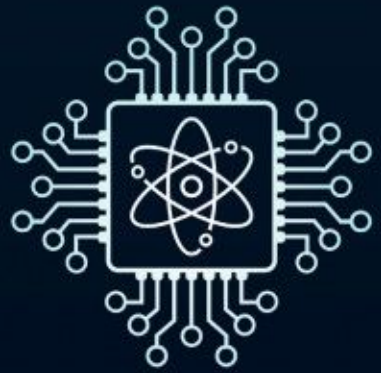


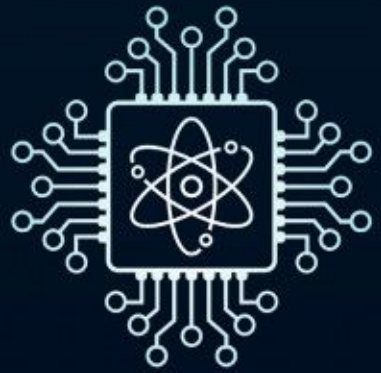
(Summary of the)
WORKSHOP ON
SOFTWARE INFRASTRUCTURE FOR ADVANCED NUCLEAR PHYSICS COMPUTING
JUNE 20-22, 2024

Presented by: Kyle Godbey

Slides:
https://docs.google.com/presentation/d/1CGaTqkN45rFlTGyEBuB26nEiI4qmwGEXh3rFWRuqE6g/edit?usp=sharing

WANDA | 2025 Workshop for Applied Nuclear Data Activities
Arlington, Virginia

Organizing Committee
Amber Boehnlein (JLab), co-chair
Peter Jacobs (LBNL), co-chair
Joe Carlson (LANL)
Ian Cloet (ANL)
Markus Diefenthaler (JLab)
Robert Edwards (JLab)
Raphael Hix (ORNL)
Thomas Papenbrock (UTK)
Brad Sawatzky (JLab)
Torre Wenaus (BNL)



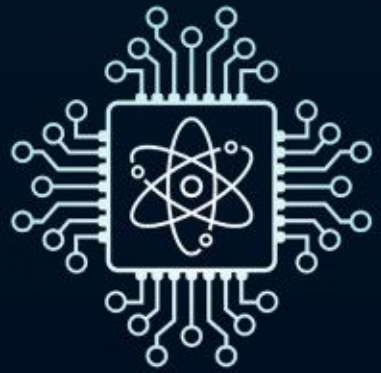
WORKSHOP ON

SOFTWARE INFRASTRUCTURE FOR ADVANCED NUCLEAR PHYSICS COMPUTING

JUNE 20-22, 2024

Workshop website:

https://www.jlab.org/conference/2024SANPC



WORKSHOP ON

SOFTWARE INFRASTRUCTURE FOR ADVANCED NUCLEAR PHYSICS COMPUTING

JUNE 20-22, 2024

Draft white paper:

https://arxiv.org/abs/2501.00905v1

Workshop Goal (from abstract)

