



Advances in High Energy Physics

Special Issue on Physics at a Fixed-Target Experiment Using the LHC Beams

CALL FOR PAPERS

Fixed-target experiments (FTE) have brought essential contributions to particle and nuclear physics. They have led to particle discoveries (Ω , J/ψ , ...) and evidence for the novel dynamics of quarks and gluons in heavy-ion collisions. In accessing high x_F and in offering options for (un-) polarised proton and nuclear targets, they have also led to the observation of surprising QCD phenomena. They offer specific advantages compared to collider experiments: access to high x_F , high luminosities, target versatility, and polarisation.

The LHC 7 TeV protons on targets release a c.m.s. energy close to 115 GeV (72 GeV with Pb), in a range never explored so far, significantly higher than that at SPS and not far from RHIC. The production of quarkonia, DY, heavy flavours, jets, and γ in pA collisions can be studied with statistics previously unheard of and in the backward region, $x_F < 0$, which is uncharted. High precision QCD measurements can also obviously be carried out in pp and pd collisions with H_2 and D_2 targets. With the 50 TeV protons of the future circular collider (FCC), the c.m.s. energy could reach 300 GeV for original studies of W and Z boson, and perhaps H^0 , production in pp and pA collisions.

With the LHC Pb beam, one can study the quark-gluon plasma (QGP) from the viewpoint of the nucleus rest frame after its formation. Thanks to modern technologies, studies of, for instance, direct γ and quarkonium P -waves production in heavy-ion collisions can be envisioned.

Polarising the target allows one to study single-spin correlations including the Sivers effect, hence, the correlation between the parton k_T and the nucleon spin.

We intend to publish a special issue on the physics at such a FTE using the LHC or FCC beams. The editors welcome original research articles and review articles from both theorists and experimentalists.

Potential topics include, but are not limited to:

- ▶ Heavy-quark and gluon content at large x
- ▶ TMDs and single-spin asymmetries
- ▶ Heavy-flavour studies in pA and AA collisions at FTEs
- ▶ W, Z, and H^0 production near threshold
- ▶ Target polarisation
- ▶ Secondary beams
- ▶ Simulation tools for high-energy physics
- ▶ Beam collimation and extraction with bent crystals
- ▶ Machine feasibility and radiological aspects
- ▶ Connection between UHECR studies and FTEs

Lead Guest Editor

Jean-Philippe Lansberg, IPN Orsay,
Orsay, France
lansberg@in2p3.fr

Guest Editors

Gianluca Cavoto, Istituto Nazionale Di
Fisica Nucleare, Roma, Italy
gianluca.cavoto@roma1.infn.it

Cynthia Hadjidakis, IPN Orsay, Orsay,
France
cynthia@ipno.in2p3.fr

Jibo He, CERN, Geneva, Switzerland
jibo.he@cern.ch

Cédric Lorcé, Université de Liège, Liège,
Belgium
c.lorce@ulg.ac.be

Barbara Trzeciak, Czech Technical
University, Prague, Czech Republic
trzebar@fffi.cvut.cz

Manuscript Due

Friday, 20 March 2015

First Round of Reviews

Friday, 12 June 2015

Publication Date

Friday, 7 August 2015