henrik Pinholt (Massachusetts Institute of Technology)



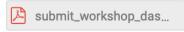
Lattice-QCD >> Software >> Hardware

Speaker: Joshua Lin (student@mit.edu)



Soft unclustered energy patterns in CMS using dask

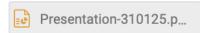
Speaker: Pietro Lugato (student@mit.edu)



Topological Chiral Superconductors beyond Fermi liquid pairing

related to https://arxiv.org/abs/2409.18067

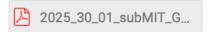
Speaker: Luke Kim (Massachusetts Institute of Technology)



A qubit that corrects itself

related to https://arxiv.org/abs/2412.03650

Speaker: Max Geier (Massachusetts Institute of Technology)



subMIT for cosmological uses

Speaker: Mikhail Ivanov (Massachusetts Institute of Technology)



Assessing a new analysis with batch jobs

related to https://arxiv.org/abs/2406.11438

Speaker: Sumita Ghosh (Massachusetts Institute of Technology)



Example Workflows & Tools

- Markov Chain Monte Carlo
- Machine Learning
- User-written code / scripts
- Singularity Containers (reproducible, portable environments)
- Dask (automatic parallelization)
- MPI (calculation steps ~1s each, 10^6 steps)
- Slurm batch jobs / job arrays
- Homogenous, simultaneous tasks vs Heterogeneous, few queued (asynchronous) tasks