Preparazione Input Comunità INFN alla European Strategy for Particle Physics Update 2024-2026

slide del GL INFN (R. Tenchini, A. Nisati, S. Malvezzi, ...)

European Particle Physics Strategy Update 2024 – 2026

HOME ABOUT PROCESS SUBMITTED INPUT ORGANISATION RESOURCES

Welcome

The European Strategy for Particle Physics is the cornerstone of Europe's strategy-setting process for the long-term future of the field. Mandated by the CERN Council, the Strategy takes into account results from the LHC and other facilities in the world, the international physics landscape and developments in related fields with the aim to maximise scientific returns.

In March 2024, the CERN Council launched the process for the third update of the Strategy. The European Strategy Group (ESG) and the Strategy Secretariat for this update were established in June 2024 to organise the full process. The remit of the European Strategy Group was also approved in June 2024.

The Strategy update process is expected to converge by January 2026, when an draft Strategy document will be submitted to the Council. The community at large will be involved during the full process and is asked to provide input at several stages.

RELATED WEBSITES

- ▶ The European Strategy for Particle Physics
- ▶ CERN Council
- ▶ European Committee for Future Accelerators (ECFA)
- ▶ European Strategy Forum on Research Infrastructures (ESFRI)

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La home page della prossima Strategy si trova a questo link:

https://europeanstrategyupdate.web.cern.ch/welcome

European Strategy Update Aim

(spc-e-1239-Rev2-c-e-3834-Rev2-ESG remit)

Develop a visionary and concrete plan that greatly advances human knowledge in fundamental physics through the realisation of the next flagship project at CERN.

This plan should attract and value international collaboration and should allow Europe to continue to play a leading role in the field

The Strategy update should include the preferred option for the next collider at CERN and prioritised alternative options to be pursued if the chosen preferred plan turns out not to be feasible or competitive.

The Strategy update should also indicate areas of priority for exploration complementary to colliders and for other experiments to be considered at CERN and at other laboratories in Europe, as well as for participation in projects outside Europe.