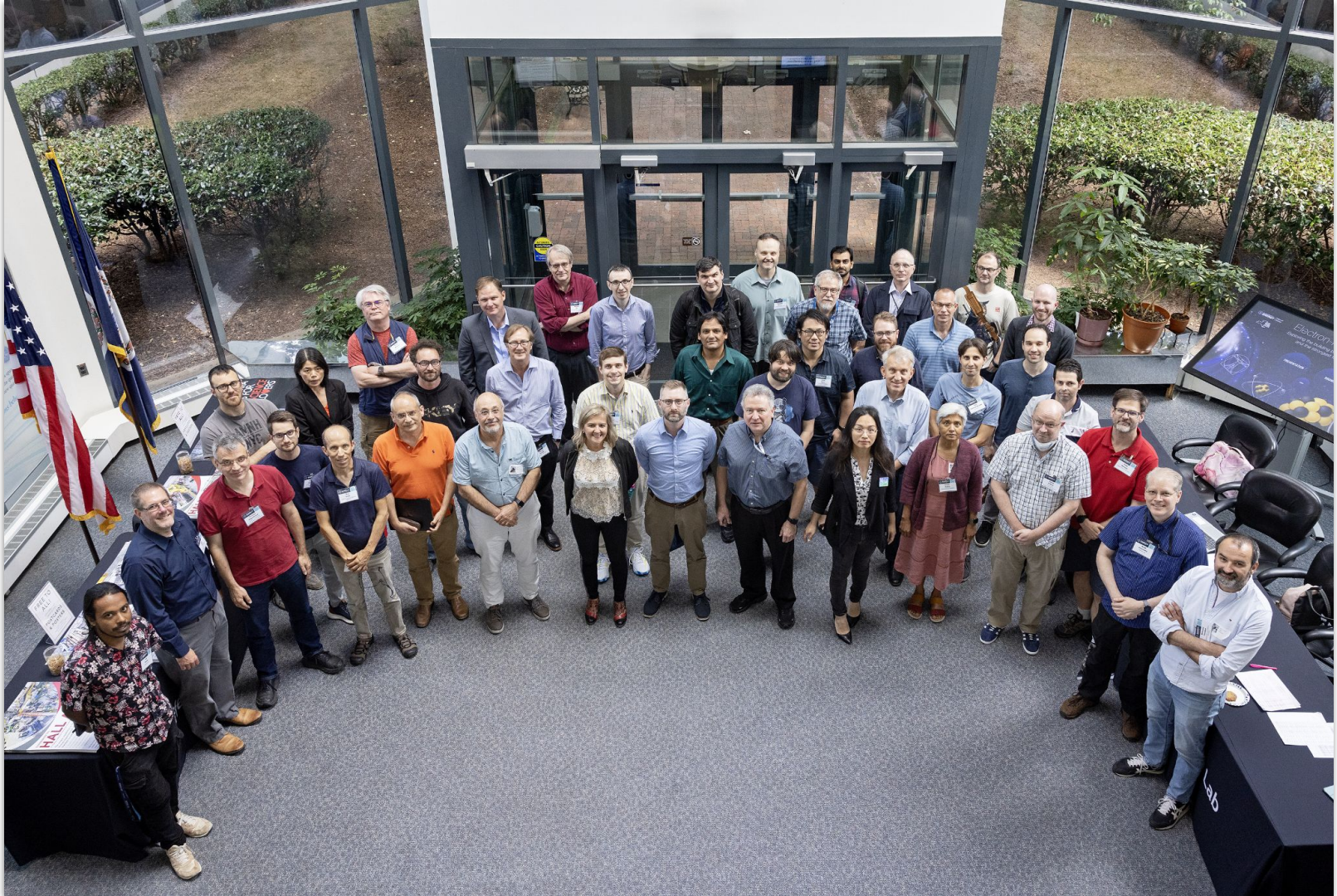
The workshop brought together members of the US Nuclear Physics community with data scientists and funding agency representatives to discuss the challenges and opportunities in advanced computing for Nuclear Physics in the coming decade.

Workshop Goal (my editorializing)

Many practitioners that work at the boundaries of nuclear theory and experiment, advanced computing, data science, software development, etc. experience similar challenges in software stewardship / data preservation, no matter their subfield

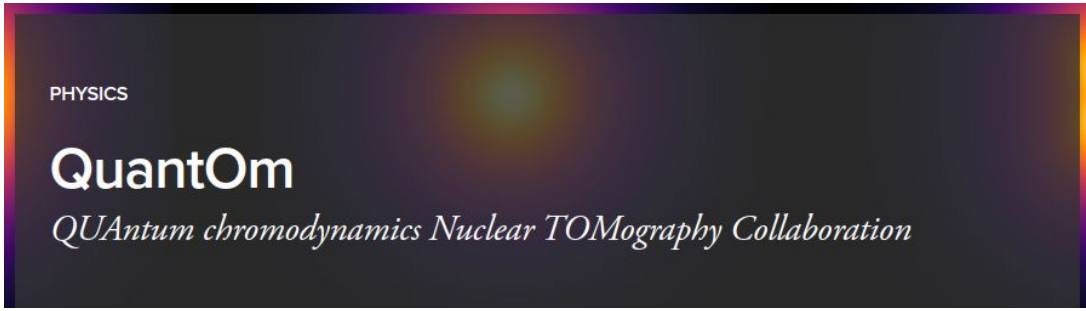
Workshop Goal (my editorializing)

