

A Framework for Interdisciplinary Research in High-Energy and Nuclear Physics



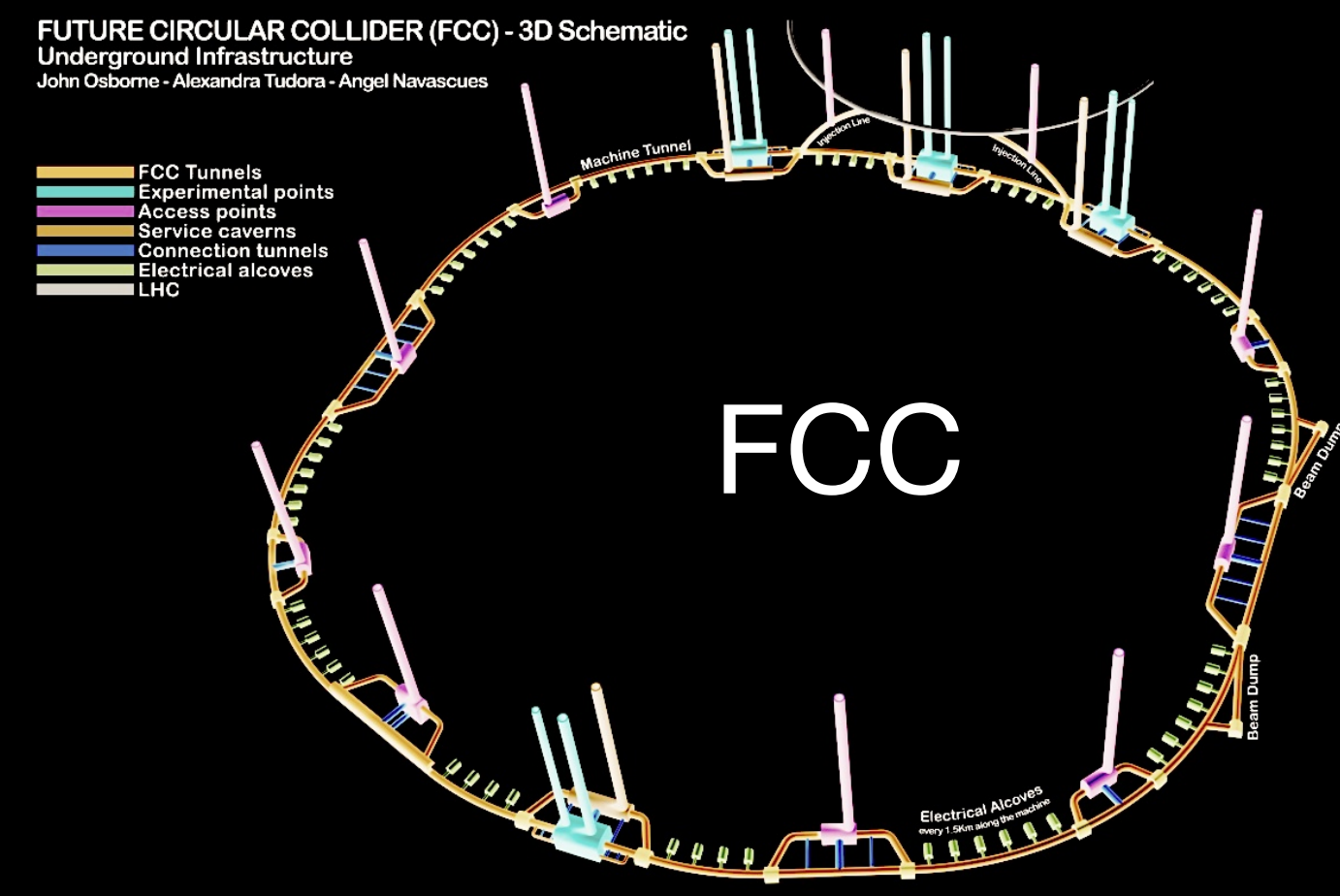
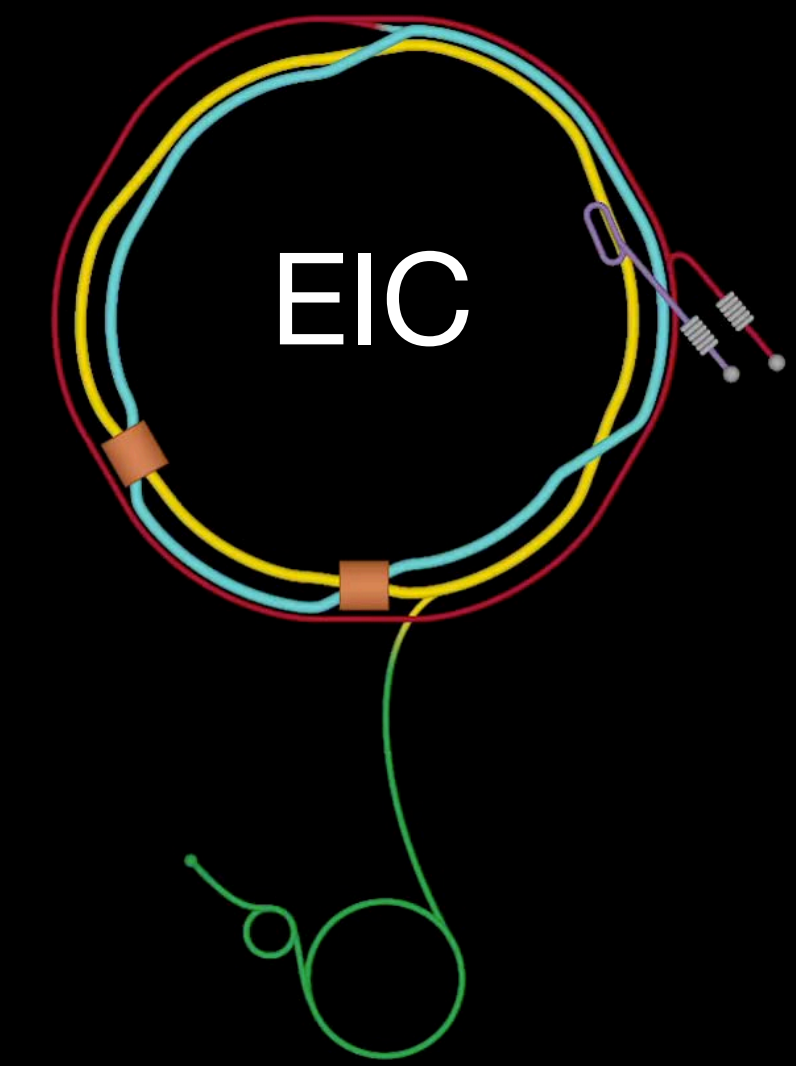
