John Adams Institute for Accelerator Science

Imperial College London

Royal Holloway University of London

UNIVERSITY OF OXFORD

Lecture 22

The Hybrid Asymmetric Linear Higgs Factory Project (HALHF)

JAI Student Design Project 2024-2025

Professor Emmanuel Tsesmelis

Principal Physicist, CERN

Department of Physics, University of Oxford

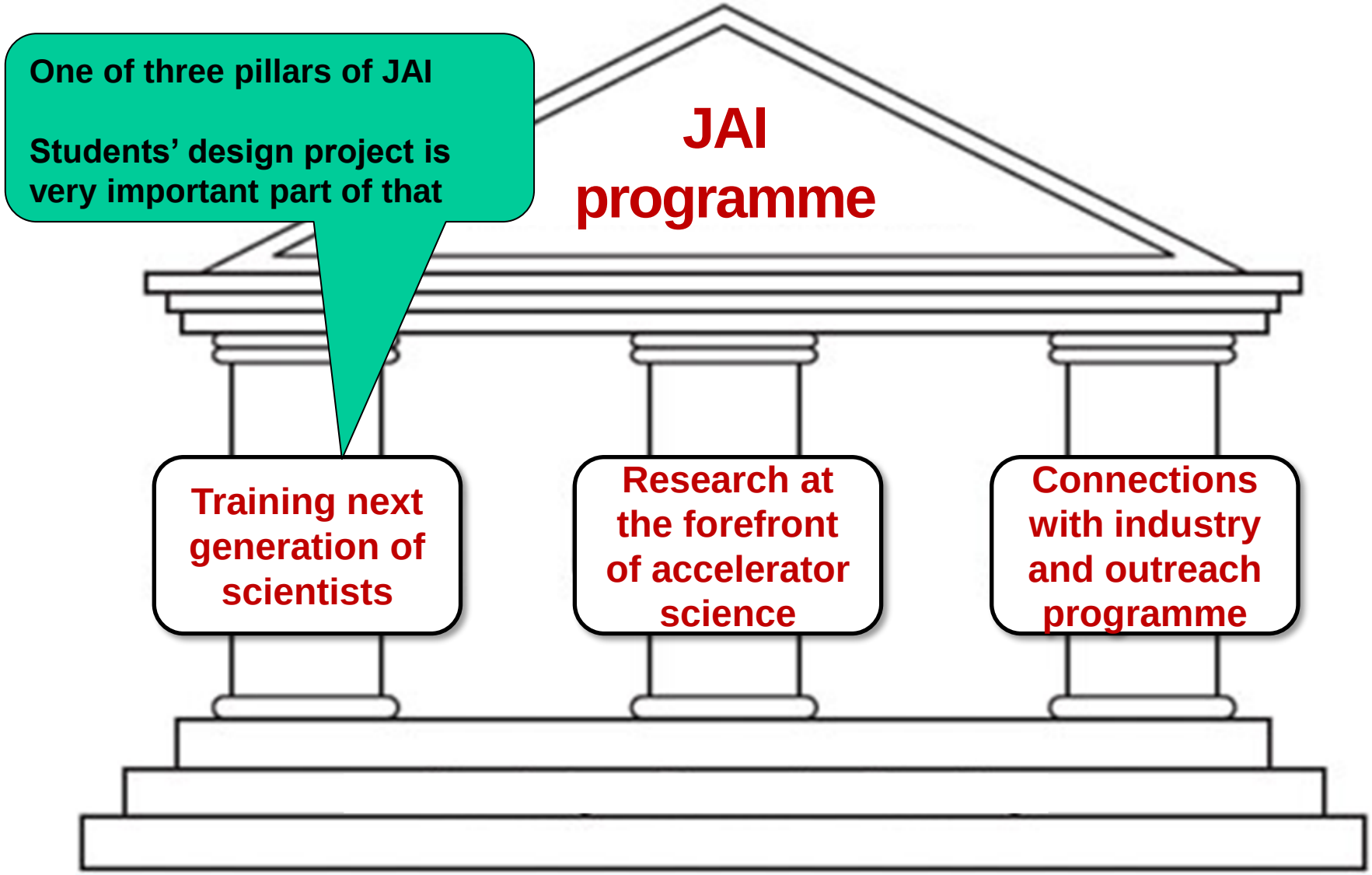
Accelerator Physics Graduate Course

John Adams Institute for Accelerator Science

27 November 2024

JAI Training

Foundation of the JAI Programme



Accelerator Design Project

- **Accelerator Design Study for**
  - **Electron SPS: 2020-2021**
  - **FCC-ee Booster Ring: 2021-2022**
  - **FCC-ee Positron Damping Ring: 2022-2023**
  - **LhARA: 2023-2024**
  - **Design work consisted of study of the lattice, magnet systems and RF cavities.**

"The design project significantly contributes to the value of a PhD at the JAI and is a very effective learning tool ... it played an essential role in helping me to find a postdoc."

"To me, the design project was by far the best part of the course. It puts the material taught into context and bridges the gap between lectures ... and a DPhil project ... ."

Laser-hybrid Accelerator for Radiobiological Applications (LhARA)

John Adams Institute Accelerator Design Project 2024

June 17, 2024

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For 2023-2024:

LhARA Report published on CDS **(10.17181/CERN.9K4Y.MM92)**

Students delivered JAI Seminar on 15 March 2024.

Student Seminar @ CERN, 12 July 2024

HALHF Student Design Project Plan

Study Areas for HALHF (January-March 2025)

- **Linac for Conventional Drive Beam**
  - **Optics studies, optimization of lattice.**
  - **Design of RF system (similar to CLIC RF technology)**

- **Magnet Design**
  - **Design dipole and quadrupole magnets for combiner ring**

- **Proposal for a hybrid, asymmetric, linear Higgs factory based on plasma-wakefield and radio-frequency acceleration (HALHF)**
  - **https://arxiv.org/abs/2312.04975**
  - **https://iopscience.iop.org/article/10.1088/1367-2630/acf395**