Mandate for the convener of the FCC/TLEP-WG9 "Offline software and computing"

1. Scientific Objectives

a. Establish an end-to-end (from Monte-Carlo generators to physics analysis) software framework for the TLEP/FCC-ee physics studies, starting from the comparative merits of what is used by the LHC collaborations and for the linear collider studies (not forgetting older LEP developments, the current use of parallel computing, and the use of modern languages like python), and after an evaluation of the specific needs for TLEP. Aspects common with the FCC-hh software framework must be sought for and built in throughout.

b. In this framework, develop a flexible parametric simulation of a typical FCC-ee/TLEP detector, where the particle energy and angular resolutions, as well as the various sub-detector granularities, are parameterized. This simulation will serve in early studies to converge on a set of "minimal" detector performance.

c. In this framework, define a compact, particle-based, data format, ready to use by the software tools needed for physics analyses (particle clustering in jets, b tagging, etc.)

d. In this framework, integrate the Monte Carlo event generators needed for physics studies, both for background and signal simulations.

e. In this framework, evaluate the needs and plan for the development of (1) detailed fast simulation; and (2) a GEANT-based (GEANT-V based) simulation; of the FCC-ee/TLEP detector designs, which will emerge from the corresponding working group. At this point, organize the event reconstruction software developments.

f. Evaluate the requirements for offline computing support for experiments.

2. Managerial objectives

a. Define and start the activities of the group with a global vision, seeking for international collaboration. Synergies with the Offline developments for the LHC experiments and/or for the linear collider studies will need to be sought, whenever appropriate and relevant. Collaboration with the PH/SFT group and the IT

department will need to be established on a firm and regular basis.

b. Attract people for the studies relevant to the group. The list of TLEP subscribers with a declared interest in online and/or offline software and computing is compiled in the mailing list TLEP-OfflineSoftware@cern.ch. One of the roles of the convener is (i) to understand who in this list is interested in "Offline" activities and restrict the list accordingly; and (ii) to extend this list as much as possible and ask new 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 studies, especially "Experimental Environment", "Detector Designs", "Electroweak Physics at the Z pole", "Di-boson Physics and W Mass Measurement", "H(126) Properties", "Top Quark Physics" and "Online Software". It is highly advisable to have group members participate to the activities of the other groups, especially if relevant to achieve the scientific objectives of the group. Note: there is another work unit (independent from Physics Coordination, and even independent of TLEP) in the FCC WBS called "Computing and data services", with which some contact will have to be established too.

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 "Offline Software and Computing" 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.