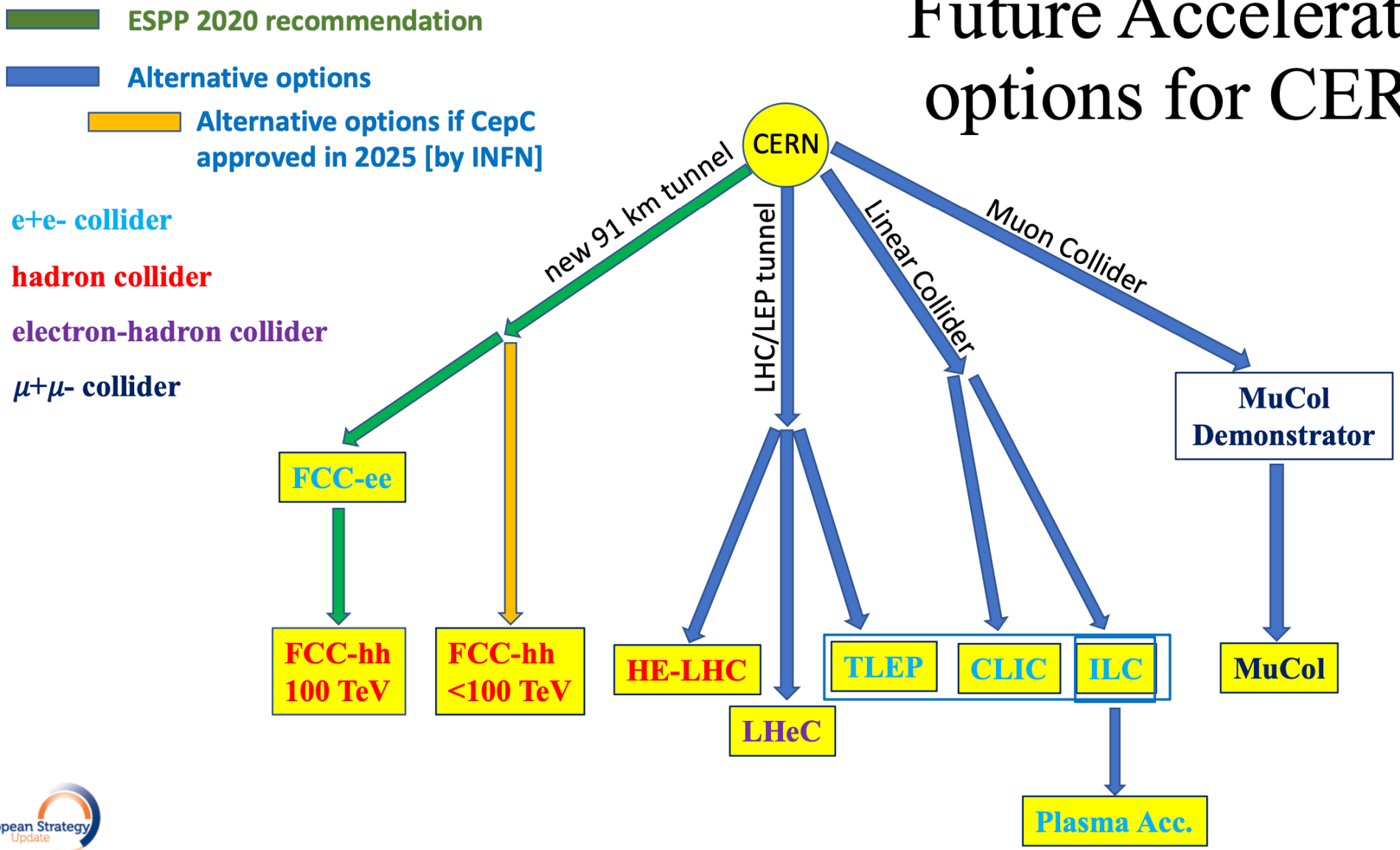
European Strategy Update Aim

The European Strategy Group should consider other items identified as relevant to the field, including accelerator, **detector and computing R&D**, the theory frontier, actions to minimise the environmental impact and to improve the sustainability of accelerator-based particle physics, **the strategy and initiatives to attract, train and retain the young generations, public engagement and outreach**.

The ESG should take into consideration:

- the input of the particle physics community;
- the status of implementation of the 2020 Strategy update;
- the accomplishments over recent years, including the results from the LHC and other experiments and facilities worldwide, the progress in the construction of the HL-LHC, the outcome of the Future Circular Collider Feasibility Study, and recent technological developments in accelerator, detector and computing;
- the international landscape of the field.

Future Accelerator options for CERN



European Strategy Update

Rapporto Draghi a EU

- Disponibile presso questo link https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en
  - Organizzato in un documento "executive summary" più report completo
- FCC/CERN sono citati esplicitamente a pagina 236:

The Large Hadron Collider has propelled CERN to global leadership in particle physics – a mantle that has shifted from the US to Europe – and it stands as CERN's flagship facility. One of CERN's most promising current projects, with significant scientific potential, is the construction of the Future Circular Collider (FCC): a 90-km ring designed initially for an electron collider and later for a hadron collider. Chinese authorities are also considering constructing a similar accelerator in China, recognising its scientific potential and its role in advancing cutting-edge technologies. If China were to win this race and its circular collider were to start working before CERN's, Europe would risk losing its leadership in particle physics, potentially jeopardising CERN's future.

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the future of CERN is at risk due to China's progress in emulating one of CERN's most promising current projects, the Future Circular Collider (FCC). Refinancing CERN and ensuring its continued global leadership in frontier research should be regarded as a top EU priority, given the objective of maintaining European prominence in this critical area of fundamental research, which is expected to generate significant business spillovers in the coming years.

Timeline for the update of the European Strategy for Particle Physics

Come si è organizzato l'INFN

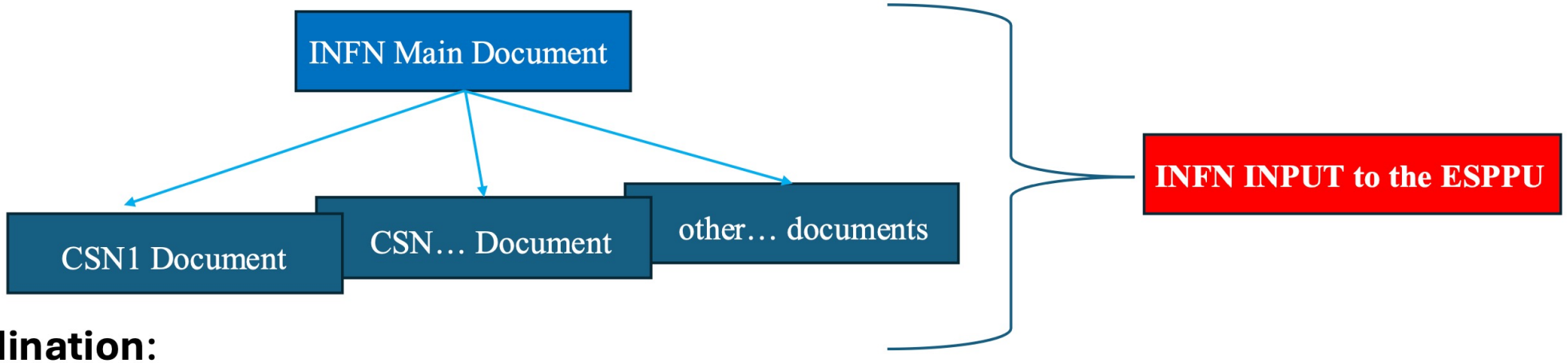
- L' INFN ha istituito un **Gruppo di Lavoro (GdL)** composto dai Presidenti delle Commissioni Scientifiche Nazionali, dai Direttori dei Laboratori Nazionali, dal Coordinatore del MAC e da un rappresentante attività legate al Calcolo (CNC). Il GdL e' guidato da uno steering group*.
- **I Presidenti delle CSN**, oltre ad organizzare eventi interni, inviteranno i loro Coordinatori ad avviare **presentazioni e discussioni locali sulle attività di interesse per la ESPP**, in accordo con i rispettivi Direttori. Le conclusioni che scaturiranno da questi incontri saranno condivise con gli stessi Presidenti.
- **I Direttori dei Laboratori** avvieranno una discussione, presso la comunità scientifica dei Laboratori da loro diretti, che metta in risalto soprattutto i **contributi che essi possono offrire in base alle infrastrutture di ricerca disponibili presso i Laboratori stessi**.

