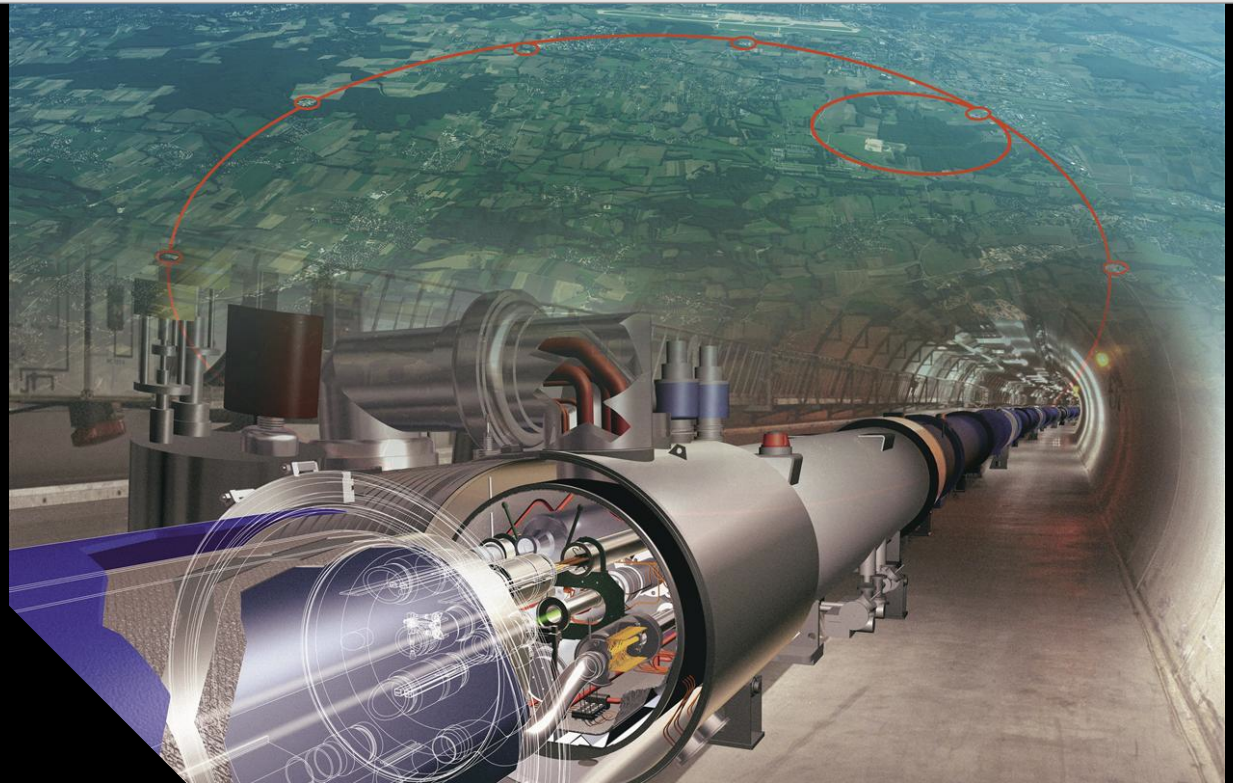
The European Strategy for Particle Physics

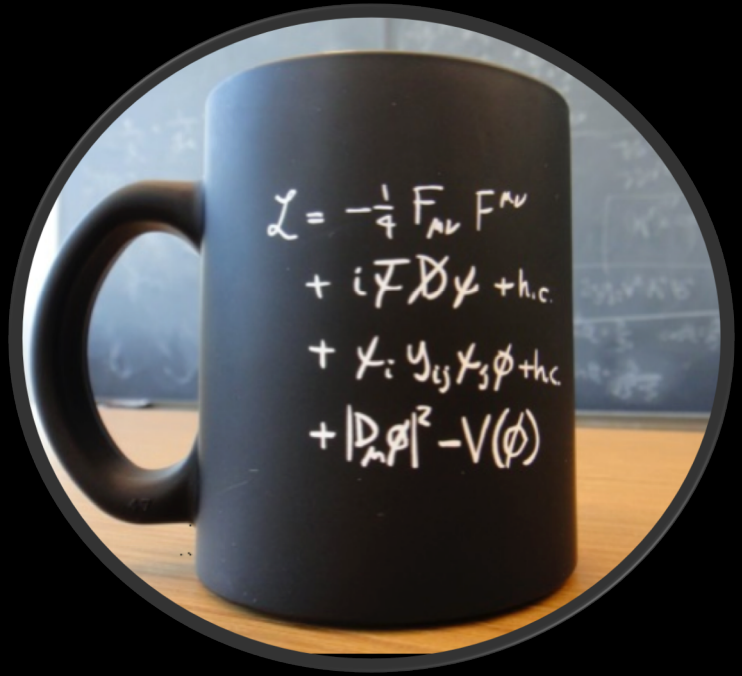
Jorgen D'Hondt
Vrije Universiteit Brussel
ECFA chairperson
(https://ecfa.web.cern.ch)

JENAS @ Orsay
Oct 14-16, 2019



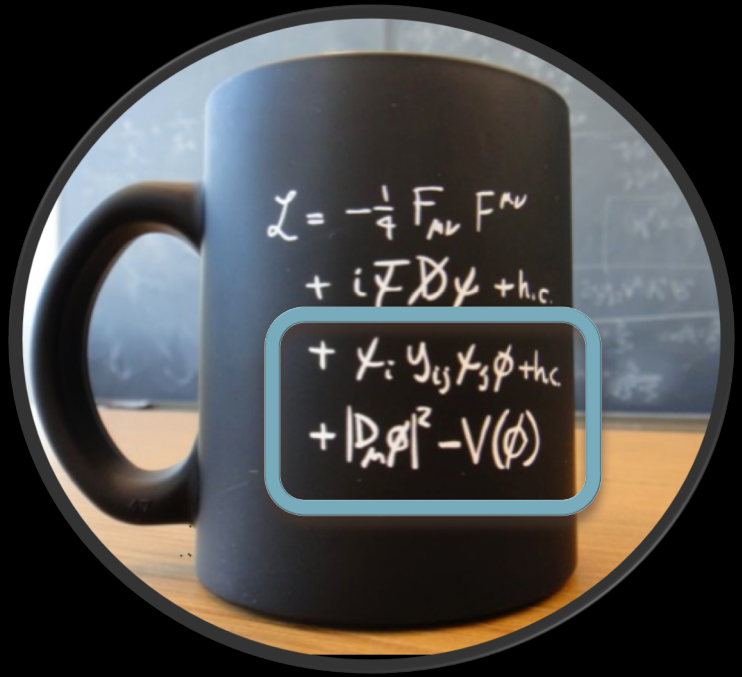
understand nature at the
largest and the smallest scales

Particle Physics today



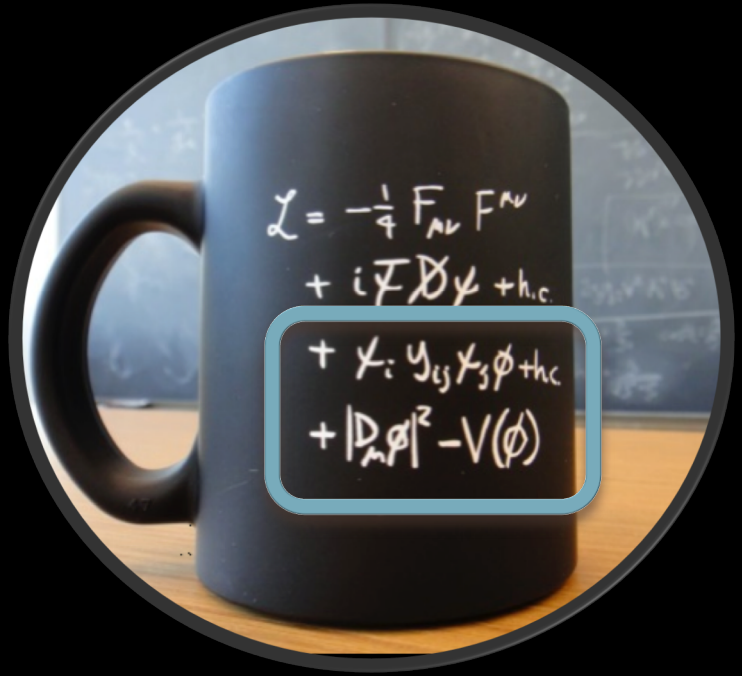
enormous success in describing matter at the smallest scales

Particle Physics today



enormous success in describing matter at the smallest scales

Particle Physics today



enormous success in describing matter at the smallest scales

describing ≠ understanding

Key open questions for particle physics?

Riccardo Rattazzi
@ Granada

Problems vs Mysteries

- Dark Matter
- Baryogenesis
- Strong CP
- Fermion mass spectrum & mixing

Plausible EFT solutions exist

- Cosmological Constant
- EW hierarchy
- Black Hole information paradox
- very Early Universe

Challenge or outside EFT paradigm

although there is no lack of novel theoretical ideas, there are no clear indications where the next paradigm shift is hiding

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an argument for a strong and diverse, yet coherent and concerted empirical exploration

although there is no lack of

ideas, the

ing and diverse,

herent and concerted empirical exploration

In order to make progress in unravelling the smallest and largest scales of Nature

we need a strong story

Long-term strategy for Particle Physics

Organization (2013 update):
http://europeanstrategygroup.web.cern.ch/europeanstrategygroup/

Organization (2006):
http://council-strategygroup.web.cern.ch/council-strategygroup/

The European Particle Physics Strategy 2013

https://cds.cern.ch/record/1567258/files/esc-e-106.pdf - *with the highest priority*

① Europe's top priority should be the exploitation of the full potential of the LHC, including the high-luminosity upgrade of the machine and detectors with a view to collecting ten times more data than in the initial design, by around 2030. This upgrade programme will also provide further exciting opportunities for the study of flavour physics and the quark-gluon plasma.

② CERN should undertake design studies for accelerator projects in a global context, with emphasis on proton-proton and electron-positron high-energy frontier machines. These design studies should be coupled to a vigorous accelerator R&D programme, including high-field magnets and high-gradient accelerating structures, in collaboration with national institutes, laboratories and universities worldwide.

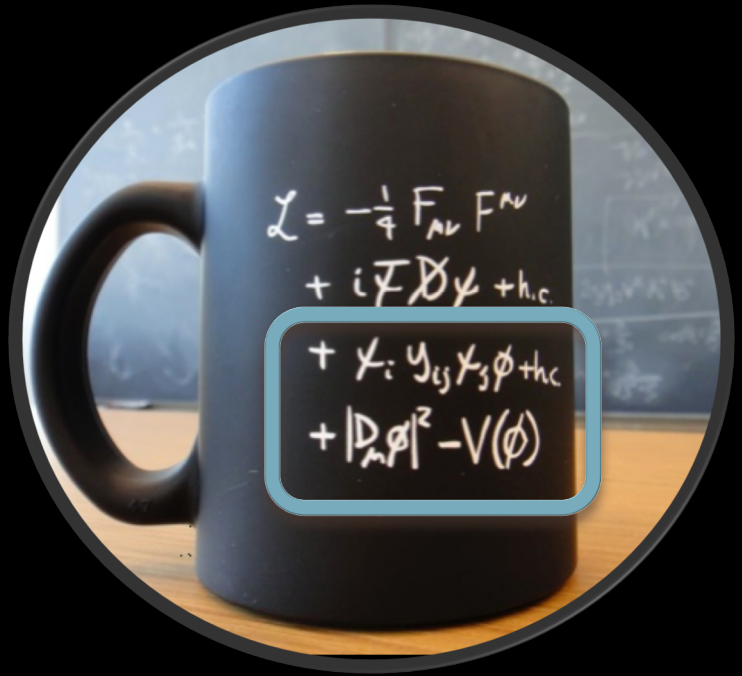
③ Europe looks forward to a [ILC] proposal from Japan to discuss a possible participation.

④ CERN should develop a neutrino programme to pave the way for a substantial European role in future long-baseline experiments. Europe should explore the possibility of major participation in leading long-baseline neutrino projects in the US and Japan.

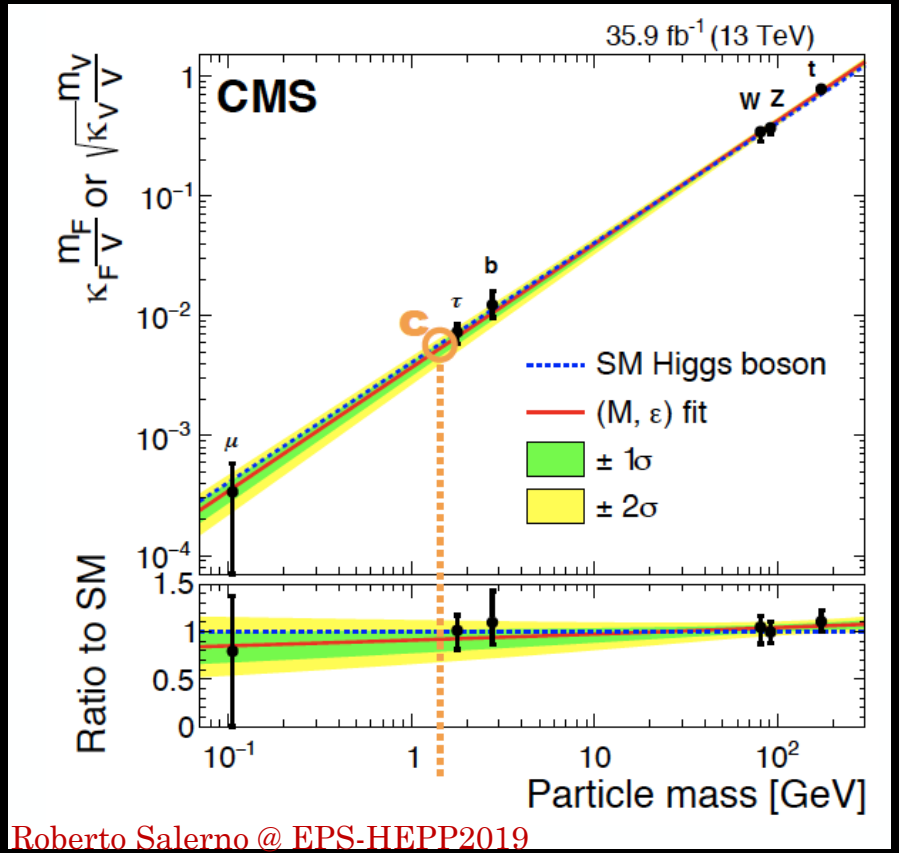
1st priority

LHC and HL-LHC

Initial legacy impact of the LHC

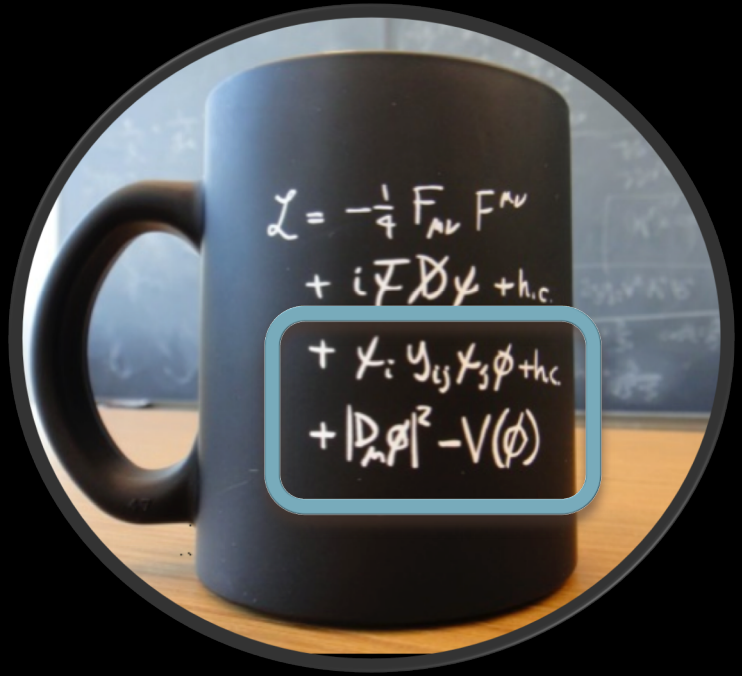


a MORE PRECISE and more COMPLETE description



Roberto Salerno @ EPS-HEPP2019

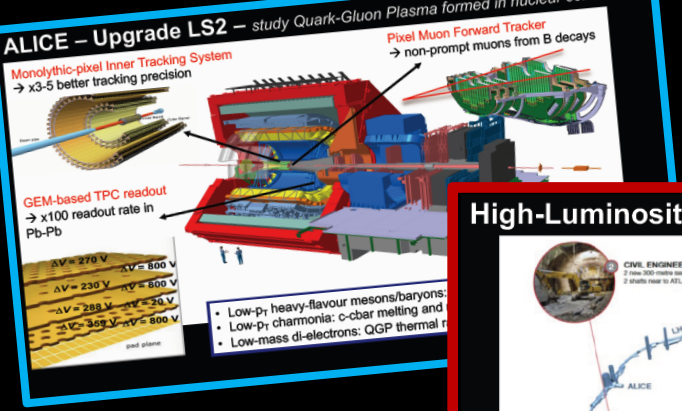
Initial legacy impact of the LHC



a MORE PRECISE and more COMPLETE description

connection

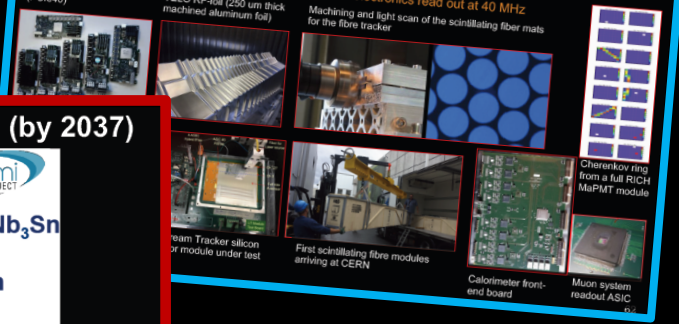
ALICE – Upgrade LS2 – *study Quark-Gluon Plasma formed in nuclear collisions*