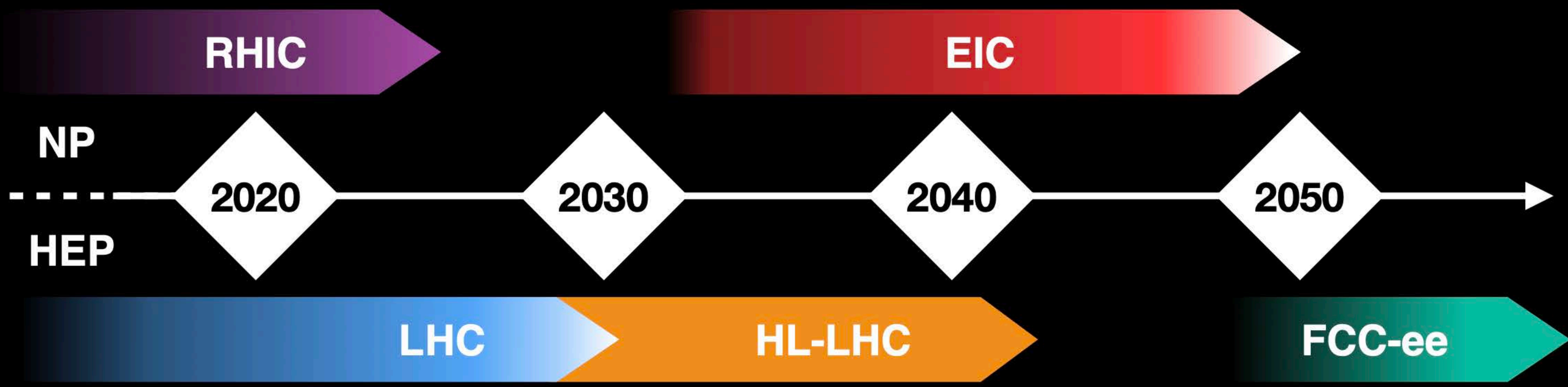
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P5 Town Hall Meeting, 12-14 Apr, 2023