This workshop attempted to distill those commonalities into a coherent set of goals and opportunities, as well as discussing best practices



JETSCAPE

BAND
Bayesian Analysis of Nuclear Dynamics



NUCLEI
Nuclear Computational Low-Energy Initiative
A SciDAC-5 Project

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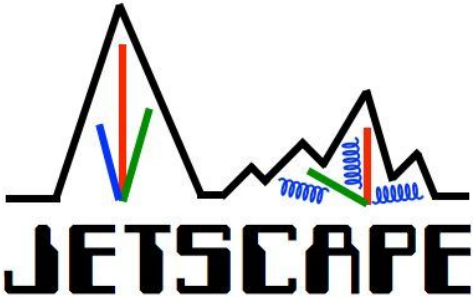
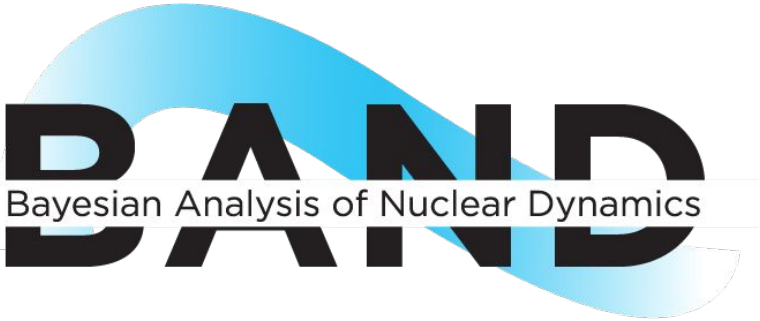
USQCD
US Lattice Quantum Chromodynamics

Exascale Nuclear Astrophysics for FRIB (ENAF)

a DOE SciDAC supported collaboration





PHYSICS

QuantOm

QUAntum chromodynamics Nuclear TOMography Collaboration

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Outcomes

Details are in the whitepaper, but a core consensus **was** distilled and cross-field opportunities to ensure stewardship of software and nuclear data were identified

Outcomes

The executive summary broke this into 5 key areas that nuclear science has benefited from immensely:

Innovation, Cross-cutting initiatives, Stewardship, Data curation and preservation, Workforce