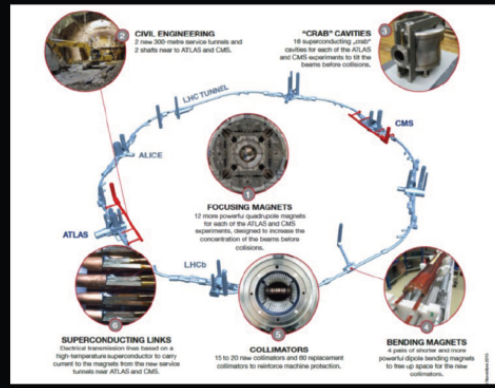
LHCb – Upgrade LS2

Construction well advanced

- Will collect 50 fb^{-1} at instantaneous lumi of 2x10^{33}cm^{-2}s^{-1}
- Full software trigger
- New tracking detectors
- New RICH photon detectors
- New electronics read out at 40 MHz



High-Luminosity LHC: 300/fb (by 2023) → 3000/fb (by 2037)



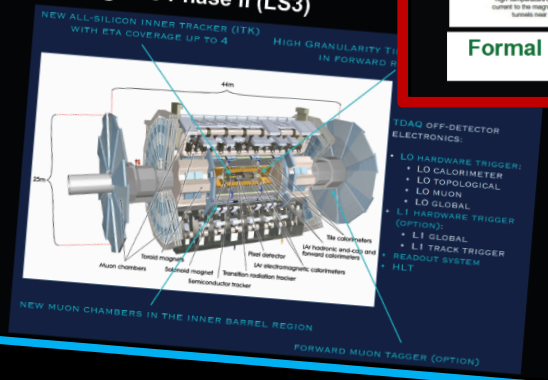
HiLumi HL-LHC PROJECT

- New IR-quads Nb_3Sn (inner triplets)
- New 11 T Nb_3Sn (short) dipoles
- Collimation upgrade
- Cryogenics upgrade
- Crab Cavities
- Cold powering
- Machine protection
- Civil engineering

Formal approval by CERN Council (June 2016)
Cost to Completion : 950 MCHF (material)

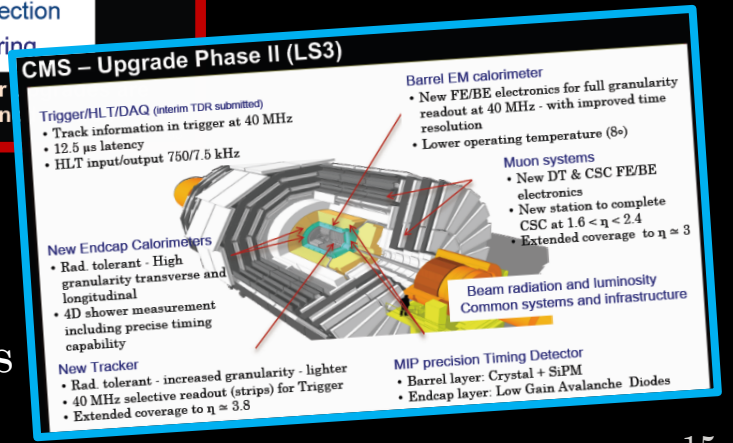
Detector plann

ATLAS – Upgrade Phase II (LS3)

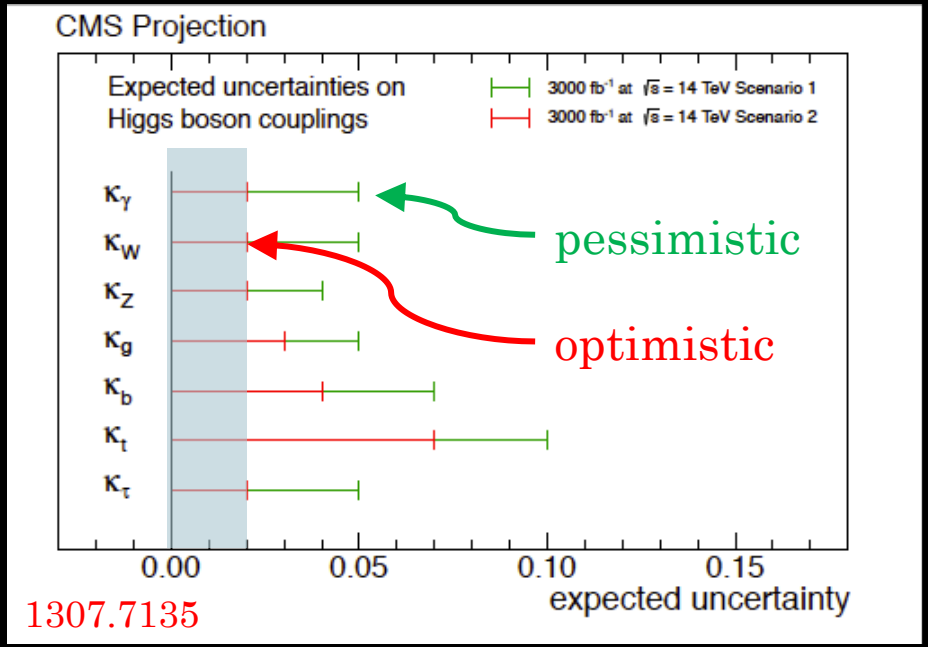


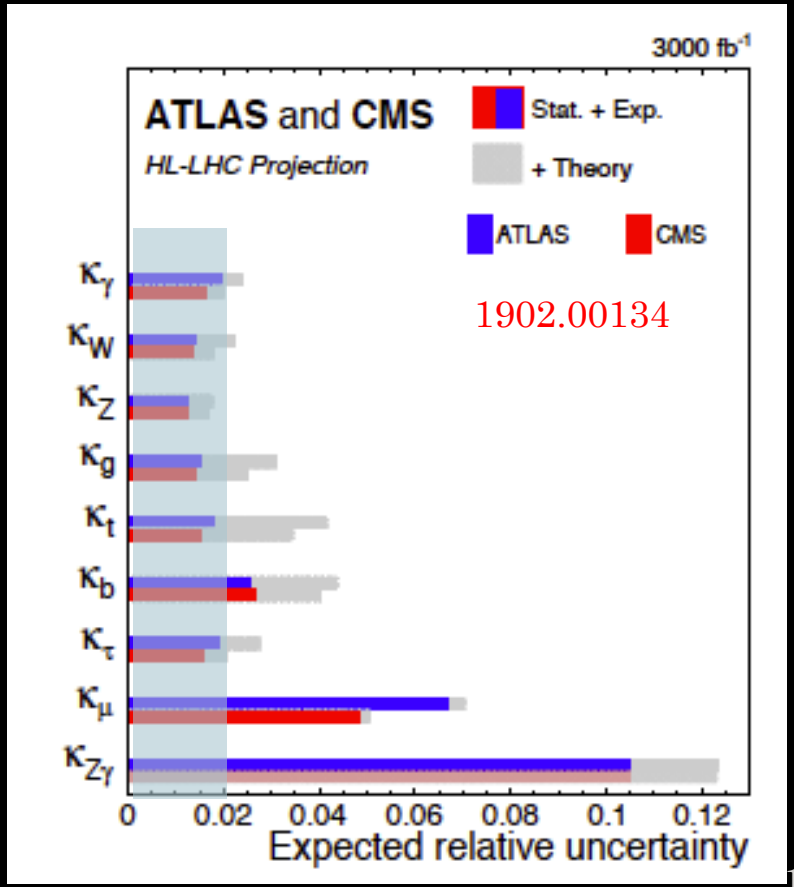
since ~10 years
for another ~20 years

CMS – Upgrade Phase II (LS3)



Potential HL-LHC performance in Higgs couplings
anno 2013 versus anno 2019





Taking into account innovative thoughts and research experience, what was optimistic in 2013 seems realistic in 2019.

Potential HL-LHC performance in Higgs couplings
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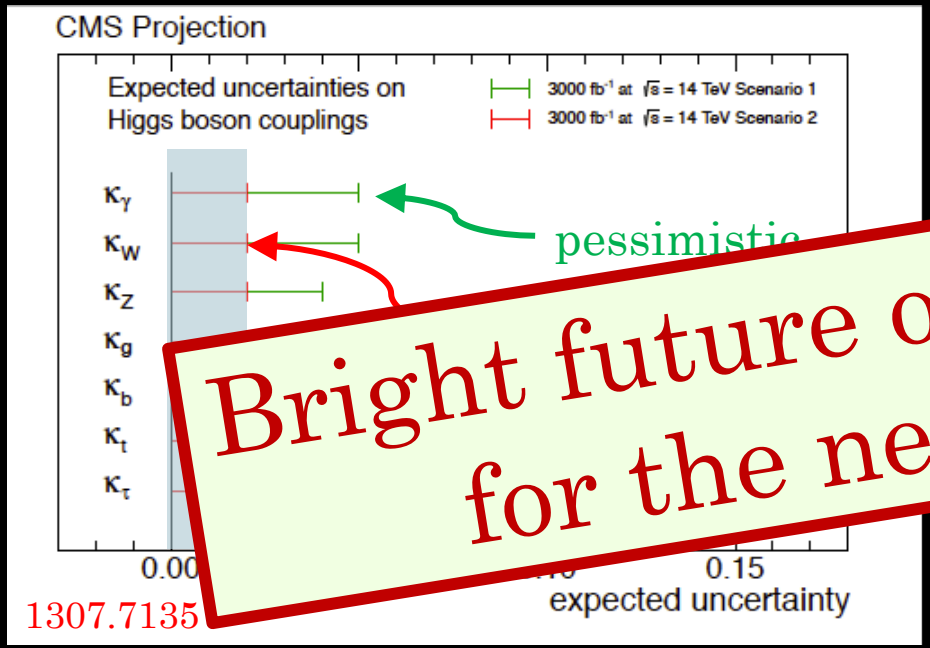


Bright future of opportunities for the next 20 years

Taking into account innovative thoughts and research experience, what was optimistic in 2013 seems realistic in 2019.

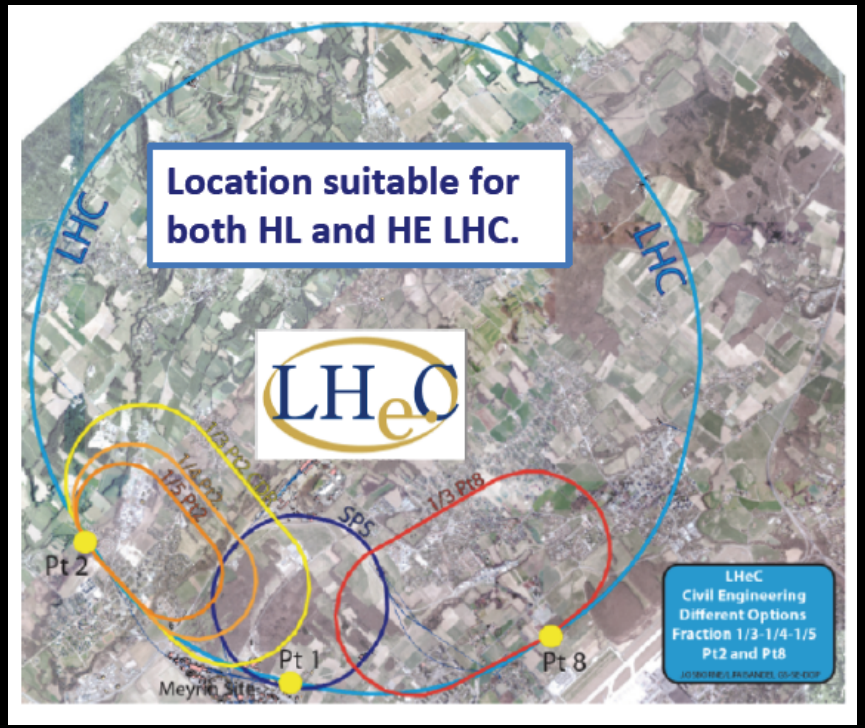
2nd priority

Future colliders at CERN
Accelerator R&D

Concrete collider options studied at CERN

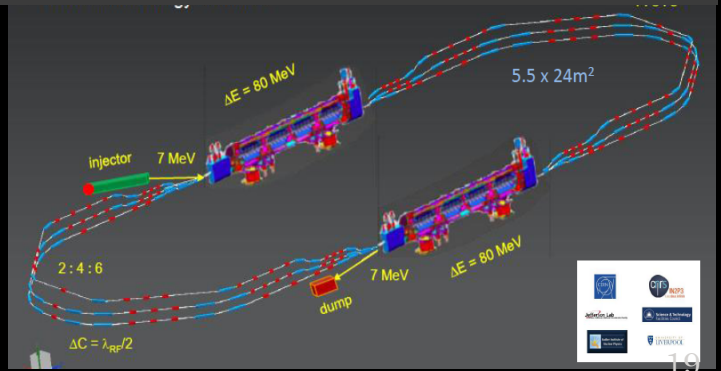
LHeC (ep), http://lhec.web.cern.ch

J. Phys. G: Nucl. Part. Phys. 39 (2012) 075001 [arXiv:1206.2913]



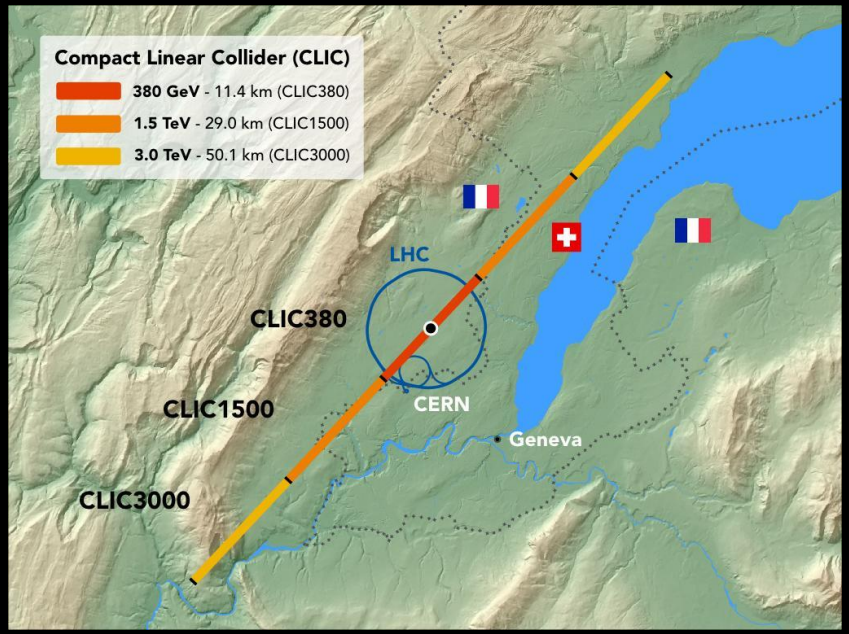
LHeC (60 GeV e- from ERL)
E_{cms} = *0.2 – 1.3 TeV*
run with the HL-LHC (≳ Run5)

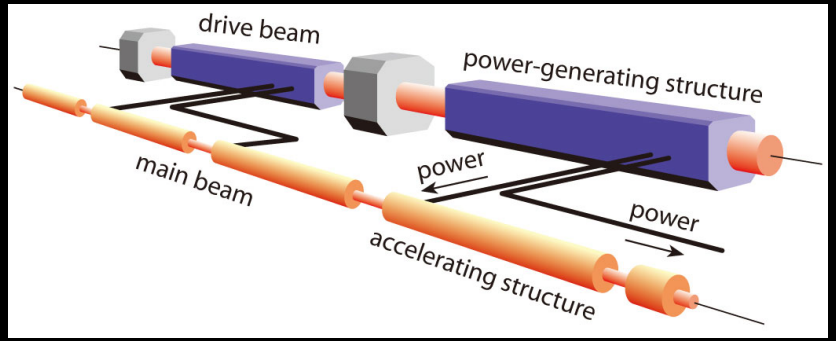
Energy Recovery Linac (ERL)
R&D demonstrator at Orsay, PERLE