TEASER: Join forces to advance High-Energy and Nuclear Physics by establishing an official framework of R&D for early career scientists

Opportunities as (an early-career) high-energy physicists

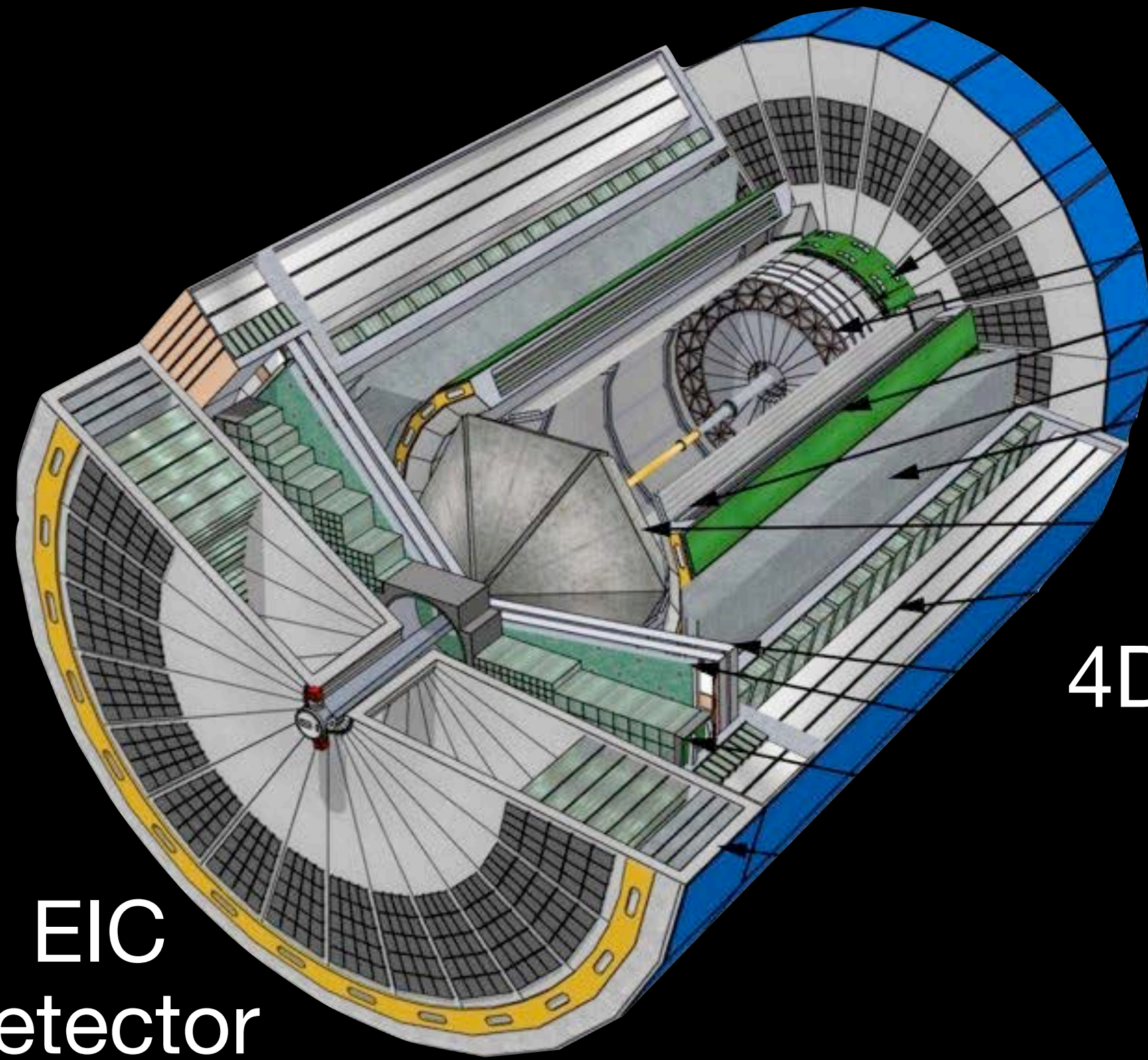
The US-based electron-ion collider is the next major nuclear physics collider is an opportunity