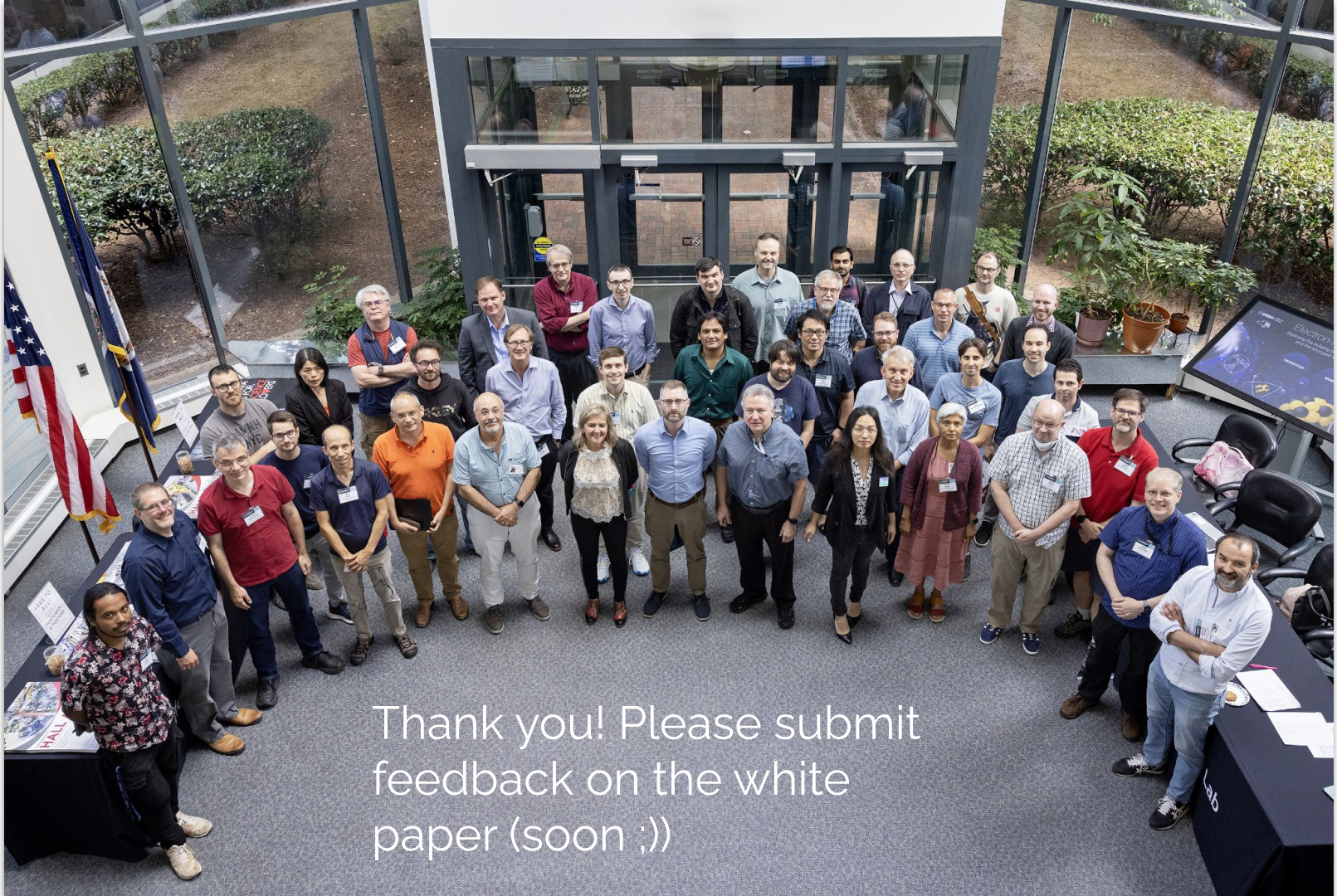
Innovation Sustainable software infrastructure for nuclear physics discovery requires innovation in hardware and algorithmic developments, and the inclusion of approaches and best practices from industry. Such innovations are often implemented in common software ecosystems that have broad application in the NP research portfolio. The importance of these ecosystems will increase as they incorporate further innovations in AI/ML and other rapidly developing technologies.

Cross-cutting initiatives The NP research enterprise has benefited greatly from multi-disciplinary efforts, which drive innovation by incorporating developments in computational science, applied mathematics, statistics, and from emerging industries. Sustainable support mechanisms are needed for such multi–disciplinary collaborations, with flexibility to support projects of widely varying scale.

Stewardship It is vital that funding instruments enable continuity and evolution of community software and software infrastructure. Sustained support in these areas leverages current investments and promotes software functionality on new HPC and other novel hardware systems. Effective stewardship should cover the full lifecycle of data and software management.

Data curation and preservation To maximize the return on current investments in NP facilities and instruments, forward-looking data analysis and preservation are essential. The development of robust mechanisms for long–term preservation of data and associated metadata, which include research software and workflows, is needed to ensure long-term accessibility and reproducibility of publicly–funded science.

Workforce Forefront NP research frequently depends upon high–performance computing and large–scale data analysis. Retention of an expert workforce in this area requires sustained funding support and viable career paths for scientific software developers working at the intersection of nuclear physics, data science, and computing. Retention mechanisms include mentorship programs, training opportunities, and the recognition of software contributions as integral to scientific research.


Thank you! Please submit feedback on the white paper (soon ;))