Concrete collider options studied at CERN

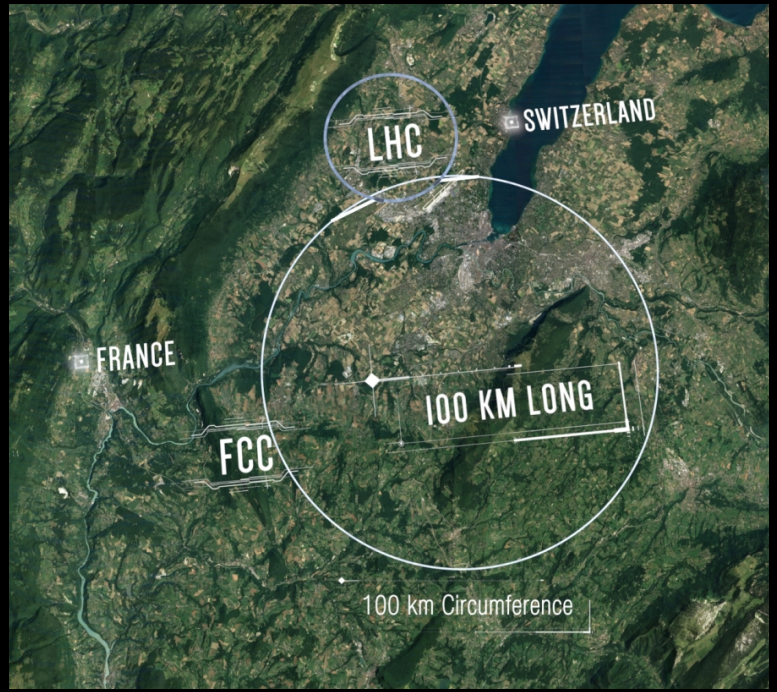
CLIC (ee), http://clic-study.web.cern.ch/





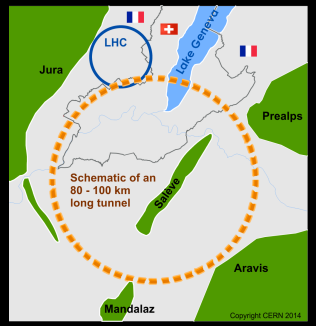
Concrete collider options studied at CERN

FCC (ee, ep, pp, pA, AA, eA), https://fcc-cdr.web.cern.ch/

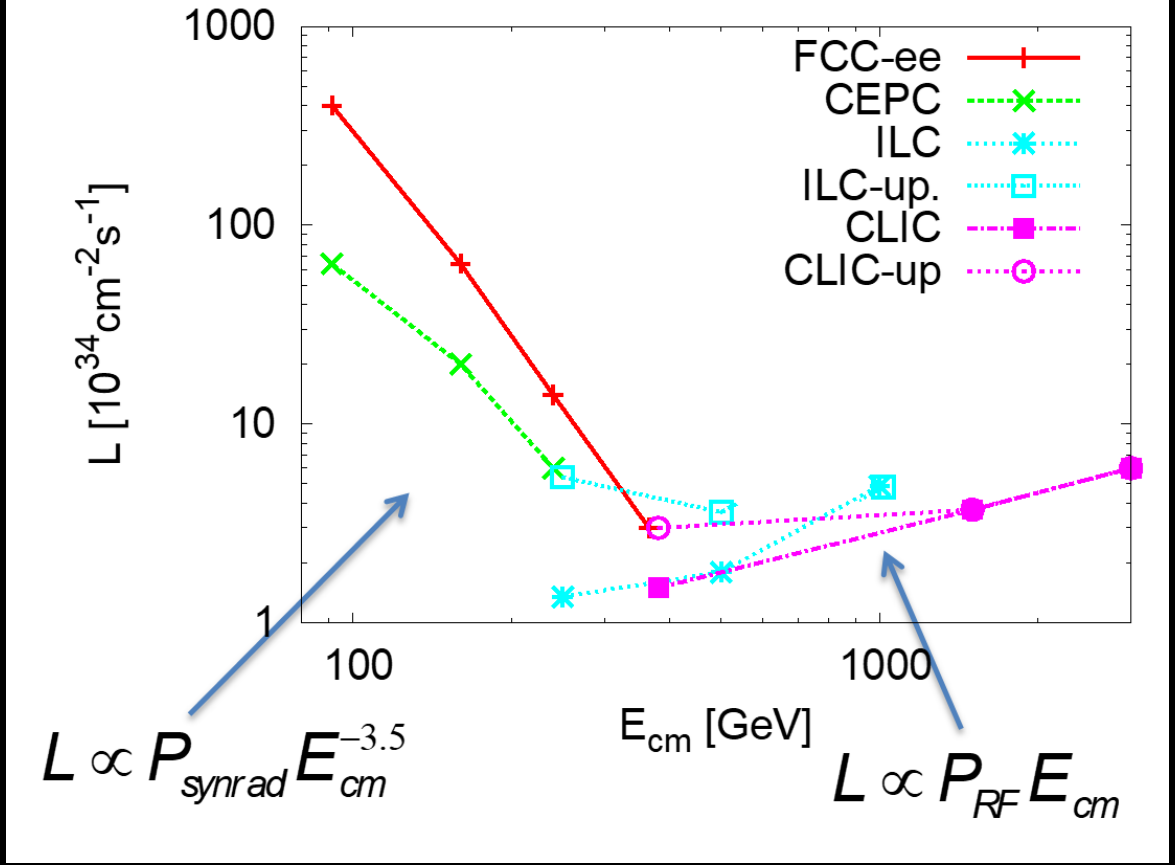


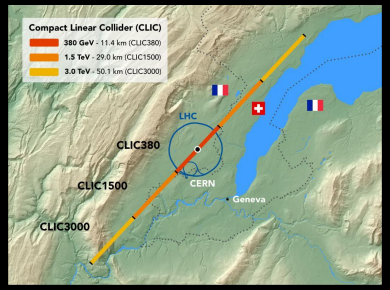
- e^+e^- **collider (*FCC-ee*) @ 90-365 GeV** as potential first step

  (ERL-technology, CLIC injector, …)
- ***pp*-collider (*FCC-hh*) @ 100 TeV**
- ***p-e* collider (*FCC-he*)**
- **HE-LHC** with *FCC-hh magnets*
- ***μμ* colider (*FCC-μμ*)** option
- AA, Ap, Ae options

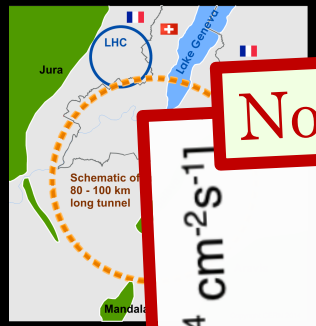


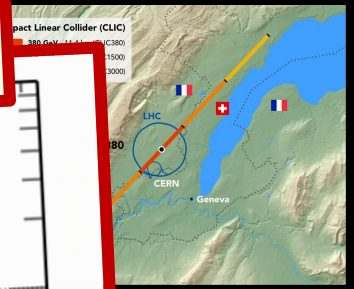
Luminosity per facility

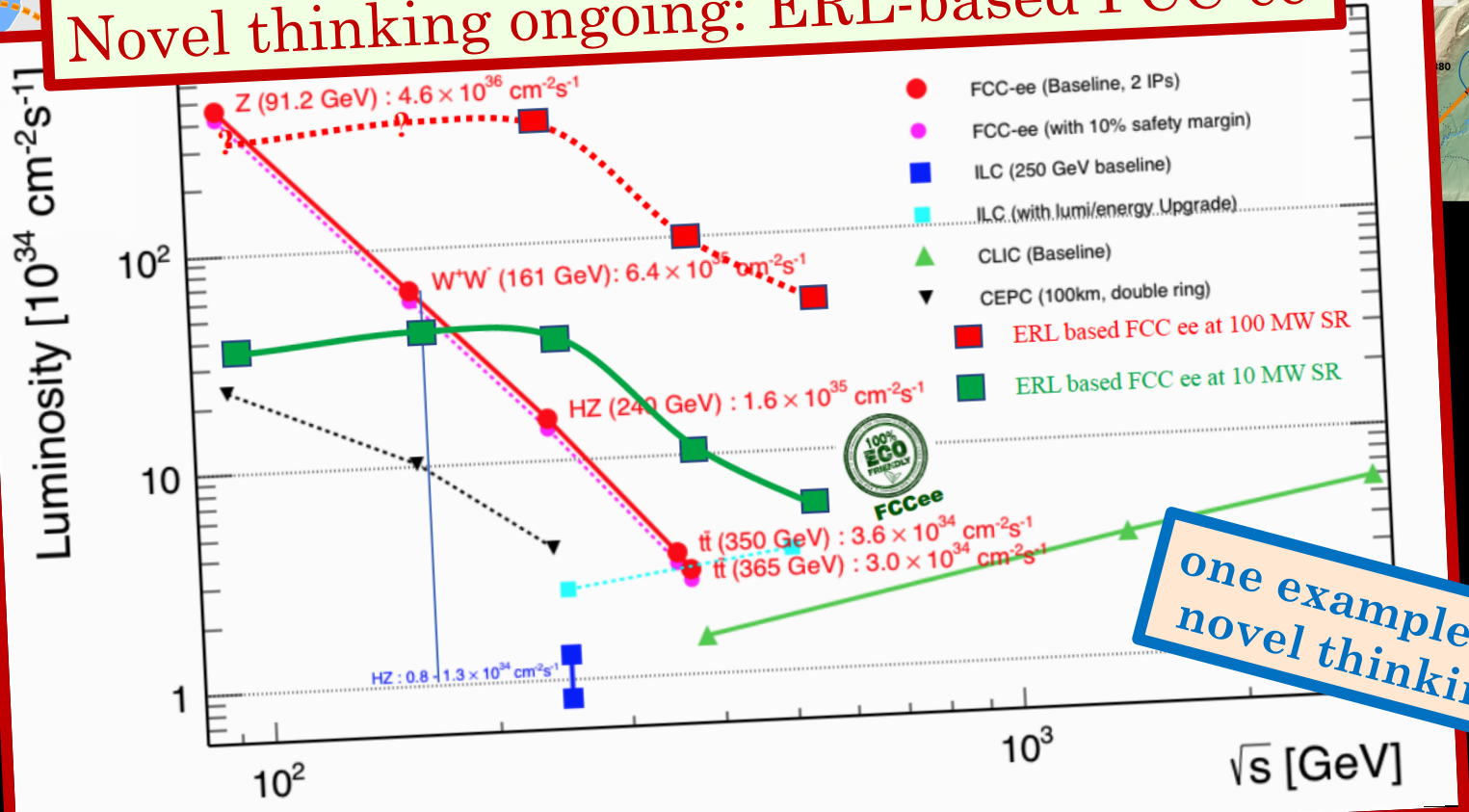




Novel thinking ongoing: ERL-based FCC-ee







one example of novel thinking

Maria Chamizo @ FCC week: https://indico.cern.ch/event/727555/contributions/3474689/

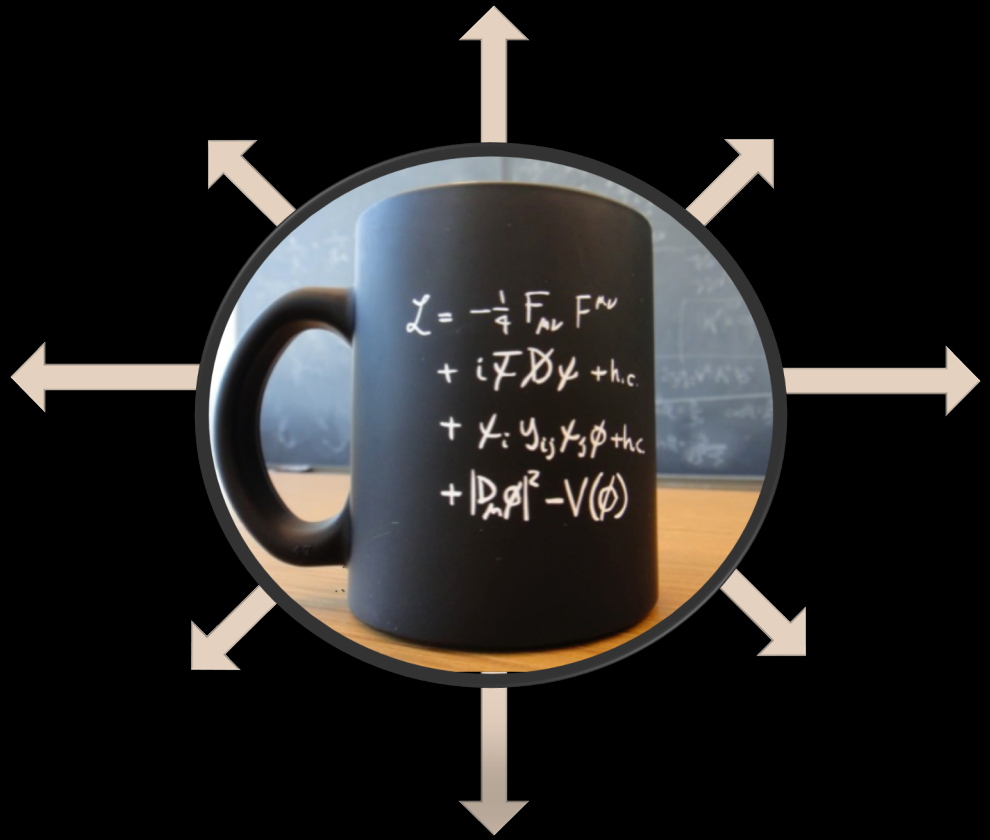
2nd priority

Future colliders at CERN

Accelerator R&D

higher energy interactions in the lab

earlier universe



rarer processes

higher energetic phenomena in the universe

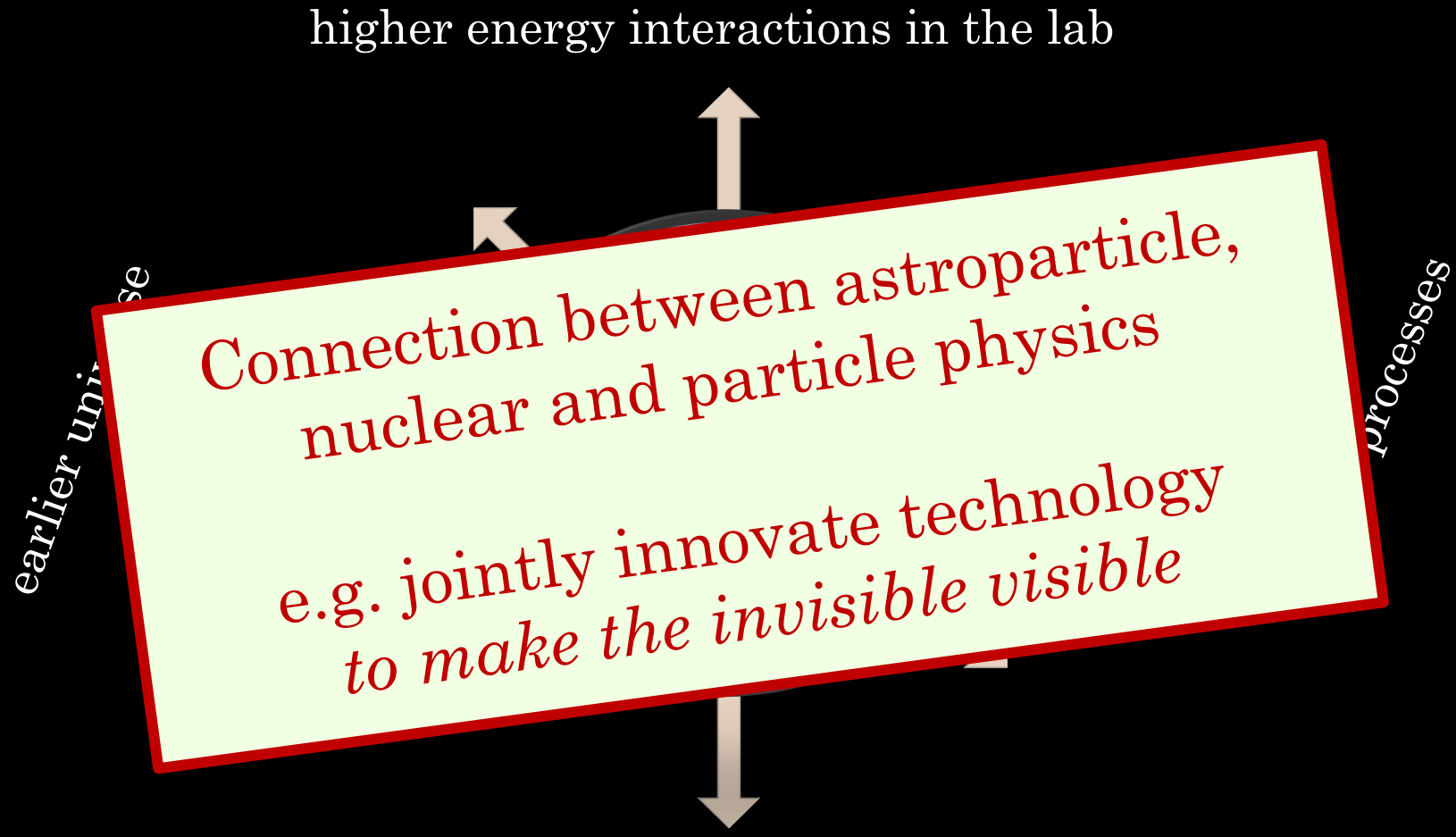
higher energy interactions in the lab

earlier universe

Innovate Technology
make the invisible visible

rarer processes

higher energetic phenomena in the universe


higher energy interactions in the lab
earlier uni se
processes
Connection between astroparticle, nuclear and particle physics
e.g. jointly innovate technology to make the invisible visible
higher energetic phenomena in the universe

What is out there on our accelerator/collider technology front?

