

The Project X Physics Study

Thursday 14 June 2012 - Saturday 23 June 2012

Fermi National Accelerator Laboratory

Scientific Programme

The Project X Physics Study will consist of several working groups exploring physics experiments that can use the intense Project X beams and several more working groups exploring enabling technologies (detectors and, in theoretical physics, lattice gauge theory).

Neutrino experiments

Conveners: Patrick Huber, André de Gouvêa, Koichiro Nishikawa, Geoffrey Mills, Steve Geer
Long- and short-baseline neutrino oscillation experiments. Non-oscillation neutrino experiments. Neutrino cross section measurement.

Summary paper

Kaon experiments

Conveners: Vincenzo Cirigliano, Kevin Pitts
Rare kaon decays. Experiments with kaon beams.

Summary paper

Muon experiments

Conveners: Graham Kribs, Bob Bernstein
Muon-to-electron conversion. Muon decay to electron+photon. Experiments with muon beams.

Summary paper

Electric dipole moments

Conveners: Susan Gardner, Tim Chupp, Zheng-Tian Lu
Measurement of electric dipole moments of the neutron, proton, radioisotopes, ..., and related measurements.

Summary paper

Neutron-antineutron oscillations

Conveners: Chris Quigg, Albert Young
Reach of neutron-antineutron oscillation experiments.

Summary paper

Hadronic physics

Conveners: Stephen Godfrey, Paul Reimer
Hadron structure, including pdfs, quark content of the nucleon. Fundamental physics measurements with hadronic beams. Fundamental physics measurements with hadronic targets.

Lattice QCD

Conveners: Ruth Van de Water, Tom Blum

Lattice QCD calculations of matrix elements for mesons and baryons, including transition form factors. Next-generation lattice-QCD calculations such as those needed for muon $g - 2$. Computer hardware and software requirements for Project-X experiments.

Summary paper

Tracking

Conveners: Jack Ritchie, Ron Lipton

Develop field-work proposals supporting development of ultra-low-mass, charged-particle tracking technologies for very high rate environments.

Summary paper

EM calorimetry

Conveners: David Hitlin, Milind Diwan

Develop field-work proposals supporting R&D for a "perfect" high-energy photon detector: next-generation performance in energy, position, direction and timing measurements in a high-rate environment.

Summary paper

Time of flight

Conveners: Bob Wagner, Mike Albrow

Develop field-work proposals supporting R&D for next-generation time-of-flight systems with performance better than 10 ps.

Neutrino detectors

Conveners: Jonghee Yoo, Kevin McFarland, Rex Tayloe

Develop field-work proposals supporting R&D for high-resolution measurement techniques for neutrino and exotica interactions near a high-power target.

Summary paper

Large-area, cost-effective detectors

Conveners: Yuri Kamyshev, Mayly Sanchez

Develop field-work proposals supporting R&D for large-area cost-effective detector technologies for rare energetic events, such as nucleon decay and neutron-antineutron oscillations.