

# Mandate for the convener of the FCC/TLEP-WG8 “Experimental Environment”

## 1. Physics Objectives

- a. Evaluate the machine-related backgrounds in the detector volume: synchrotron radiation from final focusing quadrupoles, beamstrahlung, beam halo, accelerator ring, top-off injection, large bunch multiplicity, etc., for each proposed machine and interaction point infrastructures, at the various TLEP centre-of-mass energies – starting with 91 GeV, 161 GeV, 240 GeV, 350 GeV, and 400/500 GeV.
- b. Develop flexible software tools to simulate these backgrounds (if relevant), on top of the physics processes.
- c. Understand the level of radiation hardness needed for the various sub-detectors (i.e., as a function of the radius and the angle).
- d. Propose hardware solutions and alternative geometries for the interaction point and detector infrastructure to minimize the relevance of these backgrounds for physics studies and for radiation levels, especially for (but not limited to) the small angle region.
- e. Understand the achievable levels of polarization (transverse and longitudinal) at the interaction point, in collision or for single bunches, as a function of the centre-of-mass energy, and propose hardware solutions to measure it with the precision required by electroweak physics – mostly at the Z pole and the WW threshold.

## 2. Managerial objectives

- a. Define and start the activities of the group with a global vision, seeking for international collaboration. Synergies with other (circular or linear)  $e^+e^-$  collider studies will have to be exploited whenever deemed relevant and useful.
- b. Attract people for the studies relevant to the group. The list of TLEP subscribers with a declared interest experimental environment studies is compiled in the mailing list [TLEP-ExperimentalEnvironment@cern.ch](mailto:TLEP-ExperimentalEnvironment@cern.ch). One of the roles of the convener is to extend this list as much as possible and ask interested people to subscribe to the study through <http://tlep.web.cern.ch>).

- c. Maintain a high level of contacts with the other groups of the study, especially “Machine-Detector Interface”, “Polarization and Energy Calibration”, “Detector Designs”, “Electroweak Physics at the Z pole”, “Online Software” and “Offline Software”.
- d. Create adequate sub-groups to match the group scientific objectives (if deemed useful), and suggest appropriate sub-conveners, possibly starting with a high-profile convener for each of the sub-groups.
- e. Find, within about a year, one (or two) associate(s) to work as co-conveners, and able to take over the convener task after two years or thereabout (although of prolongation of the mandate of the first convener until the end of the study is not excluded, of course).
- f. Appoint editors towards the production of intermediate reviews and a final yellow report. (See “Timescale and deliverables below.”)
- g. Report progress to the physics coordination of the study and at regular TLEP physics meetings (held monthly for the time being).

### **3. Timescale and deliverables**

The Working Group “Experimental Environment” is part of the physics coordination of the TLEP design study, itself part of the FCC (Future Circular Collider Design Study at CERN). The FCC study consists of three phases:

- a first phase, called “Exploration” until March 2015 or thereabout, which will serve exploring all possible options and potential studies, and identifying requirements and constraints;
- a second phase, called “Analysis” until September 2016 or thereabout, where the identified baselines are conceptually studied in detail and in an integrated fashion, and where the relative merits and costs are assessed;
- a third and last phase, called “Elaboration”, expected to last until the end of 2017, which delivers all information in terms of technical concepts and costs, required for the final Conceptual Design Report (CDR) of the study.

Each phase will conclude with a workshop and a review milestone that will layout the directions of the next phase. It would therefore be instrumental to foresee an interim written report of the work of the group after each the

first two phases. A final yellow report, which will be part of the FCC CDR, is to be delivered at the beginning of 2018, and will document the scientific achievements of the group, expected to match or exceed the objectives set in the first section.

The “Phase 0” for TLEP physics studies, called “Preparation” is happening now. It should be concluded within a few weeks by the delivery, from the group convener to the physics coordinator, of a document describing in some details the “scope” for the group, with work areas, deliverables, and timeline, at least for Phase 1.