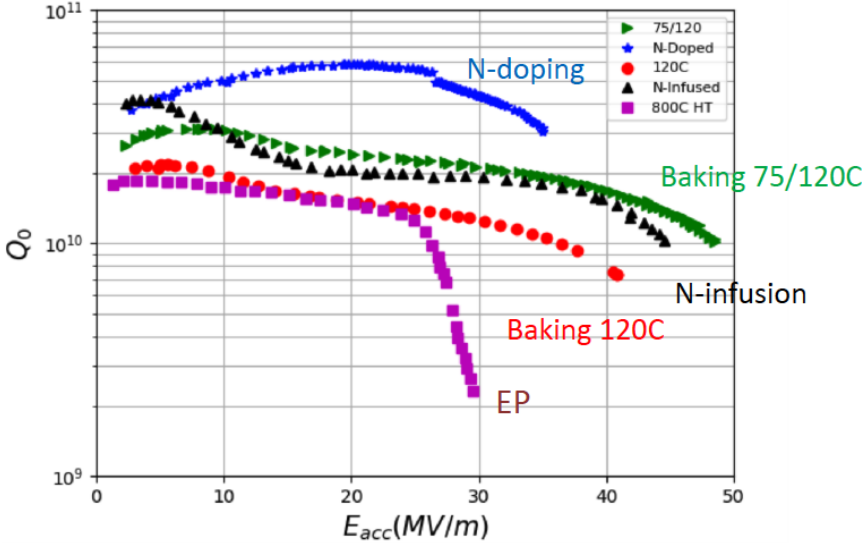
(only a very brief snapshot)

Superconducting RF cavity R&D *~50MV/m within reach, XFEL@DESY has ~30MV/m*

Akira Yamamoto
@ Granada

State of the Art in High-Q and High-G (1.3 GHz, 2K)

Courtesy: Anna Grassellino
- TTC Meeting, TRIUMF, Feb., 2019



- **N-doping** (@ 800C for ~a few min.)
  - Q >3E10, G = 35 MV/m
- **Baking w/o N** (@ 75/120C)
  - Q >1E10, G =49 MV/m (Bpk-210 mT)
- **N-infusion** (@ 120C for 48h)
  - Q >1E10, G = 45 MV/m
- **Baking w/o N** (@ 120C for xx h)
  - Q >7E9, G = 42 MV/m
- **EP** (only)
  - Q >1.3E10, G = 25 MV/m

- **High-Q** by **N-Doping** well established, and
- **High-G** by N-infusion and **Low-T baking** still to be understood and reproduced, worldwide.

SC Magnet R&D – *16 T magnets would allow to reach much higher pp collision energies*

FRESCA2 @ CERN

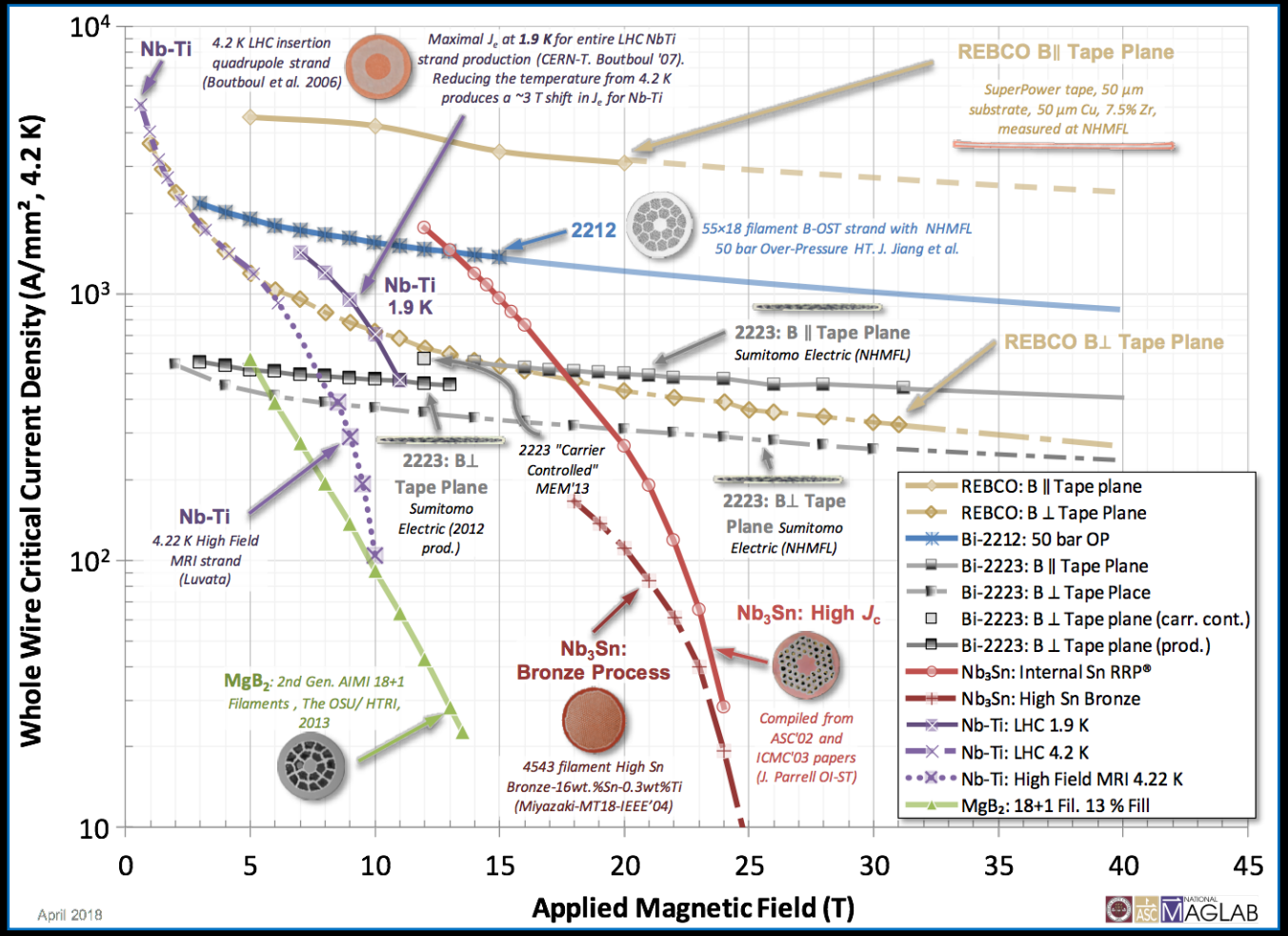
EuCARD²

Test new superconductive cables (Nb_3Sn)

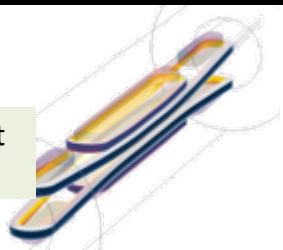
Dipole magnet
1.5 m long, 1 m diameter, 10 cm aperture

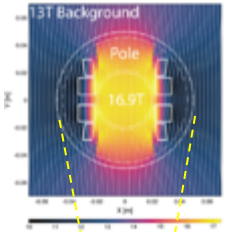
Reached 14.6 T (April 2018), a record for a magnet with a “free” aperture, and with only few quenches

SC Magnet R&D – *alternative materials for high-J_c at high magnetic field*

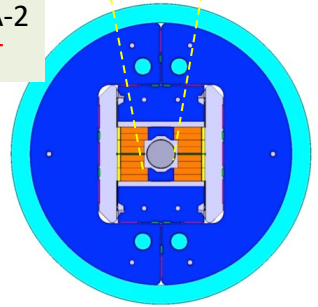


HTS-Insert
3~5 T





FRESCA-2
13-14 T



Eucard2: HTS-insert
to be tested in 2019
(3-5) + (13-14)T : > 16 T

Technology readiness

Akira Yamamoto
@ Granada

Personal View on Relative Timelines

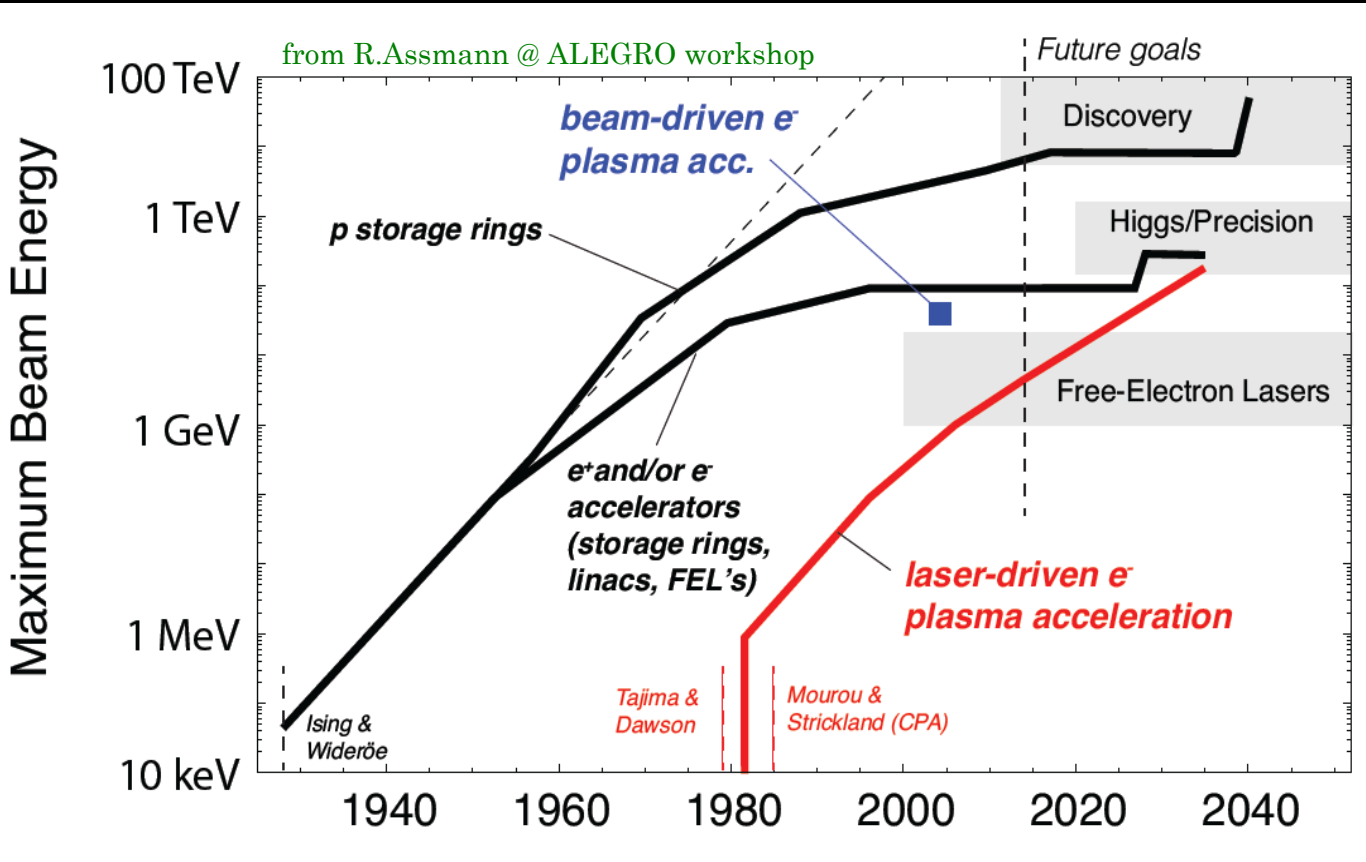
Timeline	~ 5	~ 10	~ 15	~ 20	~ 25	~ 30	~ 35
Lepton Colliders							
SRF-LC/CC	Proto/pre-series	Construction		Operation		Upgrade	
NRF—LC	Proto/pre-series	Construction		Operation		Upgrade	
Hadron Collier (CC)							
8~(11)T NbTi /(Nb3Sn)	Proto/pre-series	Construction		Operation			Upgrade
12~14T Nb_3Sn	Short-model R&D		Proto/Pre-series	Construction		Operation	
14~16T Nb_3Sn	Short-model R&D			Prototype/Pre-series		Construction	

Accelerator R&D – Advanced Novel Accelerators (ICFA Panel)

ALEGRO (Advanced LinEar collider study GROup, for a multi-TeV Advanced Linear Collider)

ALEGRO delivered a document detailing the international roadmap and strategy for Advanced and Novel Accelerators for High Energy Physics applications.

http://www.lpgp.u-psud.fr/icfaana/alegro

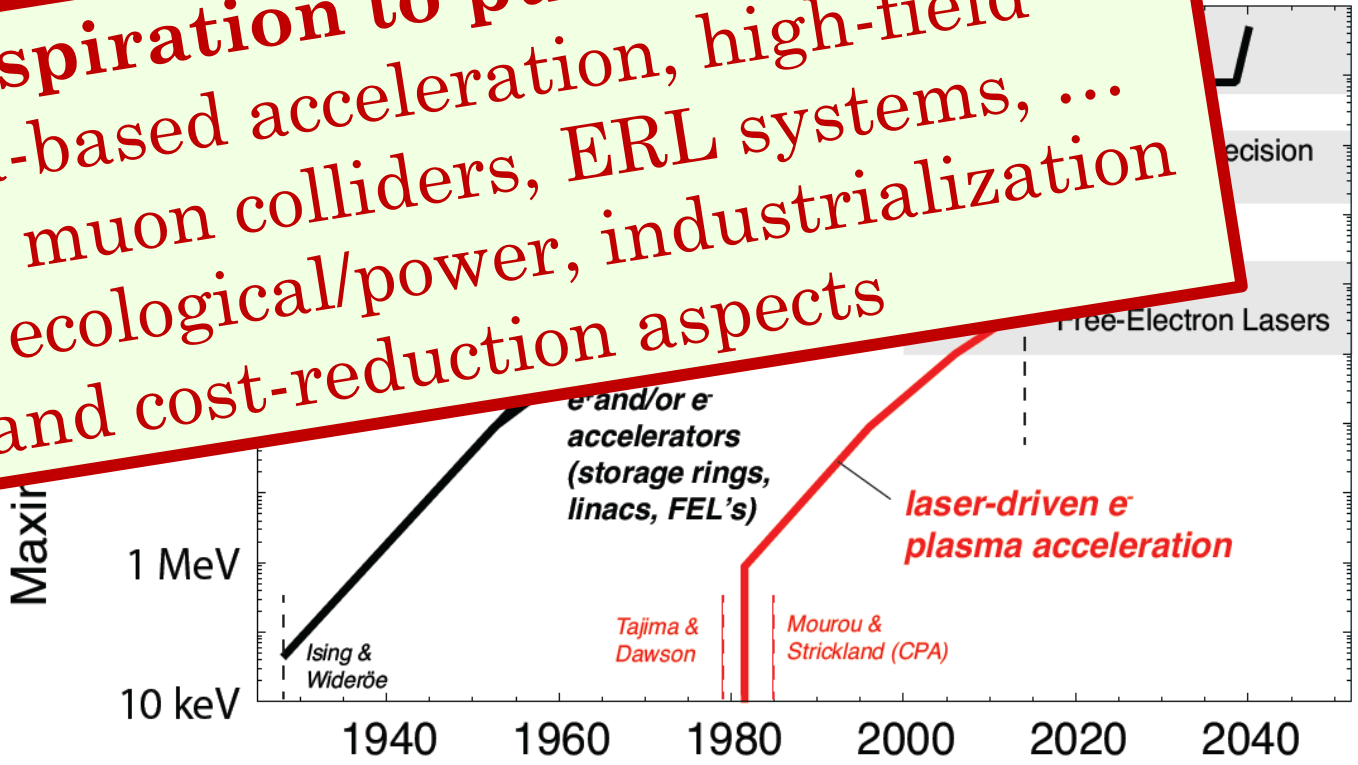


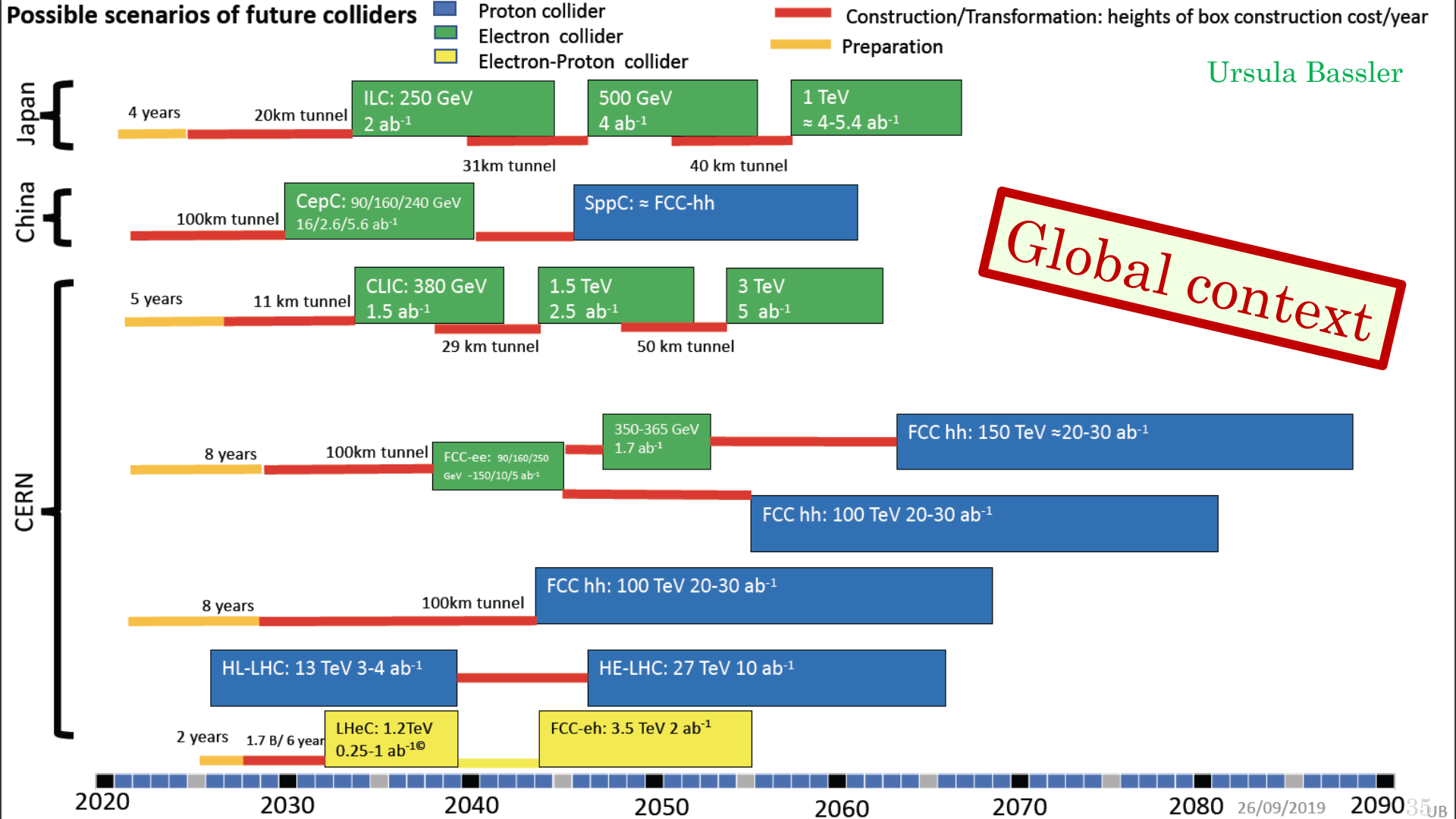
Accelerator R&D – Advanced Novel Accelerators (ICFA Panel)