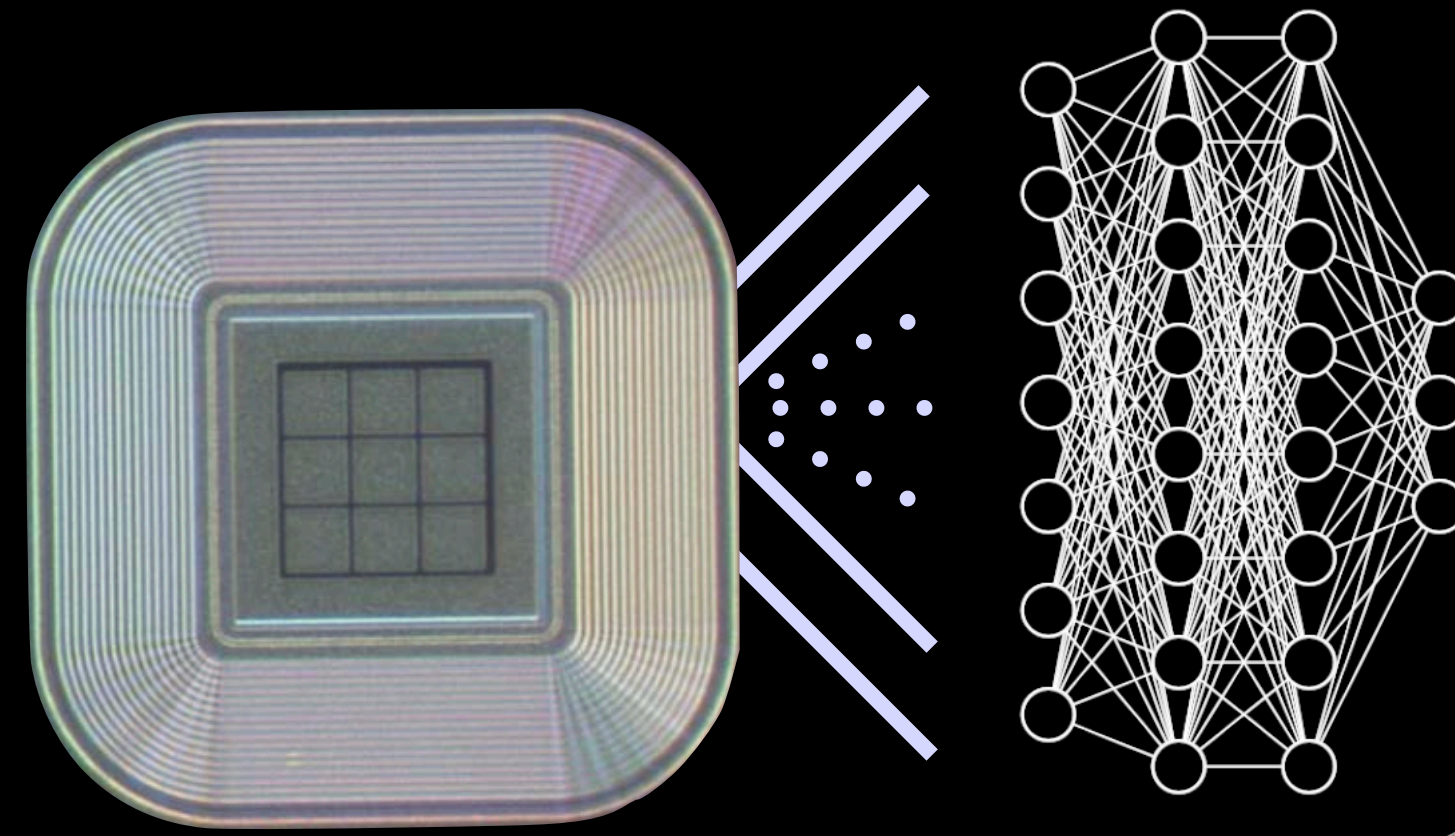
- Detectors: Leapfrogging technologies (MAPS, AC-LGAD) at the EIC for future FCC-ee
- Readout: Testing ground for Edge-AI and advanced streaming systems
- Physics: High precision PDF for QCD background in HL-LHC data

