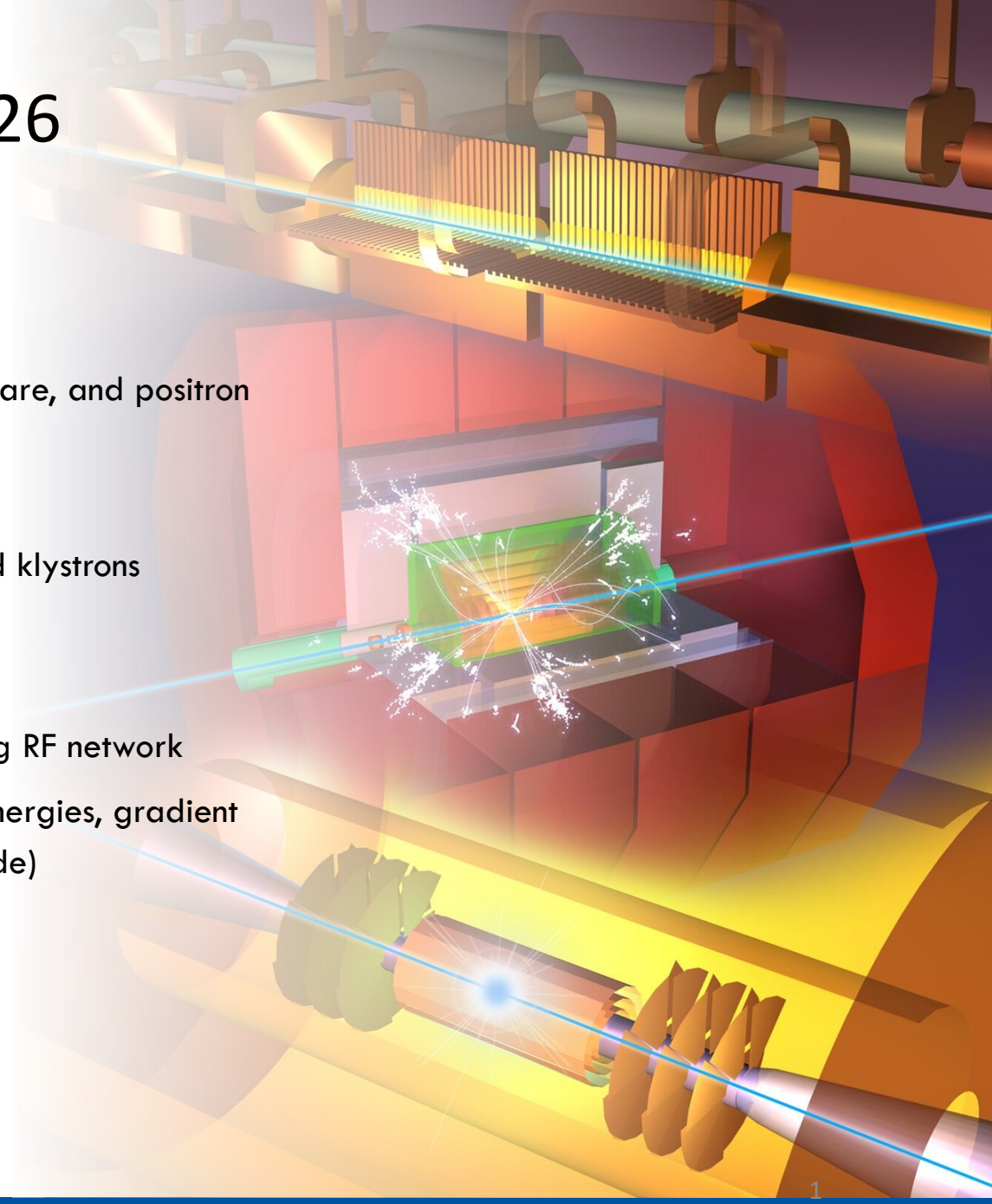
Readiness Report around ~2025-26

Update wrt Project Implementation Plan document 2018

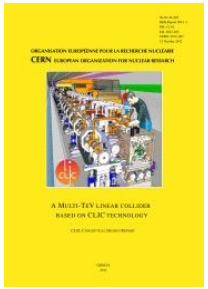
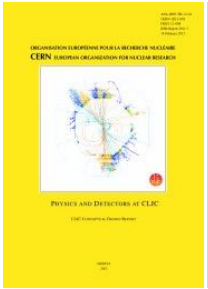
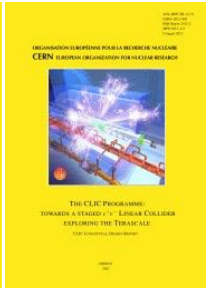
Key updates:

