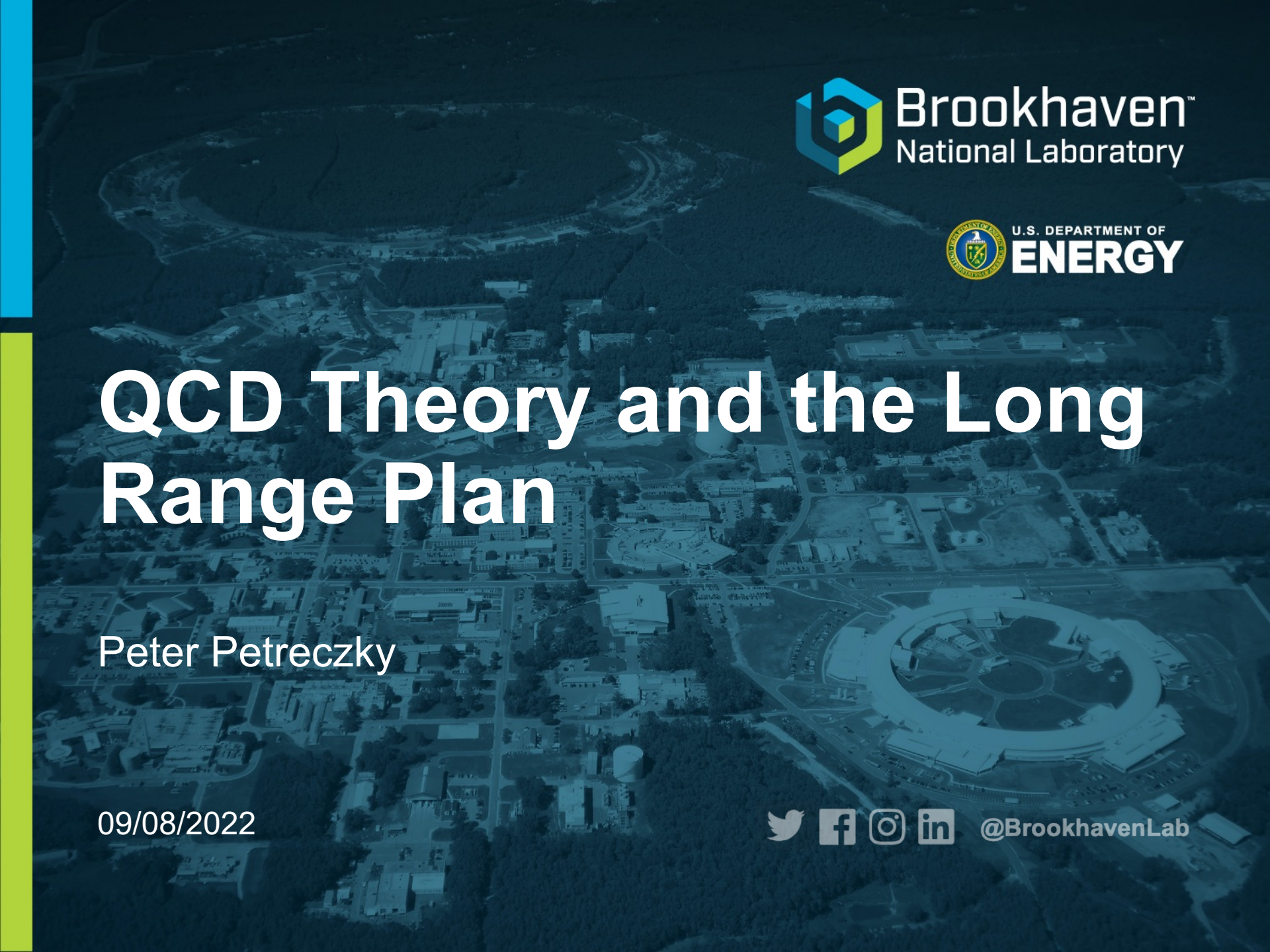

QCD Theory and the Long Range Plan

Peter Petreczky

09/08/2022

@BrookhavenLab

Main Thrusts of QCD Theory of key importance for BNL Program

- Penetrating probes of QGP (jets, open heavy flavor and quarkonia)

$\Rightarrow$ sPHENIX, LHC heavy ion program

- Broad Theory support for EIC

- Central to the above: computational nuclear theory, including lattice QCD

Workshops related to the Long Range Plan

Computational nuclear physics and AI/ML, September 6-7, 2022, SURA headquarters, Washington DC

Organizers: Alessandro Lovato (ANL) , Joe Carlson (LANL), Phiala Shanahan (MIT), Bronson Messer (ORNL) Witold Nazarewicz (FRIB/MSU), Amber Boehnlein (JLab), Peter Petreczky (BNL), Robert Edwards (JLab), David Dean (JLab),
https://indico.jlab.org/event/581/

See talk by Swagato Mukherjee

CFNS Workshop: on EIC Theory in the next decade, September 20-22, 2022, MIT

Organizers: Ian Cloët (ANL), Dmitri Kharzeev (Stony Brook University/BNL), Xiandong Ji (University of Maryland), Peter Petreczky (BNL), Jianwei Qiu (JLab), Phiala Shanahan (MIT), Ian Stewart (MIT), Ivan Vitev (LANL), Feng Yuan (LBNL)
https://indico.bnl.gov/event/16740/

CFNS Workshop: on EIC Theory in the next decade

The goal of the workshop is to review the needs and challenges for EIC theory (including workforce development and DEI, AI/ML: capabilities) and implications of these for the Long Range Plan.

Yoshitaka Hatta (EIC and spin physics), Jianwei Qiu (Exploring the x-dependence of GPDs at EIC), Ian Stewart, (SCET and TMDs), Filomena Nunes (The Road to FRIB Theory Alliance), Nobuo Sato (Global analysis and hadron structure), Werner Vogelsang (Precision ep physics and EIC), Martha Constantinou (GPDs and lattice QCD), Adam Szczepniak (Exotic spectroscopy at EIC) ,Yong Zhao (TMDs and Lattice QCD), Zhongbo Kang (Jets at EIC), Ivan Vitev (Heavy flavor production, energy loss and study of hadronization at EIC, Wim Cosyn (Nuclear structure and EIC), Raju Venugopalan, Nuclear PDF, gluon saturation and small-x physics

Can these challenges be addressed by creation a national EIC theory Consortium, similar to FRIB Theory Alliance can address the above challenges of EIC theory ?

Theory at the QCD Town Hall Meeting

Penetrating probes of QGP:
Abhijit Majumbder, Jet Theory,
Peter Petreczky, Heavy Flavor Probes and Lattice QCD
Ivan Vitev, Jets and Heavy Flavor from HIC to EIC

Very healthy cross-talk between Workshop on EIC Theory and QCD Town Hall meeting:
Yong Zhao, Advances in lattice QCD for hadron structure
Jianwei Qiu, Cold QCD, plenary
Werner Vogelsang, Spin and global analysis
Yuri Kovchegov, Nucleon Spion at Low x
Zhongbo Kang, TMD and measurements
Nobuo Sato, Parton distribution from global analysis
Yoshitaka Hatta, EIC Science, ep, plenary
Anna Stasto, EIC Science eA, plenary
Martha Constantinou, Lattice Theory for Hot and Cold QCD, plenary
Phiala Shanahan, AI/ML for QCD theory, plenary
Many Thanks to Bjoern Schenke and Swagato Mukherjee !