ALEGRO (Advanced LinEar collider study GROup, for a multi-TeV Advanced Lin… …er)

ALEGRO delivered a
docum…
intern…
and st…
Novel …
(ANAs)

Strong aspiration to pursue R&D for:
plasma-based acceleration, high-field magnets, muon colliders, ERL systems, … including ecological/power, industrialization and cost-reduction aspects




Possible scenarios of future colliders
Proton collider
Electron collider
Electron-Proton collider
Construction/Transformation: heights of box construction cost/year
Preparation
Ursula Bassler
Japan
4 years
20km tunnel
ILC: 250 GeV
2 ab-1
500 GeV
4 ab-1
1 TeV
≈ 4-5.4 ab-1
31km tunnel
40 km tunnel
China
100km tunnel
CepC: 90/160/240 GeV
16/2.6/5.6 ab-1
SppC: ≈ FCC-hh
Global context
CERN
5 years
11 km tunnel
CLIC: 380 GeV
1.5 ab-1
1.5 TeV
2.5 ab-1
3 TeV
5 ab-1
29 km tunnel
50 km tunnel
8 years
100km tunnel
FCC-ee: 90/160/250 GeV ~150/10/5 ab-1
350-365 GeV
1.7 ab-1
FCC hh: 150 TeV ≈20-30 ab-1
FCC hh: 100 TeV 20-30 ab-1
8 years
100km tunnel
FCC hh: 100 TeV 20-30 ab-1
HL-LHC: 13 TeV 3-4 ab-1
HE-LHC: 27 TeV 10 ab-1
2 years
1.7 B/ 6 years
LHeC: 1.2TeV
0.25-1 ab-1©
FCC-eh: 3.5 TeV 2 ab-1
2020
2030
2040
2050
2060
2070
2080
2090
26/09/2019

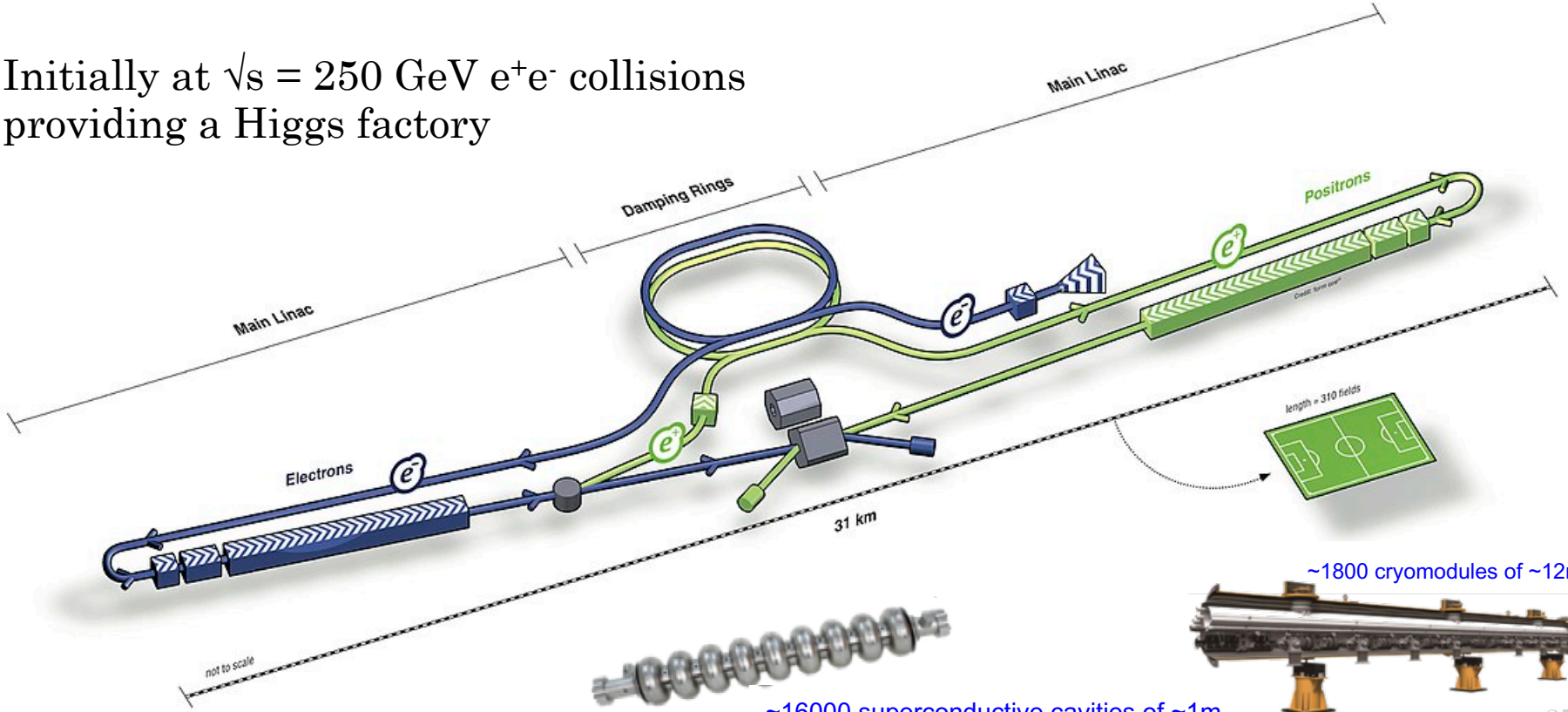
3rd priority

ILC at Japan

Towards an update of the strategy

Europe looks forward to a [ILC] proposal from Japan to discuss a possible participation.

Initially at $\sqrt{s} = 250$ GeV e^+e^- collisions providing a Higgs factory



~16000 superconductive cavities of ~1m

~1800 cryomodules of ~12m

Towards an update of the strategy

Europe looks forward to a [ILC] proposal from Japan to discuss a possible participation.

ICFA meeting, Tokyo, 6-8 March 2019

- We were informed about the position of MEXT on the ILC project. We heard as well as a speech from Hon. Kawamura from the Federation of Diet Members for the ILC. https://www.kek.jp/en/newsroom/2019/03/13/2100/
- In response, the ICFA statement: https://icfa.fnal.gov/wp-content/uploads/ICFA_Tokyo_Statement_March2019.pdf
- The letter from the Linear Collider Board (LCB): https://icfa.fnal.gov/wp-content/uploads/LCB_letter_to_MEXT-signed.pdf

"MEXT has not yet reached declaration for hosting the ILC in Japan at this moment"

"MEXT will pay close attention to the progress of the discussions at the European Strategy for Particle Physics Update"

"MEXT will continue to discuss the ILC project with other governments while having an interest in the ILC project"

4^{th} priority

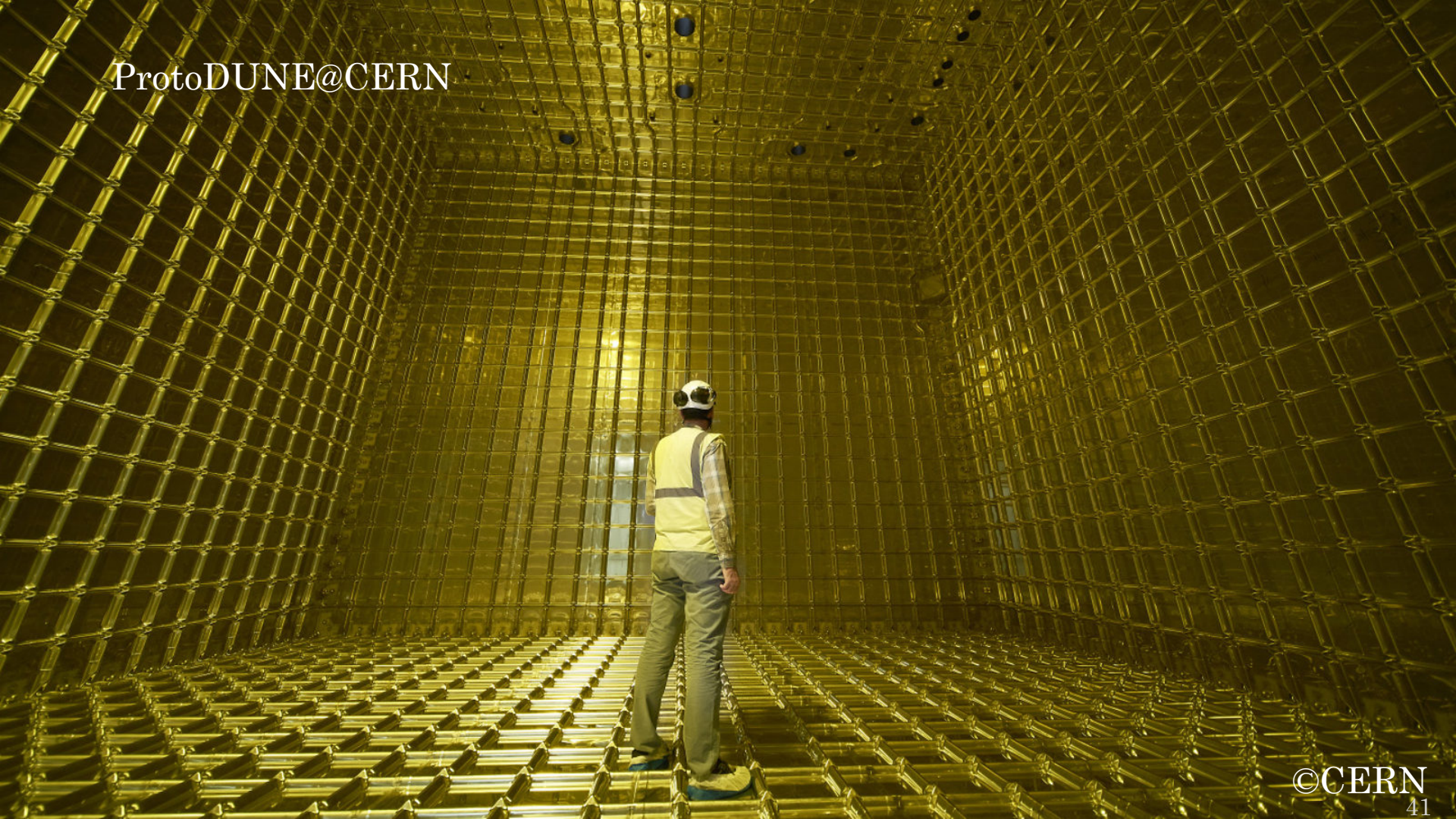
Neutrino Platform

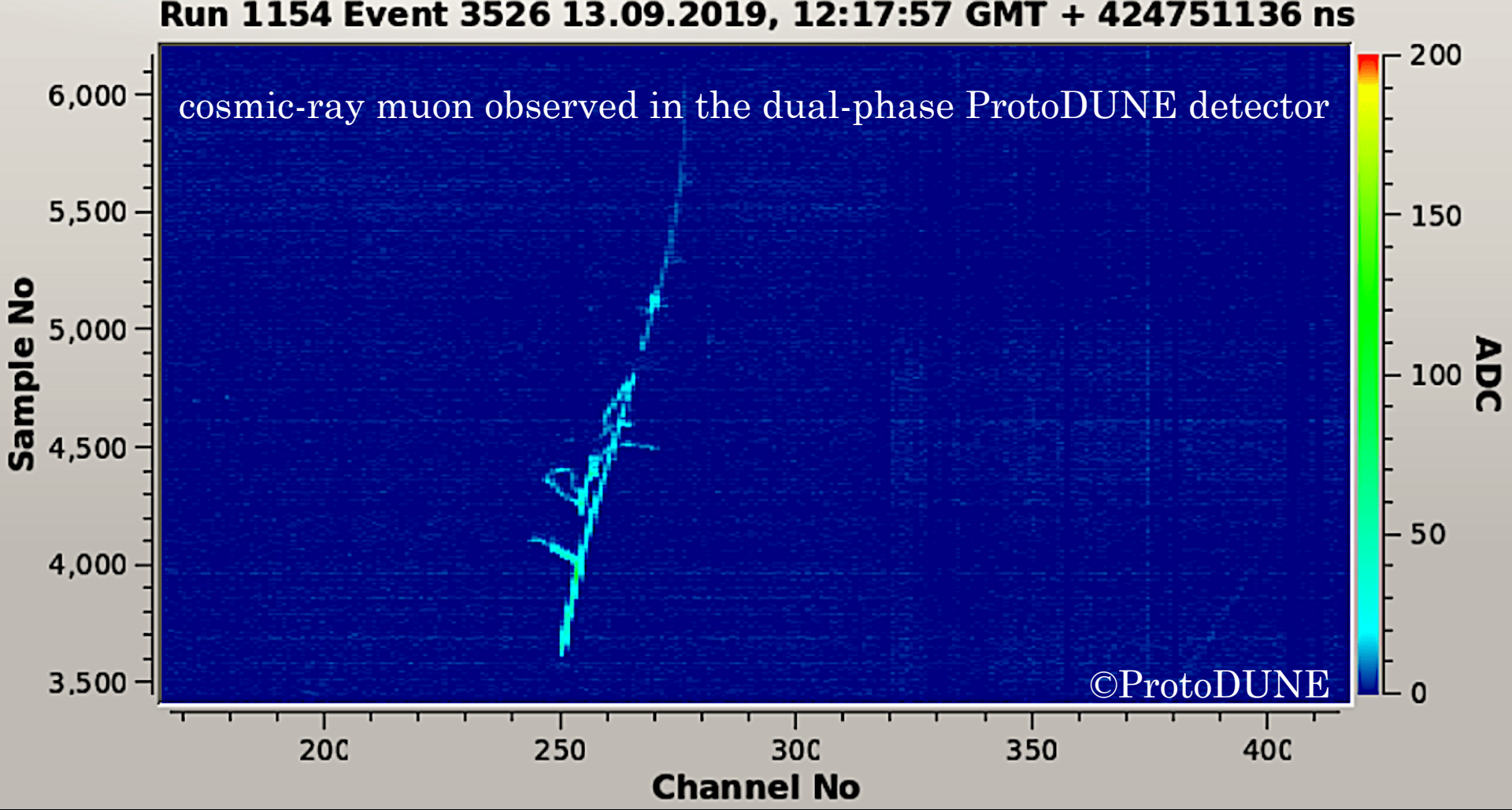
Towards an update of the strategy

CERN should develop a neutrino programme to pave the way for a substantial European role in future long-baseline experiments. Europe should explore the possibility of major participation in leading long-baseline neutrino projects in the US and Japan.

