



Collaboration



New collaborators in 2016:

- Geological and Geophysical Institute of Hungary

We had also new addenda with existing collaborators: ACAS (Australia), Trieste (Italy), IAP NASU (Ukraine) maybe more

And foreseen in 2017:

- Tsinghua (China), NTUA (Greece)
- + addendums to CLIC-UK, Helsinki , Spain (Alba)
- CEA (related to CLEAR), LNF related to CLIC/CLEAR/SPARC

- The CLIC initial stage has been defined at 380 GeV. In 2016 the parameters for a staged implementation starting at 380 GeV for Higgs and top physics, upgradeable to 3 TeV in two further stages, were further refined, based on an overall power and cost optimisation for the initial stage. The resulting project plans were published as a CERN yellow report including updates of the physics reach for such a facility.
- The studies of electron beam facilities at CERN after CTF3 were concluded. A new stand-alone user facility – CLEAR (CERN Linear Electron Accelerator for Research) – will be available for users from 2017 onwards. This new open electron beam facility is an adaptation of the CALIFES electron linac located in the experimental area of the CLIC Test Facility 3 (CTF3) at CERN. Its capabilities and initial programme have been defined and documented, including its important role for future LC studies at CERN and for European researchers.
- The CTF3 programme was brought to successful conclusion by the end of 2016, proving the CLIC two beam concept and gradient performance, measuring the X-band structure breakdown rate with beam, benchmarking the drive-beam phase stability, verifying instrumentation prototypes and carrying out detailed module performance studies.
- The ATF2 final focus studies continued with promising results on the beam size and its dependence on intensity, and installation of two CERN produced octupoles at KEK in November. These octupoles are foreseen for low beta studies in ATF2 during the coming year.
- The drivebeam front end and damping ring studies progressed at CERN and in test-programs in light-sources, respectively. The major hardware components for these studies are completed in industry and being delivered, in particular high efficiency klystrons were further designs and simulation studies are ongoing in order to establish new baseline parameters for the CLIC powering systems by the end of 2018.

- The X-band stations at CERN have all been installed, tripling the X-band test capacity at CERN for accelerating structure and RF component tests during the period 2016-2019. Optimized new structures for 3000GeV/380GeV were defined. The new CLIC 3TeV accelerating structure baseline design has improved features in order to easy machining and reduce surface heating.
- To promote X-band use in larger facilities and support collaborators interested in using the technology in compact FELs a European design study for X-band FEL implementations with ~25 collaborators is being prepared for submission at the end of March 2017.
- The CLIC module measurements in the laboratory and CTF3 beam are being completed and evaluated, together with results from the Marie Curie studies of alignment, stability and system integration in the PACMAN project, in order to update the CLIC standard module design and the construction/installation and operation schemes.
- The beam based alignment studies for CLIC have been summarized and published.
- The collaboration with ILC is continuing related to beamdynamics studies, SCRF, civil engineering and cryogenics, as well as common studies in ATF2 at KEK. The EJADE Marie Curie exchange programme is operational to support participation of European researchers in LC activities in Japan.
- In addition, very useful review of the CLIC activities in March 2016

2017:

- Publish and summarise main results from the CTF3 programme.
- Obtain first results from drive-beam klystron and modulator prototypes.
- Pursue experimental tests of nanobeams in ATF2, FELs and Light sources.
- Operate X-band test-stands for extensive tests of baseline CLIC accelerating structures.
- Initiate cost and power revisions for the CLIC project implementation plan 2018-19.
- Summarise the CLIC experimental module programme as preparation for an updated technical design ... since written: 2nd general module design concept needed by end year at the latest
- Follow and participate in ILC preparation activities in collaboration with European laboratories and universities and facilitate the European preparatory studies in selected technical domains.

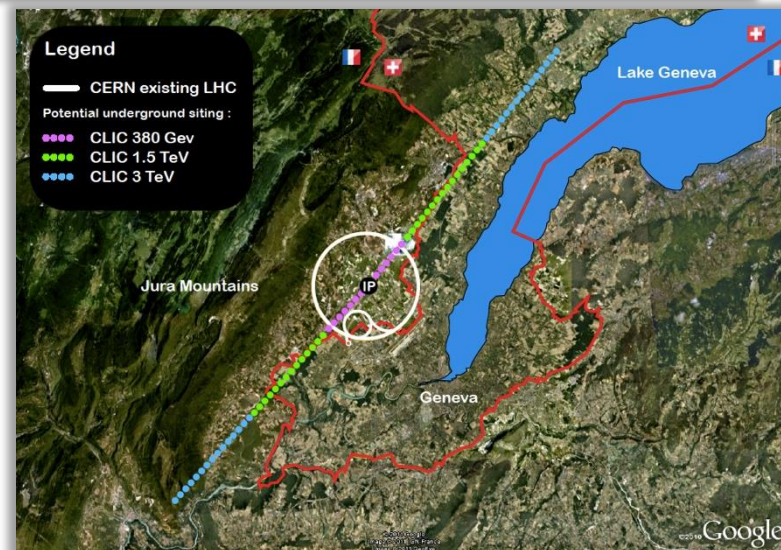
2018:

- Complete and document main results for the Implementation Plan by end 2018.
- Summarize main results for the drive-beam klystron and modulator prototypes.
- Pursue experimental tests of nanobeams in ATF2, FELs and Light sources.
- Operate X-band test-stands for detailed tests of baseline CLIC accelerating structures and cost-reducing alternatives.
- Complete cost and power revisions for the CLIC Project Implementation Plan.
- Conclude the module programme with a complete technical design and cost estimate.
- Follow and participate in ILC preparation activities in collaboration with European laboratories and universities and facilitate the European preparatory studies in selected technical domains.

