

- ~250 participants, ~60 on site
 - https://indico.cern.ch/event/1471891/overview
 - · Newsline articles in the making
 - Participation/contributions by French groups (detector/physics and accelerator)
- Allowed for take stock on how a first stage of a LCF could look like and what are upgrade options
 - More on next slides
 - Still it was rather a working meeting than a symposium
- It is excellent to have lots of material in one place
- Main messages
 - A LCF will have two interaction regions (that could be used guite differently)
 - The numbers developed (for good reasons) for ILC in Japan do not reflect the full capability of a LCF (even not that of the cold option)
 - in terms of luminosity but also energy reach
- People start seriously to think how different options could fit into the initial infrastructure
 - Work on cost updates were presented
 - The status of the sustainability study was presented by Maxim
- The last three points are key (from my point of few) to reach a wider acceptance
- ECR Forum on first day
 - ECR complained that the (young) community is not well informed about the potential of a linear collider
 - Discussion too much dominated by FCC (since pushed by CERN direction) and there is a firm belief that CERN will find the money for the FCC
 - ECR pushed the seniors to work out also a "luxury version" of the ILC (i.e. pointing out what would be possible in principle)





- Very nice talks that show the potential of the full LCF programme
 - All energy stages have their own justification but they also talk to each other
 - NLO EFT may change the picture on the achievable precision since high energy measurements needed to constrain effects at low energy
 - Nice talk about Higgs at highest energies
 - · Pointing out the game changing nature of the measurement of the Higgs self-coupling
 - Michael pointed out the discovery potential of the top physics programme
 - Photon collider mode would offer alternative option for (di-)Higgs production
 - Exciting non-collider physics programme
- Also still some rough edges (mainly due to early stage of project and first week after Christmas break)
 - 2f, 4f and BSM talks were a bit too personal
 - For BSM the actual text in the draft is already much better
 - CP Violation was missing
 - From my point of view we have to be careful to be not too technical
 - For example: What to do with the excellent precisions obtainable in tth and multi-boson production
 - · We have the entire HL-LHC still ahead of us.





- An ILC-like collider based on SCRF is a "safe bet" to start with
 - Layout of BDS would work until 1 TeV
- Upgrades
 - Promising prospects for SCRF
 - 50 MV/m seem to be reach on time scale of 5 years (plating with Q_0 and surfaces, provided corresponding investment in development)
 - Traveling wave acceleration may even allow to go for 70 MV/m on a 10 years time scale
 - C3 is making steady progress and tries to integrate into initial LCF (seems feasible)
 - CLIC is (relatively) mature CERN proposal but integration into LCF is very challenging
 - However, CLIC is a CERN proposal and this has to be taken into account in the discussion
 - Photon collider needs R&D on mirrors, which crossing angle is preferred (20 mrad would be compatible with basic LCF layout)
 - Mouth watering luminosities with ERL
 - Very conceptual level
 - ... and the team could benefit from some streamlining
 - I haven't looked at PWA for today (no time)
- Need space for non collider experiments





- Basic options are a 20km minimal version (a la ILC Japan but two IP) and a 33 km option to reach immediately 550 GeV
 - · An intermediate version of 27 km could be envisaged
- Basic option would operate at 250 GeV with 5 Hz and feature an instantaneous lumi of 1.34x10³⁴ cm⁻²s⁻¹
- Upgrade to 2.7×10^{34} cm⁻²s⁻¹ by doubling the bunches (1312 \rightarrow 2624)
- Note that beam polarisation increases the effective luminosities
 - More observables
 - Important aspects of SM Model as chiral theory will be projected out better (e.g. Higgs couplings in EFT scenario)
- 10 Hz at 250 GeV operation (or more) would require longer tunnel, the full cryo power of 550 GeV machine plus the second damping ring
 - Energy consumption O(200 MW) compared with 110 MW for minimal version
 - Note in passing that with 270 GeV as for FCCee 13 HZ operation would be possible
 - Update 19/1/25: Q₀ of 2¹⁰ could/would change this picture





- Upgrade on ILC250 cost in Japan (Akira Yamamoto)
 - 60% increase w.r.t. to 2017 value
 - Reasons: general inflation, but also construction costs did increase significantly in Japan
- Costing study underway for 20 and 33 km machines for CERN (Benno List)
 - Construction cost lower in Europe than in Japan
 - \rightarrow Basic option would be cheaper in Europe than in Japan
 - It is therefore safe to assume that the basic version of a LCF would stay well below 10 GEUR
- The high energy version based on SCRF would be above 10 GEUR
 - ... but a LCF can be staged, therefore upgrade << 10 GEUR
 - Upgrades could be adiabatically (less risk) or more radical if cost savings are realistic
 - Work on cost effective solution could start on day 1 of a LCF





- FCC feasible?
 - FCChh gave up on 100 TeV and opt for 85 GeV
 - ... based on 14 T magnets
 - https://indico.cern.ch/event/1498966/
 - Charge for feasibility study was 100 TeV
- At a meeting in Poland the future DG pointed out that the FCCee should be evaluated w/o the FCChh as "upgrade"
 - This may give greater weight to the high-energy options of a LCF
- LCWS 2025 at Valencia
 - 20th-24th of October





- Indico page of symposium
 - https://indico.in2p3.fr/event/34662/
- (Most) relevant talks
 - GT1 summary by GT1 Coordinators
 - See also https://esppu.in2p3.fr/uploads/Contribution-of-the-GT1-to-the-ESPPU-2025-20250115171459.pdf
 - Correct summary!
 - GTS talk by Jeremy Andrea
 - Marc is in contact with Jeremy
- General point
 - How do we make sure that a LCF appears in the French input to the Strategy?
 - ... like other countries do (e.g. Germany but also Spain and Poland)
 - Would need to understand how "definite" a French statement will be
 - ... given the fact that the feasibility study will only be available on March 31st
 - What would be our main arguments to bring up in the discussion?
 - LCF has "low cost" entry point?
 - LCF has the potential of higher energies?
 - What else?
 - The 31st of March is not the end of the discussion
 - How to spread the word on a LCF in France?



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