Since 2014 the CERN Neutrino Platform fosters the collaboration of ~90 European institutions in detector R&D and construction.
e.g. DUNE@LBNF (US) and ND280@T2K (Japan)

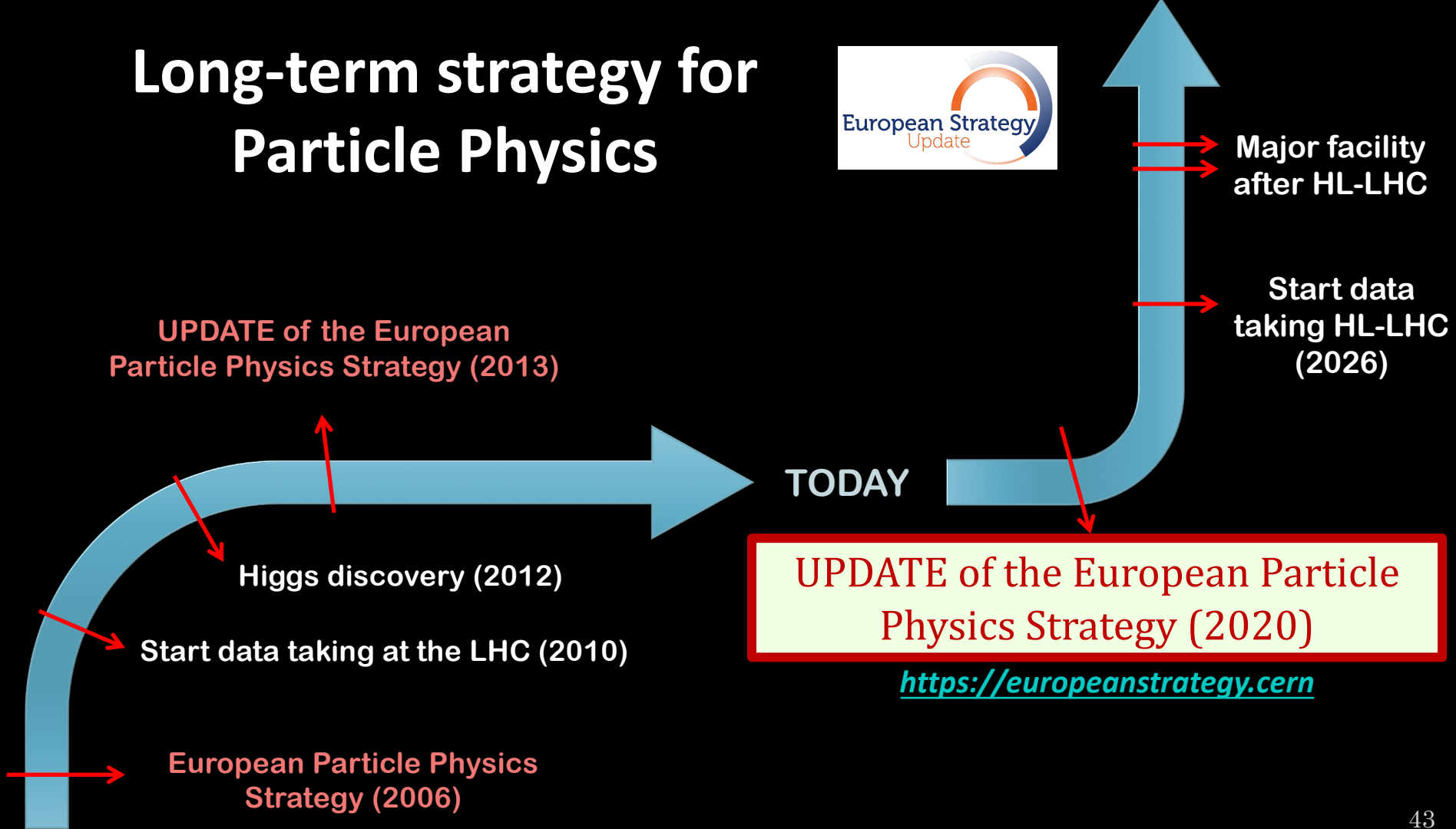
Upgrades are considered in due time for these long-baseline neutrino projects.
e.g. doubling the beam power at DUNE (from 1.2MW to 2.4 MW)


ProtoDUNE@CERN
©CERN



https://home.cern/news/news/experiments/tests-start-cern-large-scale-prototype-new-technology-detect-neutrinos

Long-term strategy for Particle Physics



Open Symposium
Towards updating the European Strategy for Particle Physics
May 13-16, 2019, Granada, Spain
https://cafpe.ugr.es/eppsu2019/
~600 participants
Information captured in 8 thematic summary talks

Physics Briefing Book
Physics Preparatory Group

- Overviewing the submitted input and the discussions in Granada
- Excluding references etc. about 200 pages
- The work of many!
- http://cds.cern.ch/record/2691414

Physics Briefing Book

European Strategy Update

Input for the European Strategy for Particle Physics Update 2020

Electroweak Physics: Richard Keith Ellis[1], Beate Heinemann[2,3] *(Conveners)*
Jorge de Blas[4,5], Maria Cepeda[6], Christophe Grojean[2,7], Fabio Maltoni[8,9], Aleandro Nisati[10], Elisabeth Petit[11], Riccardo Rattazzi[12], Wouter Verkerke[13] *(Contributors)*

Strong Interactions: Jorgen D'Hondt[14], Krzysztof Redlich[15] *(Conveners)*
Anton Andronic[16], Ferenc Siklér[17] *(Scientific Secretaries)*
Nestor Armesto[18], Daniël Boer[19], David d'Enterria[20], Tetyana Galatyuk[21], Thomas Gehrmann[22], Klaus Kirch[23], Uta Klein[24], Jean-Philippe Lansberg[25], Gavin P. Salam[26], Gunar Schnell[27], Johanna Stachel[28], Tanguy Pierog[29], Hartmut Wittig[30], Urs Wiedemann[20] *(Contributors)*

Flavour Physics: Belen Gavela[31], Antonio Zoccoli[32] *(Conveners)*
Sandra Malvezzi[33], Ana Teixeira[34], Jure Zupan[35] *(Scientific Secretaries)*
Daniel Aloni[36], Augusto Ceccucci[20], Avital Dery[36], Michael Dine[37], Svetlana Fajfer[38], Stefania Gori[37], Gudrun Hiller[39], Gino Isidori[22], Yoshikata Kuno[40], Alberto Lusiani[41], Yosef Nir[36], Marie-Helene Schune[42], Marco Sozzi[43], Stephan Paul[44], Carlos Pena[31] *(Contributors)*

Neutrino Physics & Cosmic Messengers: Stan Bentvelsen[45], Marco Zito[46,47] *(Conveners)*
Albert De Roeck[20], Thomas Schwetz[29] *(Scientific Secretaries)*
Bonnie Fleming[48], Francis Halzen[49], Andreas Haungs[29], Marek Kowalski[2], Susanne Mertens[44], Mauro Mezzetto[5], Silvia Pascoli[50], Bangalore Sathyaprakash[51], Nicola Serra[22] *(Contributors)*

Beyond the Standard Model: Gian F. Giudice[20], Paris Sphicas[20,52] *(Conveners)*
Juan Alcaraz Maestre[6], Caterina Doglioni[53], Gaia Lanfranchi[20,54], Monica D'Onofrio[24], Matthew McCullough[20], Gilad Perez[36], Philipp Roloff[20], Veronica Sanz[55], Andreas Weiler[44], Andrea Wulzer[4,12,20] *(Contributors)*

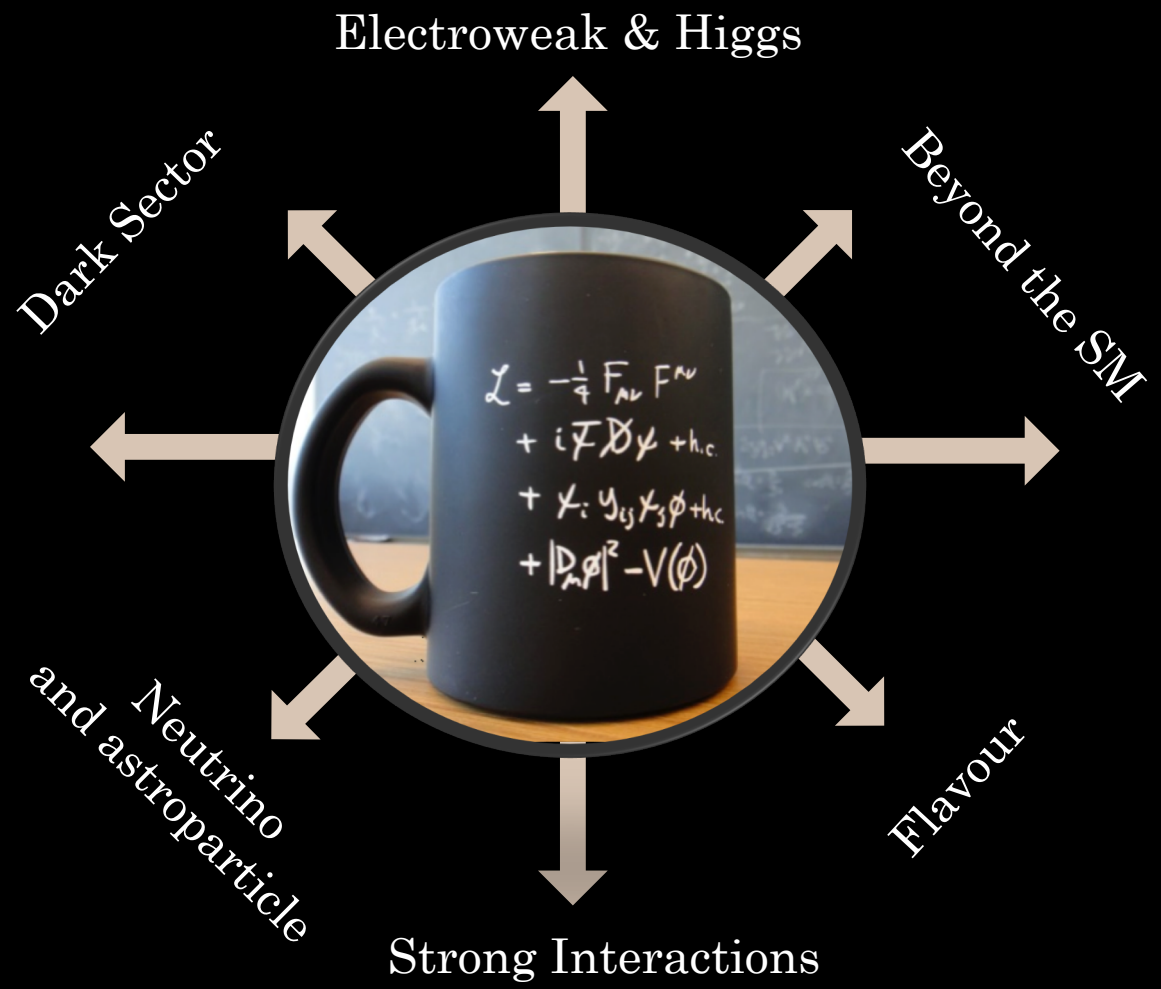
Dark Matter and Dark Sector: Shoji Asai[56], Marcela Carena[57] *(Conveners)*
Babette Döbrich[20], Caterina Doglioni[53], Joerg Jaeckel[28], Gordan Krnjaic[57], Jocelyn Monroe[58], Konstantinos Petridis[59], Christoph Weniger[60] *(Scientific Secretaries)*

Accelerator Science and Technology: Caterina Biscari[61], Leonid Rivkin[62] *(Conveners)*
Philip Burrows[26], Frank Zimmermann[20] *(Scientific Secretaries)*
Michael Benedikt[20], Edda Gschwendtner[20], Erk Jensen[20], Mike Lamont[20], Wim Leemans[2], Lucio Rossi[20], Daniel Schulte[20], Mike Seidel[62], Vladimir Shiltsev[63], Steinar Stapnes[20], Akira Yamamoto[20,64] *(Contributors)*

Instrumentation and Computing: Xinchou Lou[65], Brigitte Vachon[66] *(Conveners)*
Roger Jones[67], Emilia Leogrande[20] *(Scientific Secretaries)*
Ian Bird[20], Amber Boehnlein[68], Simone Campana[20], Ariella Cattai[20], Didier Contardo[69], Cinzia Da Via[70], Francesco Forti[71], Maria Girone[20], Matthias Kasemann[2], Weidon Li[65], Lucie Linssen[20], Felix Sefkow[2], Graeme Stewart[20] *(Contributors)*

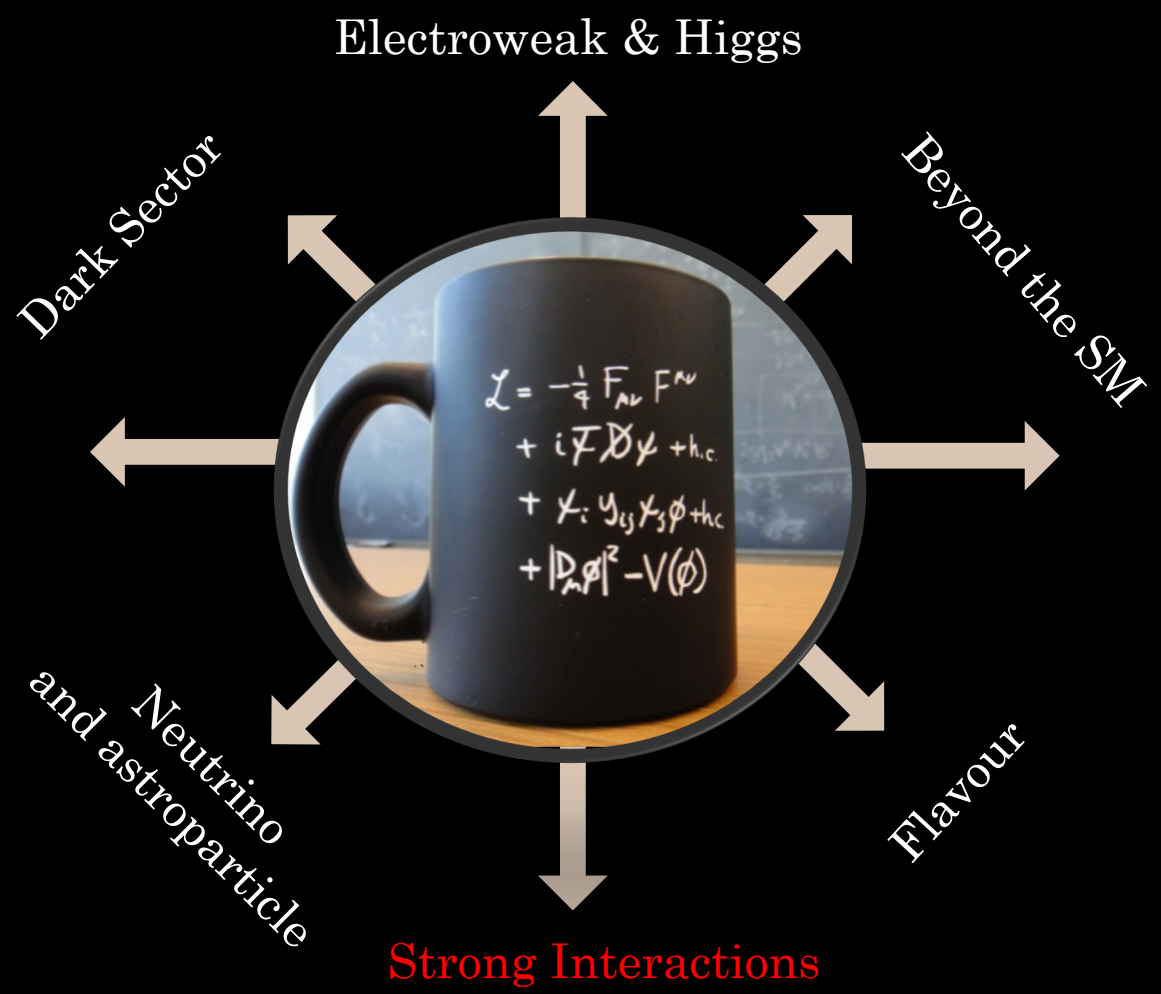
Editors: Halina Abramowicz[72], Roger Forty[20], and the Conveners