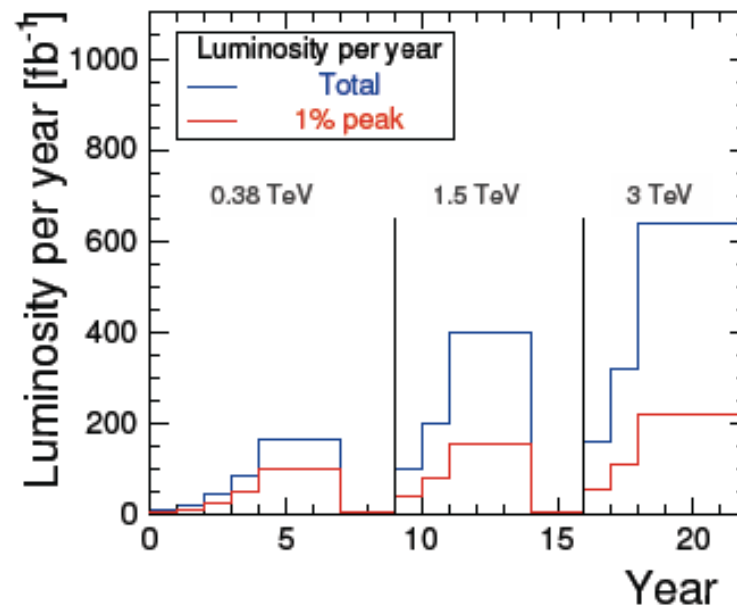
Goal for next strategy update (end 2018): Present a CLIC project that is a “credible” option for CERN beyond LHC, a Project Implementation Plan.

Guidelines used internally:

- Adapt to physics results – LHC mostly – taking into account LHC at 13-14 TeV as results become available (be flexible)
- Physics no later than 2035, solid luminosities from Higgs/top at 380 GeV to 3 TeV (staging)
- Initial costs compatible with current CERN budget level (order LHC+50%) (staging)
- Upgradable in 2-3 stages over a 20-30y period, without major (max 3-4 years) operational breaks, and with upgrade costs also in reasonable agreement with current budget level.
- Cover accelerator, detector, physics



Parameter	Unit	380 GeV	3 TeV
Centre-of-mass energy	TeV	0.38	3
Total luminosity	$10^{34}\text{cm}^{-2}\text{s}^{-1}$	1.5	5.9
Luminosity above 99% of \sqrt{s}	$10^{34}\text{cm}^{-2}\text{s}^{-1}$	0.9	2.0
Repetition frequency	Hz	50	50
Number of bunches per train		352	312
Bunch separation	ns	0.5	0.5
Acceleration gradient	MV/m	72	100
Site length	km	11	50





Project Organisation



Over the last year the LC study organisation has changed in preparation of the European Strategy Update report. We put more emphasis on implementation studies related to the entire CLIC machine.

We still have the project organised in four main activities, each with a group of individual WPs and WP leaders:

1. Beamdynamic and design - D.Schulte
2. X-band included high off klystron studies - W.Wuensch
3. Linac systems: Main Linac module and Drive Beam front end - S.Doebert
4. Technical systems and studies - N.Catalan

General work-packages and budgets – S.Stapnes:

The studies at ATF2 and in light sources are WPs under General activities. ILC/LCC support activities likewise. CTF3 closedown and CLEAR preparation are also under this general heading with WPs lead by R.Corsini.

Five new implementation working groups preparing for the ESU have been started (<https://indico.cern.ch/category/4337/>) – some of which also existed ahead of the CDR in 2012:

1. Civil Engineering & Infrastructure and Siting WG (CEIS) (lead J.Osborne) ([mandate](#))
2. Cost, Power and Schedule (lead S.Stapnes) (Detailed costing of a 380 GeV machine - DB and klystrons - plus additional stages beyond)
3. Main Linac Hardware Baseline (lead C.Rossi) (Optimised module technical design and surrounding infrastructure in the tunnel, considering the entire lifetime of a module including commissioning, installation, conditioning, operation, rework, replacements etc.)
4. Baseline parameters and design (lead D.Schulte) (Designs and parameters for 380 (DB and klystrons) GeV, 1.5 TeV and 3 TeV)
5. Novel Accelerator methods for future stages of CLIC (lead E.Adli) ([mandate](#))

The WGs have ~10-15 core members as needed to cover the subject, and meet every 4-6 weeks in open meetings (to all coll. members). Costing meetings are closed.

See implementation meetings every Friday 9-11 at indico link above.