*Steering group : Marco Ciuchini (GE), Sandra Malvezzi (GE), Aleandro Nisati, Roberto Tenchini (Pres. CSN1), Cecilia Borca (Rappresentante ECR)

Come si è organizzato l'INFN

- **I Presidenti delle CSN e i Direttori dei Laboratori dovranno produrre un documento** da inviare allo Steering Group INFN; esso sintetizzerà i risultati del processo all'interno delle CSN e dei Lab e potrà eventualmente essere sottomesso come input alla Strategy.
- **Il Coordinatore del MAC** curerà la preparazione di un **documento che raccolga in modo omogeneo gli studi di macchine acceleratrici svolti dall'INFN** e che sono stati finanziati dalla Giunta Esecutiva con fondi dedicati per contribuire allo sviluppo delle raccomandazioni European Strategy 2020.
- **Il Rappresentante Calcolo** curerà la preparazione di un documento che raccolga in modo omogeneo gli studi degli aspetti legati al calcolo per i progetti futuri.

INFN Input for the European Strategy



- **Coordination:**
  - **Steering Group** (C. Borca, M. Ciuchini, S. Malvezzi, A. Nisati, R. Tenchini)
  - **Working group (GdL) :**
    - Chairs of the 5 Scientific Committees
    - Directors of National Laboratories
    - Chair of the INFN Machine Advisory Committee
    - Chair of the INFN National Computing Committee
    - Representatives of the INFN communication office