The Granada physics themes



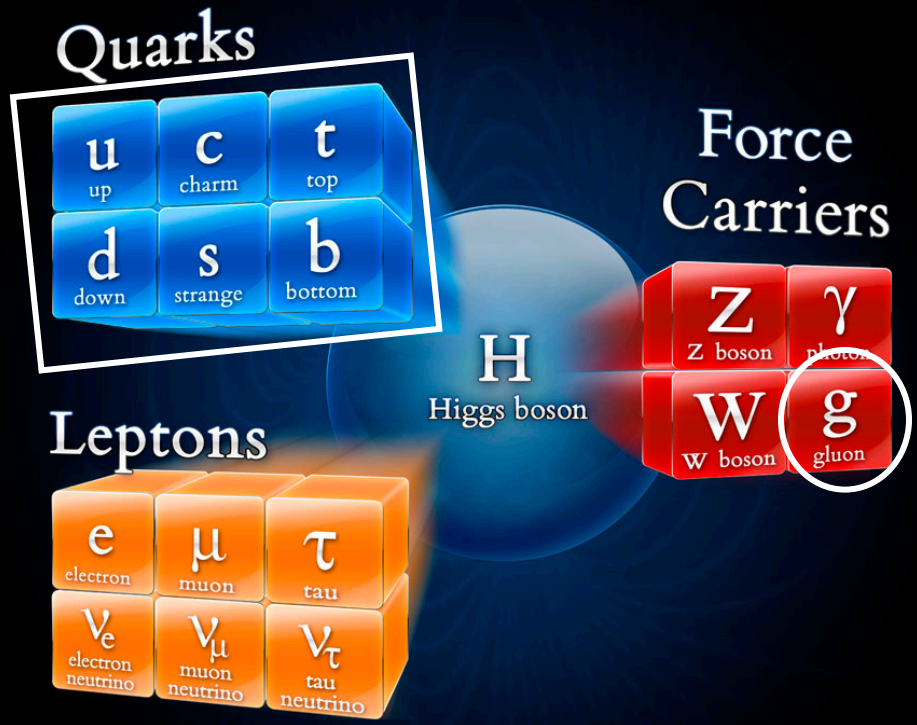
The Granada themes

Strong Interactions



The Granada themes

Strong Interactions



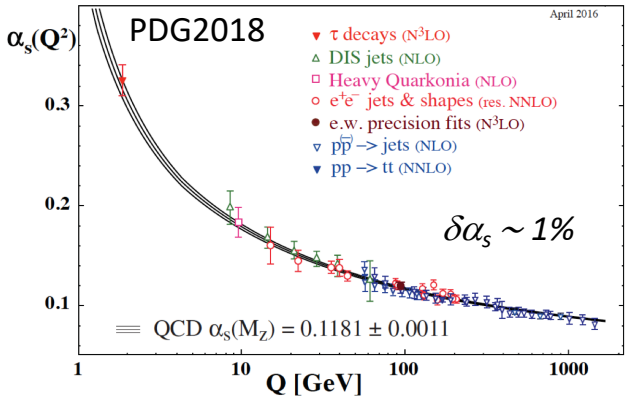
Strong interactions

QCD theory: $\mathcal{L}_{\mathrm{QCD}} = -\frac{1}{4} F^a_{\mu\nu} F^{\mu\nu}_a + \bar{\psi}(i\not{D} - m)\psi$

colour confinement

α_s (Q^2 low) ~ 1

key phenomena (non-Abelian gauge group)



asymptotic freedom

α_s (Q^2 high) << 1

"hot and dense QCD"

(low energy domain)

(lattice calculations)

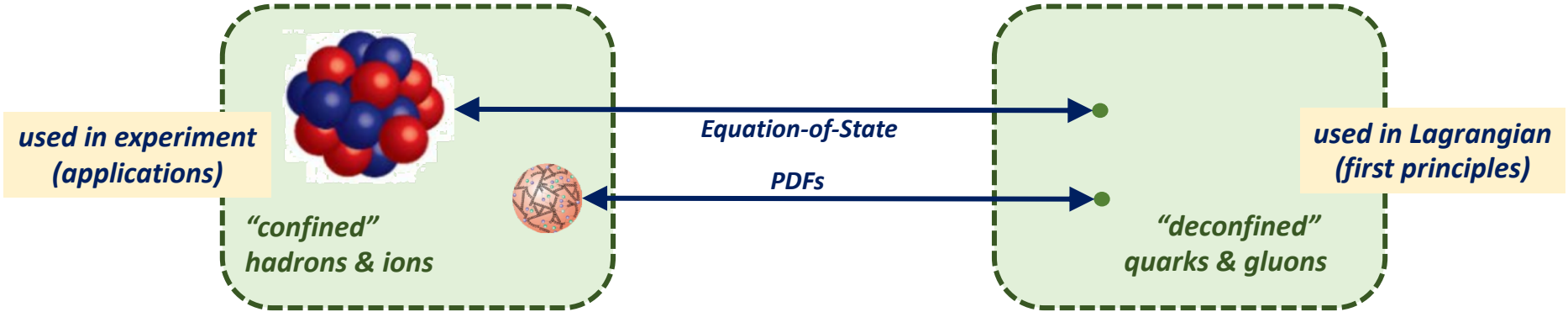
"vacuum QCD"

(high energy domain)

(perturbative calculations)

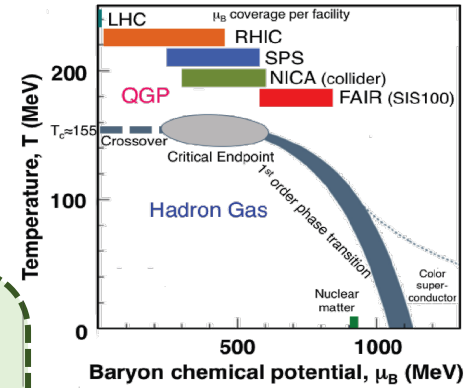
$\alpha_{EW} << \alpha_s$

“hot and dense QCD” ⟷ *“vacuum QCD”*



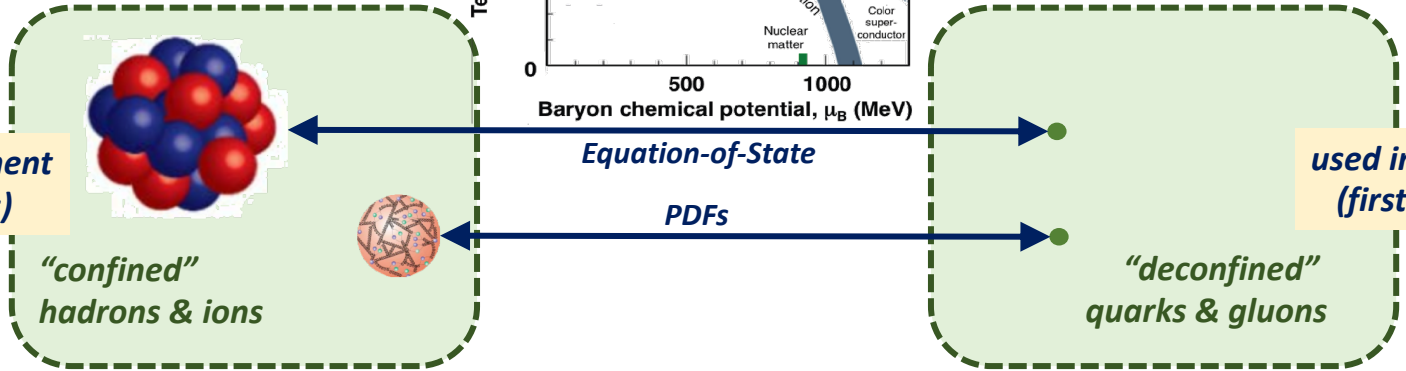
"hot and dense QCD" ⟷ *"vacuum QCD"*

How do properties of the QGP emerge from the fundamental QCD interactions as a function of system size and under varying conditions of initial energy density and baryon chemical potential?



From LQCD: T_c (μ_B=0) = 156.5 ± 1.5 MeV

From experiment: determination of chemical freeze-out temperature



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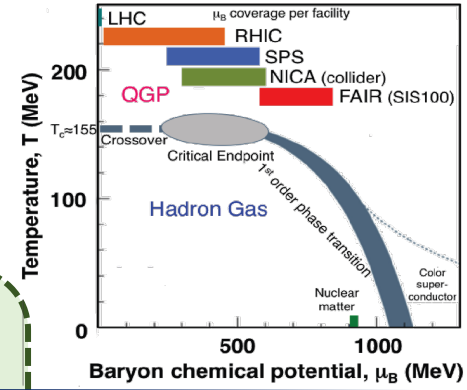


From LQCD: T_c (μ_B=0) = 156.5 ± 1.5 MeV

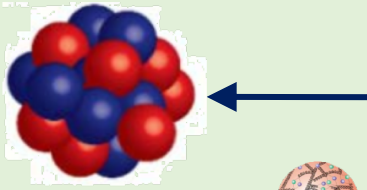
From experiment: determination of chemical freeze-out temperature

used in experiment (applications)

used in Lagrangian (first principles)

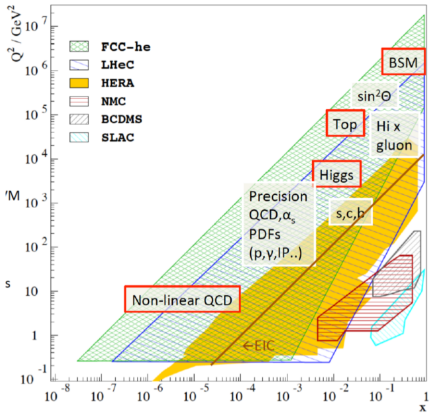
Equation-of-State

PDFs



"confined" hadrons & ions

"deconfined" quarks & gluons



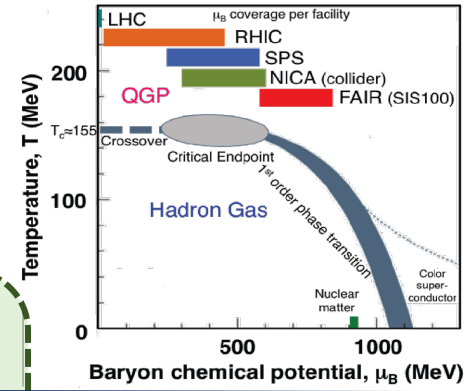
What are the experimental and theoretical pre-requisites to reach an adequate precision of perturbative and non-perturbative QCD predictions at the highest energies?

From QCD: evolution equations of PDFs

From experiment: PDF parameters values themselves

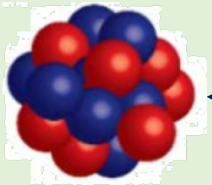
“hot and dense QCD” ⟷ *“vacuum QCD”*

How do properties of the QGP emerge from the fundamental QCD interactions as a function of system size and under varying conditions of initial energy density and baryon chemical potential?



Key facilities involve collisions with heavy ions

used in experiment (applications)



“confined” hadrons & ions

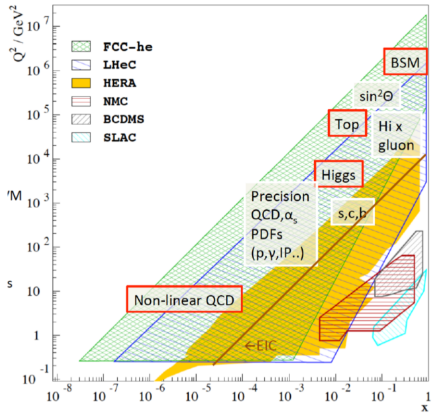
Equation-of-State

PDFs

used in Lagrangian (first principles)

“deconfined” quarks & gluons

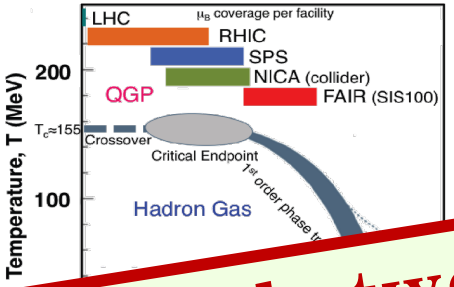
What are the experimental and theoretical pre-requisites to reach an adequate precision of perturbative and non-perturbative QCD predictions at the highest energies?



Key facilities involve collisions with protons

“hot and dense QCD” ⟷ “vacuum QCD”

How do properties of the QGP emerge from the fundamental QCD interactions as a function of system size and under varying conditions of initial energy density and baryon chemical potential?



Key facilities involve collisions with heavy ions

Synergies between nuclear and particle physics

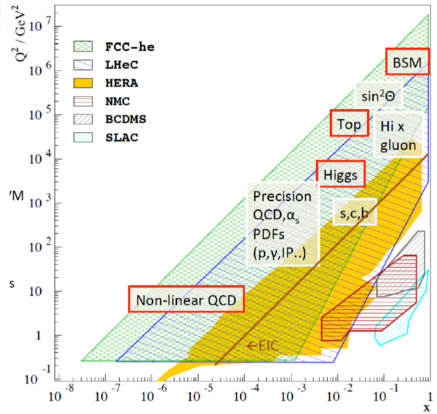
used in (appl

hadrons & ions

PDFs

used in Lagrangian (first principles)

“deconfined” quarks & gluons

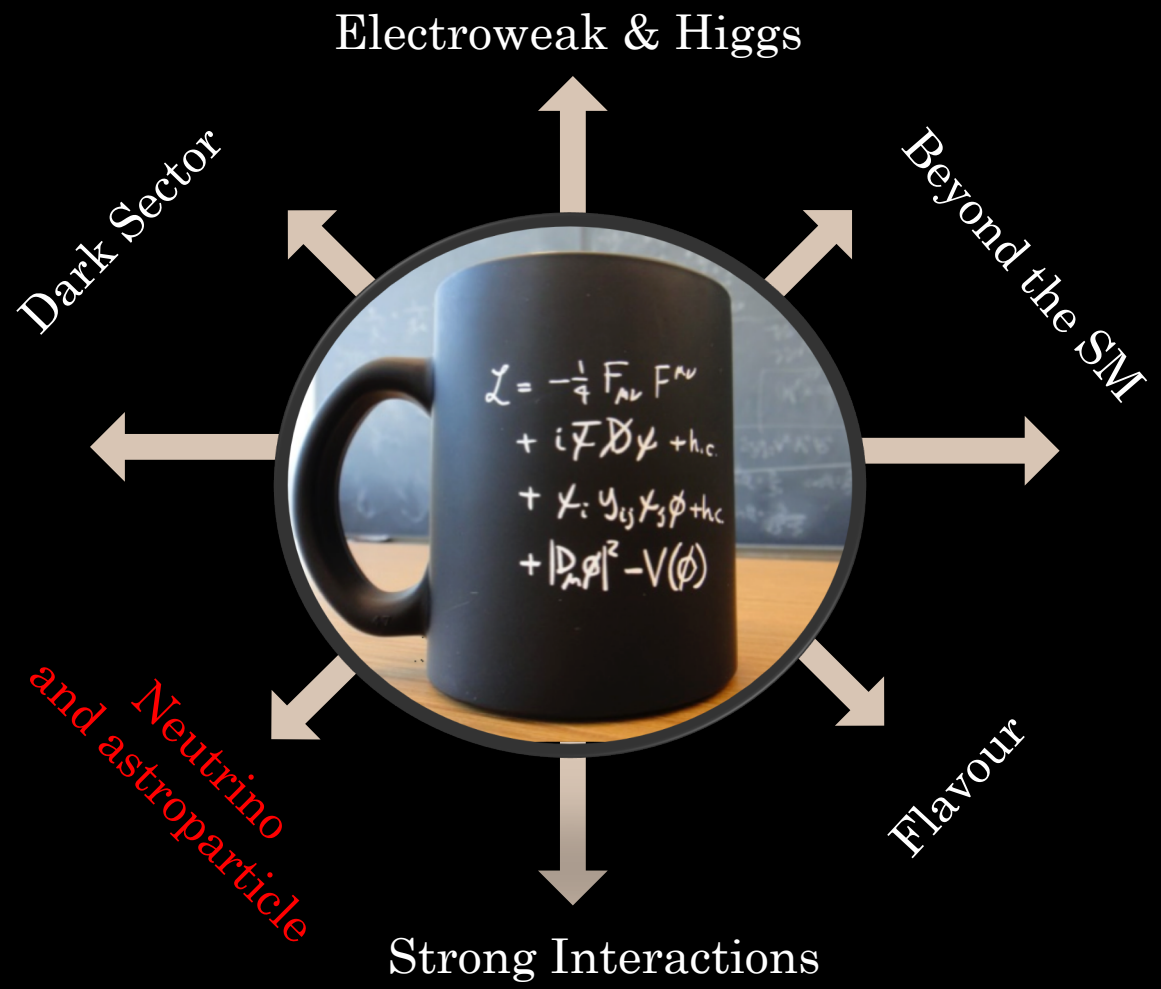


What are the experimental and theoretical pre-requisites to reach an adequate precision of perturbative and non-perturbative QCD predictions at the highest energies?