Opportunities as (an early-career) nuclear physicists

EIC experiments can leverage High-Energy Physics technologies and technique

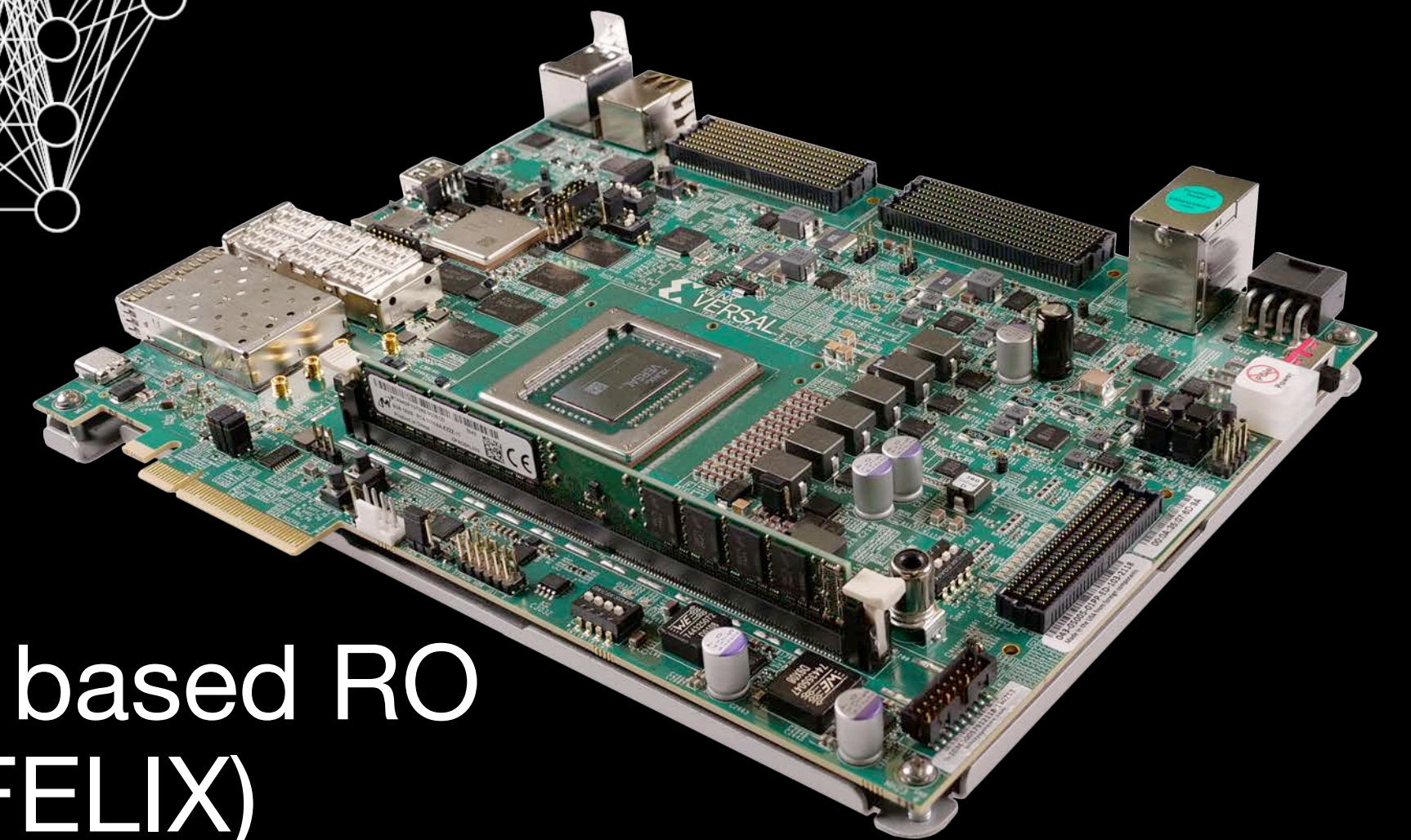


EIC detector



4D sensor (AC-Low Gain Avalanche Diode)

Edge-AI **hls4ml**



FPGA based RO (FELIX)

- Fast-time pixel/strip sensors, front-end electronics: candidates for EIC detectors
- Edge-AI enhance readout and FGPA : candidate for reduce data throughput
- Machine learning techniques (Jet-substructure): improve measurement precision