Scadenze per produzione documenti di Input

- **DRAFT Preliminare: 13 Dicembre 2024**
- **DRAFT Finale: 24 Gennaio 2025**

- Il portale su cui caricare i documenti sarà comunicato quanto prima

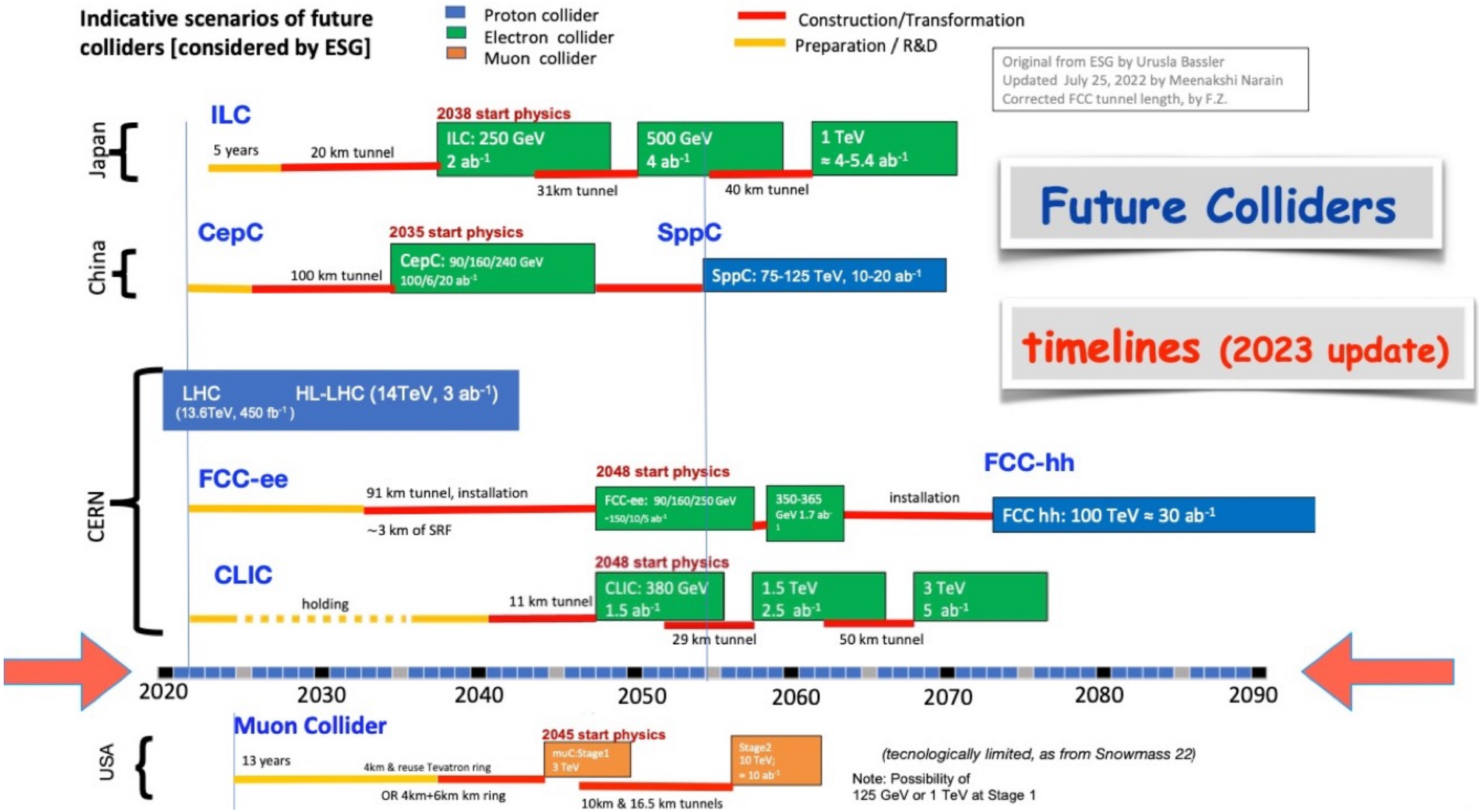
- Come già discusso negli incontri già fatti, questi documenti dovranno essere molto brevi: 5 pagine andrebbero benissimo; si raccomanda di non superare le 8 pagine in ogni caso

Workshop di Sezione sulla Strategia Europea per la Fisica delle Particelle Elementari

21 novembre 14:00 → 19:00 Europe/Rome

Aula Multimediale (Bari)

14:00 → 14:05	**Welcome**	5m
14:05 → 14:50	**Overview**	45m
15:00 → 15:15	...FCC...	15m
15:15 → 15:30	...MUCOL...	15m
15:30 → 15:45	**Talk 3**	15m
15:45 → 16:00	**Talk 4**	15m
16:00 → 16:15	**Talk 5**	15m
16:15 → 16:30	**Talk 6**	15m
16:30 → 17:00	**Round Table**	30m


Indicative scenarios of future colliders [considered by ESG]
Proton collider
Electron collider
Muon collider
Construction/Transformation
Preparation / R&D
Original from ESG by Urusla Bassler
Updated July 25, 2022 by Meenakshi Narain
Corrected FCC tunnel length, by F.Z.
Future Colliders
timelines (2023 update)
Japan
ILC
5 years
20 km tunnel
2038 start physics
ILC: 250 GeV
2 ab-1
31km tunnel
500 GeV
4 ab-1
40 km tunnel
1 TeV
≈ 4-5.4 ab-1
China
CepC
100 km tunnel
2035 start physics
CepC: 90/160/240 GeV
100/6/20 ab-1
SppC
SppC: 75-125 TeV, 10-20 ab-1
CERN
LHC
(13.6TeV, 450 fb-1)
HL-LHC (14TeV, 3 ab-1)
FCC-ee
91 km tunnel, installation
~3 km of SRF
2048 start physics
FCC-ee: 90/160/250 GeV
~150/10/5 ab-1
350-365 GeV 1.7 ab-1
installation
FCC-hh
FCC hh: 100 TeV ≈ 30 ab-1
CLIC
holding
11 km tunnel
2048 start physics
CLIC: 380 GeV
1.5 ab-1
29 km tunnel
1.5 TeV
2.5 ab-1
50 km tunnel
3 TeV
5 ab-1
2020
2030
2040
2050
2060
2070
2080
2090
USA
Muon Collider
13 years
4km & reuse Tevatron ring
OR 4km+6km km ring
2045 start physics
muC:Stage1
3 TeV
10km & 16.5 km tunnels
Stage2
10 TeV;
≈ 10 ab-1
(tecnologically limited, as from Snowmass 22)
Note: Possibility of
125 GeV or 1 TeV at Stage 1