

PHIN Photo-Injector as the CLIC Drive Beam Source

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The Compact Linear Collider (CLIC) study proposes a multi-TeV, high luminosity, electron-positron linear collider in order to fulfill the current need for a lepton collider. The study has been started in the late 80s at CERN and currently is a joint effort with a collaboration of 40 institutes. An innovative scheme of high peak RF power production for the high accelerating gradient has been proposed for CLIC. The so called “two-beam scheme” consists of two beams that are running parallel to each other. One of the beams is to be accelerated for the collision experiments and called “the main beam”. The second beam of the CLIC scheme is “the drive beam” and will be employed for the power production. The quality of the main beam acceleration depends on the stability of the power that is generated by the drive beam. Therefore, the optimization of the drive beam production with the proper time structure and within the required beam dynamics tolerances is one of the most important accelerator physics aspects of the project.

Currently in the conceptual level, the baseline design of the drive beam injector consists of a thermionic gun. This electron source has to be combined with a sub-harmonic bunching system in order to provide the required time structure of the drive beam. However, a big disadvantage of this scheme is the parasitic satellite bunches that are produced due to the sub-harmonic bunching system. PHIN photoinjector has been raised as another option in order to replace the existing thermionic gun of CLIC test facility (CTF3) and to form the bases of a source for the CLIC drive beam. The PHIN project is in the framework of the European CARE (Coordinated Accelerator Research in Europe) program.

In this talk the highlights from the design and the commissioning of the PHIN photoinjector will be presented.

Author: Dr METE, Oznur (CERN / EPFL)

Co-authors: Dr DABROWSKI, Anne (CERN); Mr EGGER, Daniel (CERN / EPFL); Mr CHEVALLAY, Eric (CERN); Mrs CSATARI, Marta (CERN); Dr PETRARCA, Massimo (CERN); Dr DOEBERT, Steffen (CERN); Dr FEDOSSEEV, Valentine (CERN)

Presenter: Dr METE, Oznur (CERN / EPFL)

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