- Luminosity numbers, covering beam-dynamics, nanobeam studies and hardware, and positron production - at all energies
    - Risk reduction (wrt performance), bumps, redundancies
- Energy/power/sustainability: 380 well underway, 3 TeV to be done, L-band klystrons
- Sustainability issues, more work on running/energy models, carbon (construction/operation/disassembly)
- X-band progress – for CLIC, smaller machines, industry availability, including RF network
- RF design optimization/development – including injectors, R&D for higher energies, gradient (cool/HTS/etc.), power, beam parameters - links to plasma (if it can be made)
- Cost update. Changes wrt to 2018, plus impact of going green.
- Physics “update”, use for “diversity” types of physics, LDM etc.
- Low cost/power klystron version, with fewer klystrons, 250 GeV

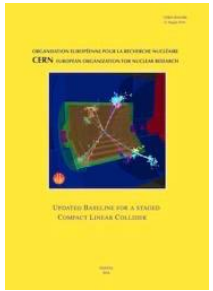


Status reports and studies

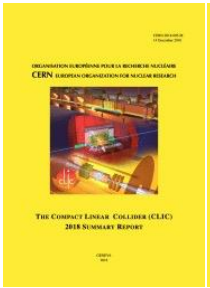
3-volume CDR 2012

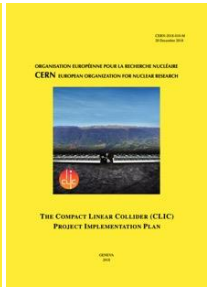




Updated Staging Baseline 2016



4 CERN Yellow Reports 2018






Details about the accelerator, detector R&D, physics studies for Higgs/top and BSM

Available at:
clic.cern/european-strategy

Two formal submissions to the ESPPU 2018


Several LoIs have been submitted on behalf of CLIC and CLICdp to the Snowmass process:

- *The CLIC accelerator study: Link*
- *Beam-dynamics focused on very high energies: Link*
- *The physics potential: Link*
- *The detector: Link*

Snowmass white paper:
https://arxiv.org/abs/2203.09186

Broadly speaking: "Updated accelerator part of 2018 Summary Report"

The CLIC project

O. Brunner[a], P. N. Burrows[b], S. Calatroni[a], N. Catalan Lasheras[a], R. Corsini[a], G. D'Auria[c], S. Doebert[a], A. Faus-Golfe[d], A. Grudiev[a], A. Latina[a], T. Lefevre[a], G. Mcmonagle[a], J. Osborne[a], Y. Papaphilippou[a], A. Robson[e], C. Rossi[a], R. Ruber[f], D. Schulte[a], S. Stapnes[a]*, I. Syratchev[a], W. Wuensch[a]

[a]CERN, Geneva, Switzerland, [b]John Adams Institute, University of Oxford, United Kingdom, [c]Elettra Sincrotrone Trieste, Italy, [d]IJCLab, Orsay, France, [e]University of Glasgow, United Kingdom, [f]Uppsala University, Sweden

April 4, 2022

Abstract

The Compact Linear Collider (CLIC) is a multi-TeV high-luminosity linear e^+e^- collider under development by the CLIC accelerator collaboration, hosted by CERN. The CLIC accelerator has been optimised for three energy stages at centre-of-mass energies 380 GeV, 1.5 TeV and 3 TeV [21]. CLIC uses a novel two-beam acceleration technique, with normal-conducting accelerating structures operating in the range of 70 MV/m to 100 MV/m.

