

CLIC Physics Potential

<http://clicdp.web.cern.ch/content/wg-physics-potential>

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The Working Group

WG Physics Potential

Conveners: [Jorge de Blas](#), [James Wells](#), [Andrea Wulzer](#)

This working group coordinates the theory community effort to assess the CLIC potential to discover cracks in the Standard Model. The physics picture that is emerging from the LHC results and the recent completion of the CLIC feasibility study and detector design, make this assessment particularly timely, in preparation of the forthcoming update of the European Strategy.

New physics might be discovered at CLIC either indirectly, through precise measurements showing departures from the Standard Model predictions, or via the direct observation of new particles. Both aspects will be investigated under several beyond-the-Standard Model perspectives. A summary of ongoing activities and the corresponding contact persons is reported below.

Working Units:

- **SM EFT** ([F. Riva](#)): Probing the SM EW-plus-Higgs sector with precise measurements.
- **Direct Searches** ([R. Franceschini](#), [M. Spannowsky](#)): Assessing the direct discovery potential, its complementarity with indirect probes and the impact on BSM physics.
- **Light Flavours** ([J. Zupan](#)): Probing new physics through light quarks and leptons.

This a community effort. Please join our mailing list (clicdp-wg-physicspotential@cern.ch) [here](#) and/or contact us for comments and suggestions.

The July Workshop

Physics at CLIC

17-18 July 2017

CERN

Europe/Zurich timezone



Extremely useful summary of existing/ongoing LC activity.

Triggered renewed interest in CLIC from BSM community.

Several CLIC-related projects started during the workshop!

BSM Report

General question: what will we learn from CLIC?

Naturalness (conclusive results)

Higgs or Top **Compositeness**

Supersymmetry

Dark Matter

New Exotics

The origin of **Flavour**

Vacuum Stability

EW Baryogenesis

and also

Can we **characterise** LHC discoveries? [much less emphasis than past, but still there]

Enormous added value in the high-energy stages

Format will be CERN Yellow Report open to (selected) community contributions. FCC-style

BSM Report

2 The Standard Model EFT (Francesco)

2.1 The EFT Framework

2.2 Higgs and Gauge

- Summary of Higgs results (with new H trilinear)
- Drell–Yan (revised analysis from **Andrea&Jorge**)
- Dibosons (improved analysis from **Francesco&Philipp&al**)
- $WW>HH?$ $WW>WW?$ (existing papers)
- BSM interpretation (general Universal, Composite Higgs) (**Oleksii&Gauthier**)

2.3 Top

- ttH (from top report)
- Top Pair Production (existing papers)
- $WW>tt$ (**Andrea&Christophe&Tevong&Zhang**)
- BSM interpretation (general Top-philic, Top compositeness, top partners (**Oleksii&Gauthier**))

BSM Report

3 Direct Searches (Michael and Roberto)

3.1 EWSB

- Closing SUSY Holes: Summary of previous studies Compressed spectra
- Extra Scalars (in progress **Sala, Tesi, Redigolo, Buttazzo**)
- SUSY limits from loops
- Extended Higgs Sectors (**Santos**)
- Discovering Naturalness: scenarios that can be truly first seen at CLIC and/or that can be established. (existing literature, plus **Reece, Fan**)

3.2 Dark Matter

- Neutralino DM
- Co-annihilation scenarios (**Plascencia, Sakurai**)
- Minimal (milli-charged) DM
- Non-WIMP scenarios

3.3 New Neutrinos and see-saw mediators

- Gauge-Charged see-saw mediators (**Ghezzi, Pruna, Panizzi, Mitra**)
- Singlet see-saw mediators

3.4 EW Baryogenesis (J. M. No)

BSM Report

4 Flavour Physics

4.1 FCNC

- Direct probes by high-energy $q\bar{q}$? (including top), maybe also mu-tau, e-tau
- Exotic top decays and interplay with the above

4.2 BSM impact of Light quark Yukawa determination

4.3 LFUV anomaly