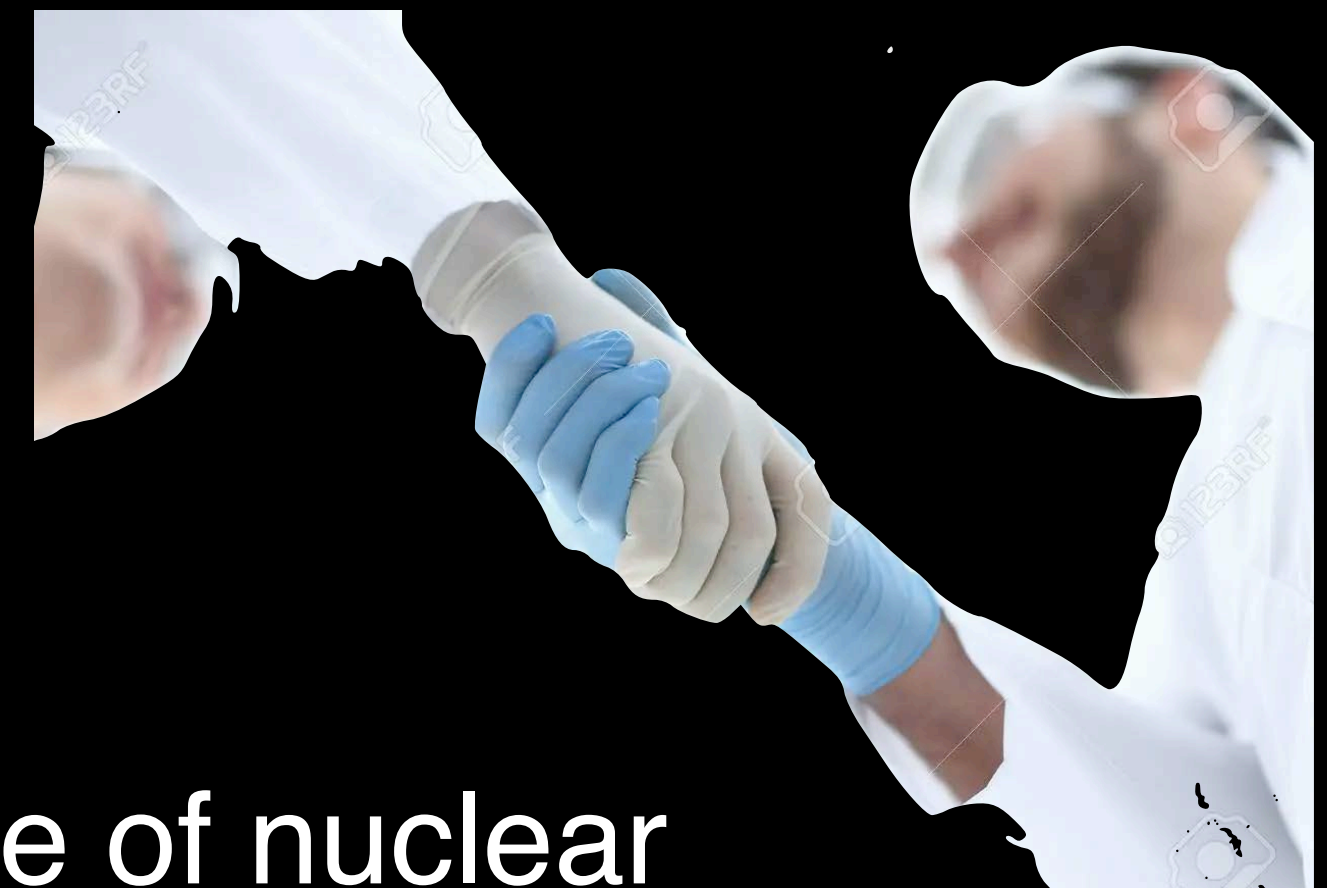
Summary

Recommendations:

- Establish an official framework to foster collaboration and leverage synergy between early career high-energy and nuclear physicists
- Transfer technologies and techniques between the two fields
- Exploit the timeline of mega-facilities to leapfrog advancements in both fields

Action Items:

- Organize joint conferences and workshops
- Fund interdisciplinary research
- Develop joint training programs & workforce development
- Encourage more dialogue and collaboration between the "office of nuclear physics" and the "office of high energy physics"



Potential example of success:

- AC-LGAD/MAPS detector + AI-enhanced readout at EIC, informative for FCC-ee