The report describes recent achievements in accelerator design, technology development, system tests and beam tests. Large-scale CLIC-specific beam tests have taken place, for example, at the CLIC Test Facility CTF3 at CERN [39], at the Accelerator Test Facility ATF2 at KEK [53, 67], at the FACET facility at SLAC [35] and at the FERMI facility in Trieste [38]. Crucial experience also emanates from the expanding field of Free Electron Laser (FEL) linacs and recent-generation light sources. Together, they demonstrate that all implications of the CLIC design parameters are well understood and reproducible in beam tests and prove that the CLIC performance goals are realistic. An alternative CLIC scenario for the first stage, where the accelerating structures are powered by X-band klystrons, is also under study. The implementation of CLIC near CERN has been investigated. Focusing on a staged approach starting at 380 GeV, this includes civil engineering aspects, electrical networks, cooling and ventilation, installation scheduling, transport, and safety aspects. All CLIC studies have put emphasis on optimising cost and energy efficiency, and the resulting power and cost estimates are reported. The report follows very closely the accelerator project description in the CLIC Summary Report for the European Particle Physics Strategy update 2018-19 [22].

Detailed studies of the physics potential and detector for CLIC, and R&D on detector technologies, have been carried out by the CLIC detector and physics (CLICdp) collaboration. CLIC provides excellent sensitivity to Beyond Standard Model physics, through direct searches and via a broad set of precision measurements of Standard Model processes, particularly in the Higgs and top-quark sectors. The physics potential at the three energy stages has been explored in detail [2, 3, 17] and presented in submissions to the European Strategy Update process.

Submitted to the Proceedings of the US Community Study on the Future of Particle Physics (Snowmass 2021)

*Compiled and edited by the CLIC Accelerator Steering Group on behalf of the CLIC Accelerator Collaboration, corresponding author: steinar.stapnes@cern.ch

Chapter	New studies and results

Intro

Design and Performance

Updated lum and energies

System overview

Updated DR RF, RTML, injector changes, positron production, DB klystrons and consequences

Technologies

include X-band readiness, use in other facilities and projects

include use of technologes in other projects (e.g. HiLumi)

Implementation

Updated cost, power and LCA, check el distirbution for 2-3 TeV

More about personnel for construction and operation

Risks and TRLs

Next steps and longer term facility development opportunities (split in two chapters)

Towards a TDR - need to come from/be summarized from sections above

Include synergies with other project (e.g other LCs) and scientific diversity

Include personnel, CE and site readiness,

CLIC Project Meeting #45

Tuesday 19 Mar 2024, 14:00 → 18:00 Europe/Zurich

31/3-004 - IT Amphitheatre (CERN)

Videoconference: CLIC Project Meeting #45 — Join — 31/3-004

14:00 → 14:10	**Welcome and introduction** Speaker: Steinar Stapnes (CERN)	10m
14:15 → 14:30	**Update on CLIC RTML optimisation studies** Speaker: Mr Yongke Zhao (CERN)	15m
14:35 → 14:50	**RF design of the CLIC-K module and BOC and CC measurements** Speaker: Ping Wang (CERN)	15m
14:55 → 15:10	**Investigation of the mechanism behind conditioning: Context and simulation** Speaker: Mr Lee Millar (CERN)	15m
15:15 → 15:30	**Investigation of the mechanism behind conditioning: Experiments** Speaker: Victoria Madeleine Bjelland	15m
15:35 → 15:45	Coffee	10m
15:45 → 16:00	**CLEAR Scientific Board** Speaker: Roberto Corsini (CERN)	15m
16:05 → 16:20	**Ultra low beta studies in the ATF2 2023 fall campaign and future campaigns** Speaker: Enrico Manosperti (Universitat Politecnica Catalunya (ES))	15m
16:25 → 16:40	**Update on ICS studies @ CTF2** Speaker: Vlad Musat (University of Oxford)	15m
16:45 → 17:00	**Simulation of beam-loading effects in linacs** Speaker: Javier Olivares Herrador (Univ. of Valencia and CSIC (ES))	15m
17:05 → 17:20	**ChDR ATF2 monitor status and upgrade plans** Speaker: Stefano Mazzoni (CERN)	15m
17:25 → 17:40	**Cold-cavity BPM R&D** Speaker: Laura Karina Pedraza (IFIC)	15m
17:45 → 17:50	**AOB**	5m