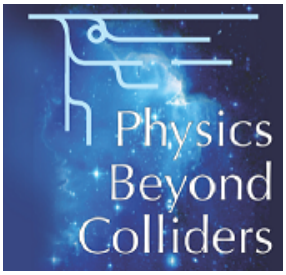


Contribution ID: **12** Type: **not specified**

# AFTER@LHC : A fixed-target programme at the LHC for heavy-ion, hadron, spin and astroparticle physics

*Wednesday 7 September 2016 14:40 (20 minutes)*

In this talk, we review a number of recent ideas* put forward in favour of a fixed-target programme at the LHC - AFTER@LHC- dedicated to heavy-ion, hadron, spin and astroparticle physics. By extracting the beam with a bent crystal or by using an internal gas target, the multi-TeV LHC beams allow one to perform the most energetic fixed-target experiments ever with which one can access the essentially uncharted backward kinematics with detectors similar to LHCb or ALICE.

In particular we argue that this allows one to study $pp$, $pd$ and $pA$ collisions at $\sqrt{s_{NN}} \simeq$115 GeV and Pb$p$ and Pb$A$ collisions at $\sqrt{s_{NN}} \simeq$72 GeV with extremely high precision with modern detection techniques. Such studies, including

- single transverse-spin asymmetries for hard and rare processes,
- suppression of heavy-flavours and quarkonia as well as azimuthal asymmetries down to the target rapidity in heavy-ion collisions,
- cold-nuclear matter effects,
- the physics involved in ultra-peripheral hadron and ion collisions,
- far backward gluon and heavy-quark sensitive processes,
- vector-boson production near threshold ...,

would greatly complement collider experiments, in particular those of the Electron-Ion Collider project or RHIC (with luminosities larger by 1 to 3 orders of magnitude).

Such a mode indeed allows for a broad physics programme, covering the large-$x$ QCD frontier for particle and astroparticle physics, as well as spin and heavy-ion physics with respectively a polarised target and the LHC lead beam.

*: for a complete list of references see
http://after.in2p3.fr/after/index.php/Recent_published_ideas_in_favour_of_AFTER@LHC

**Author:** LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS)

**Presenter:** LANSBERG, Jean-Philippe (IPN Orsay, Paris Sud U. / IN2P3-CNRS)

**Session Classification:** New experimental ideas