Key facilities involve collisions with protons

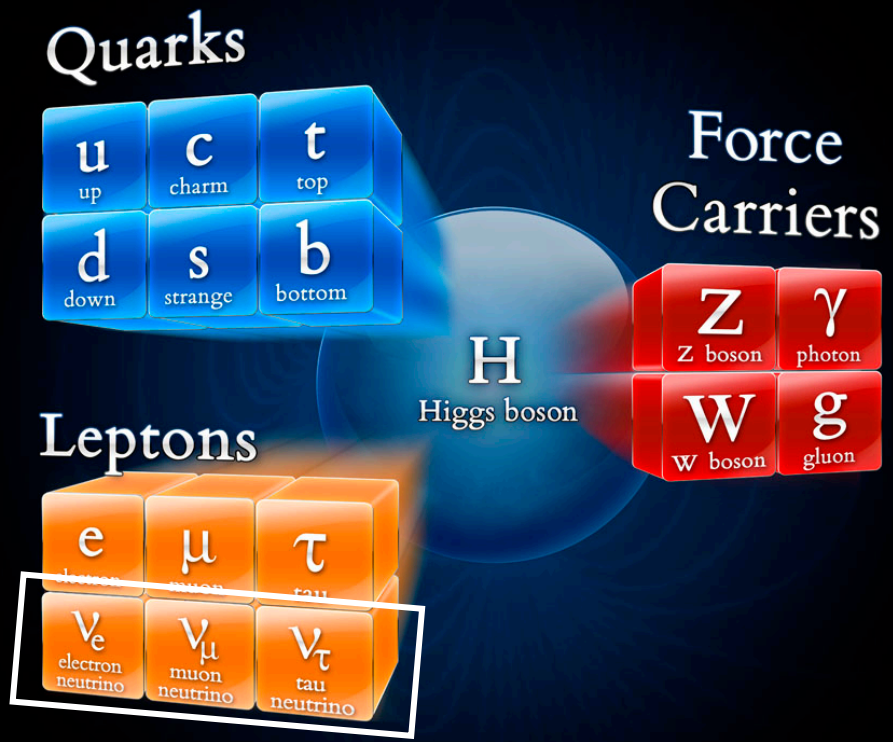
The Granada themes

Neutrino and astroparticle



The Granada themes

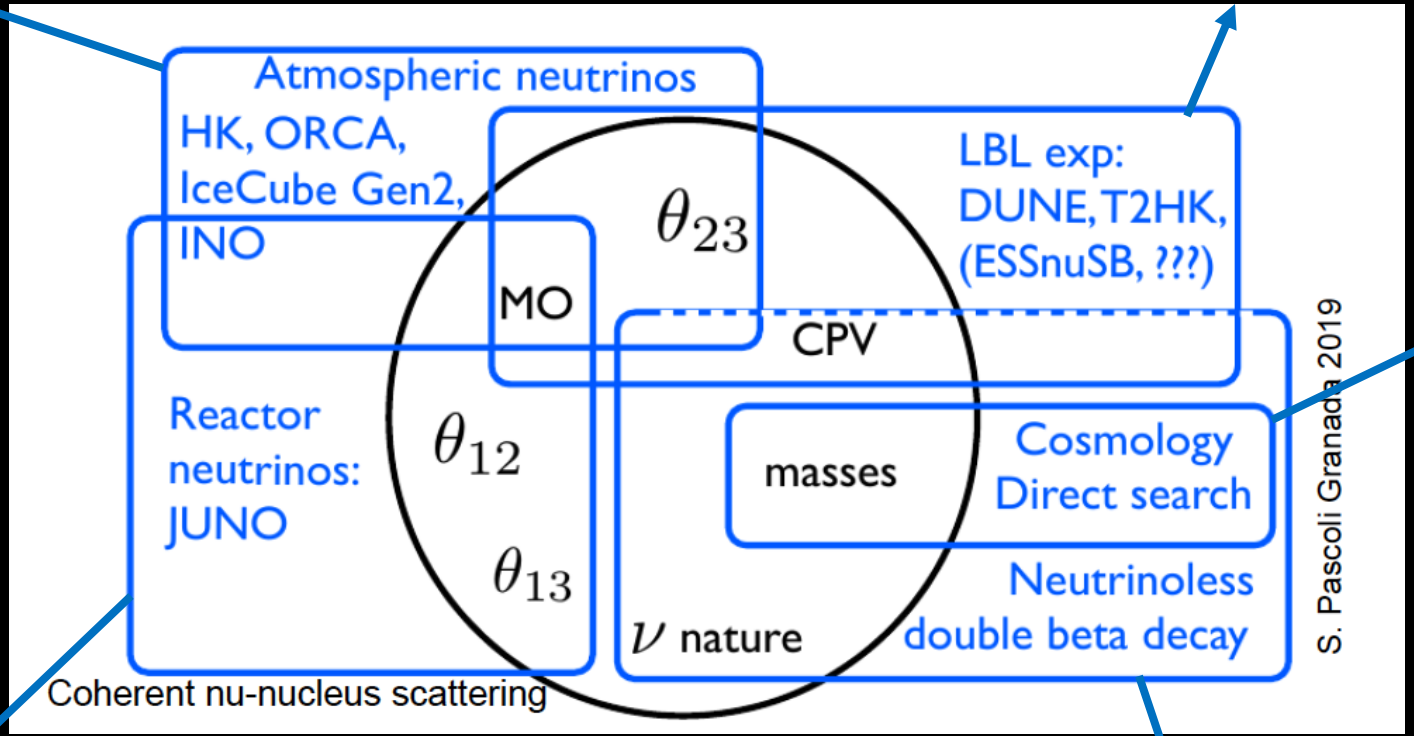
Neutrino and astroparticle



Need for a diverse approach – *every neutrino source counts*

Complementary for mass ordering and sterile neutrinos

Collaboration with QCD/nuclear models (NA61) CERN Neutrino Platform essential



Euclid, DESI, …

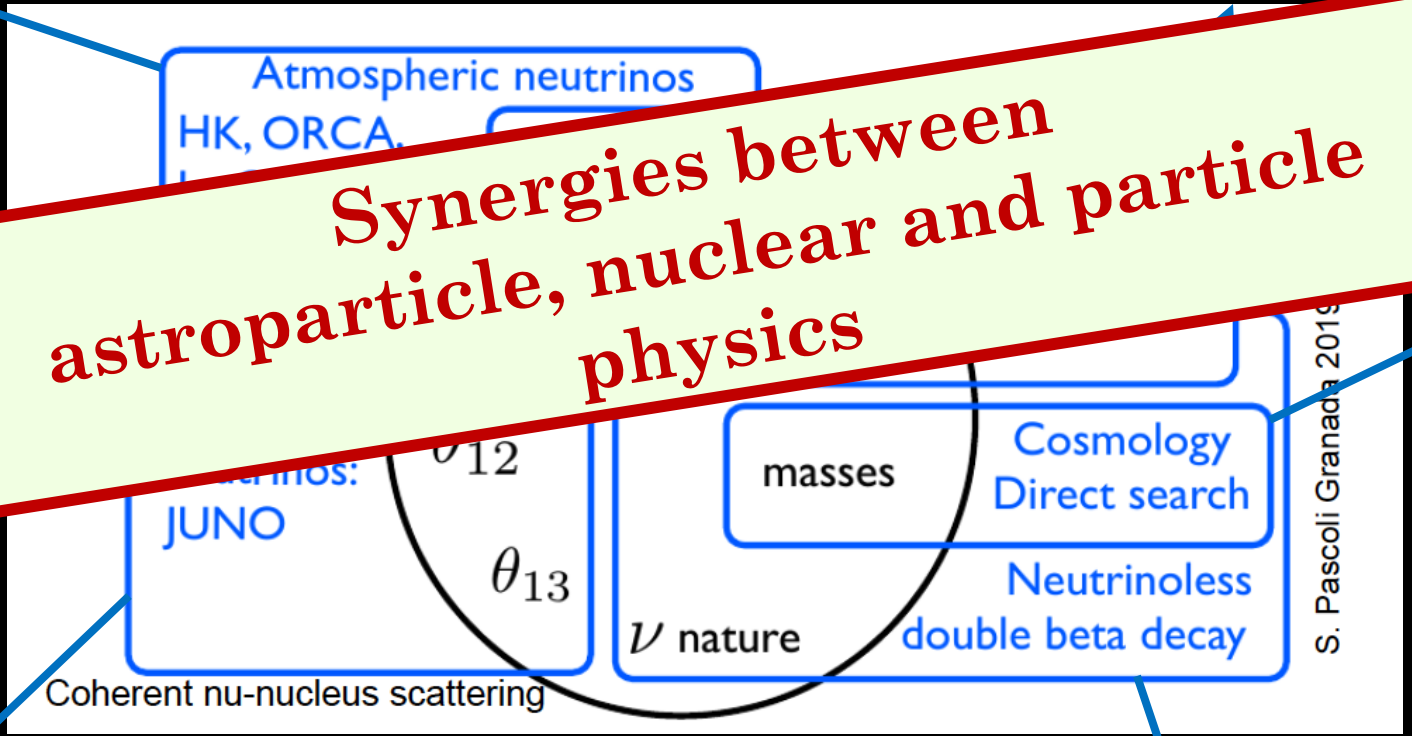
Sterile neutrinos

Upcoming experiments: LEGEND, CUPID, NEXT, …

Need for a diverse approach – *every neutrino source counts*

Complementary for mass ordering and sterile neutrinos

Collaboration with QCD/nuclear models (NA61)
CERN Neutrino Platform essential



Synergies between astroparticle, nuclear and particle physics

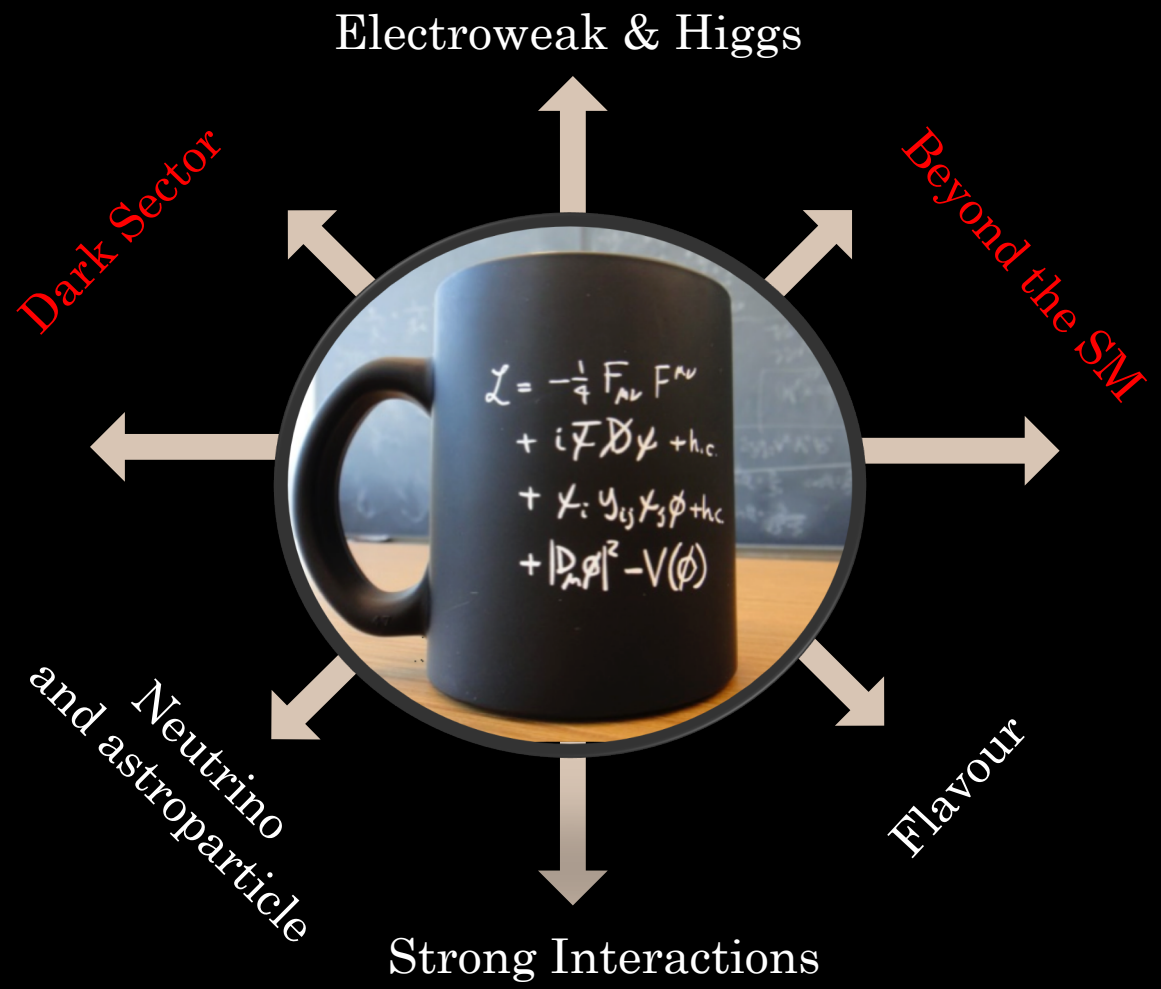
Euclid, DESI, …

Sterile neutrinos

Upcoming experiments: LEGEND, CUPID, NEXT, …

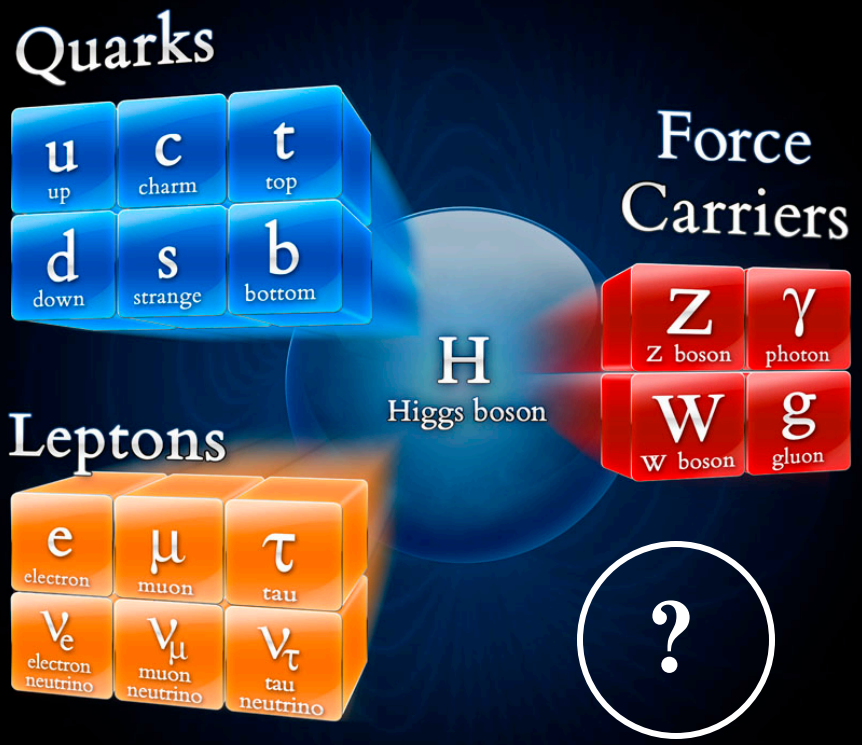
The Granada themes

Beyond the SM
&
Dark Sector



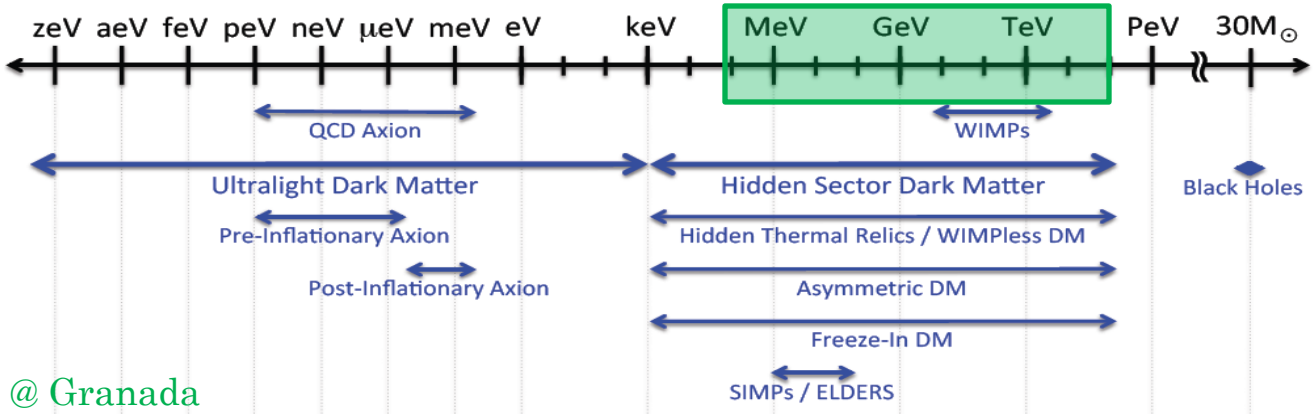
The Granada themes

Beyond the SM
&
Dark Sector



Dark Matter: Where to start looking? Very little clue on the mass scale…

Too small mass
⇒ won't "fit"
in a galaxy!

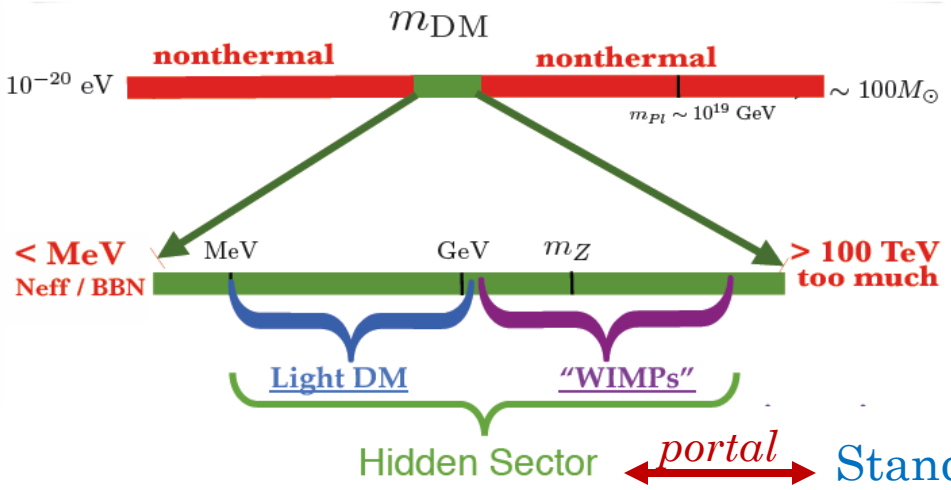


From MACHOs searches

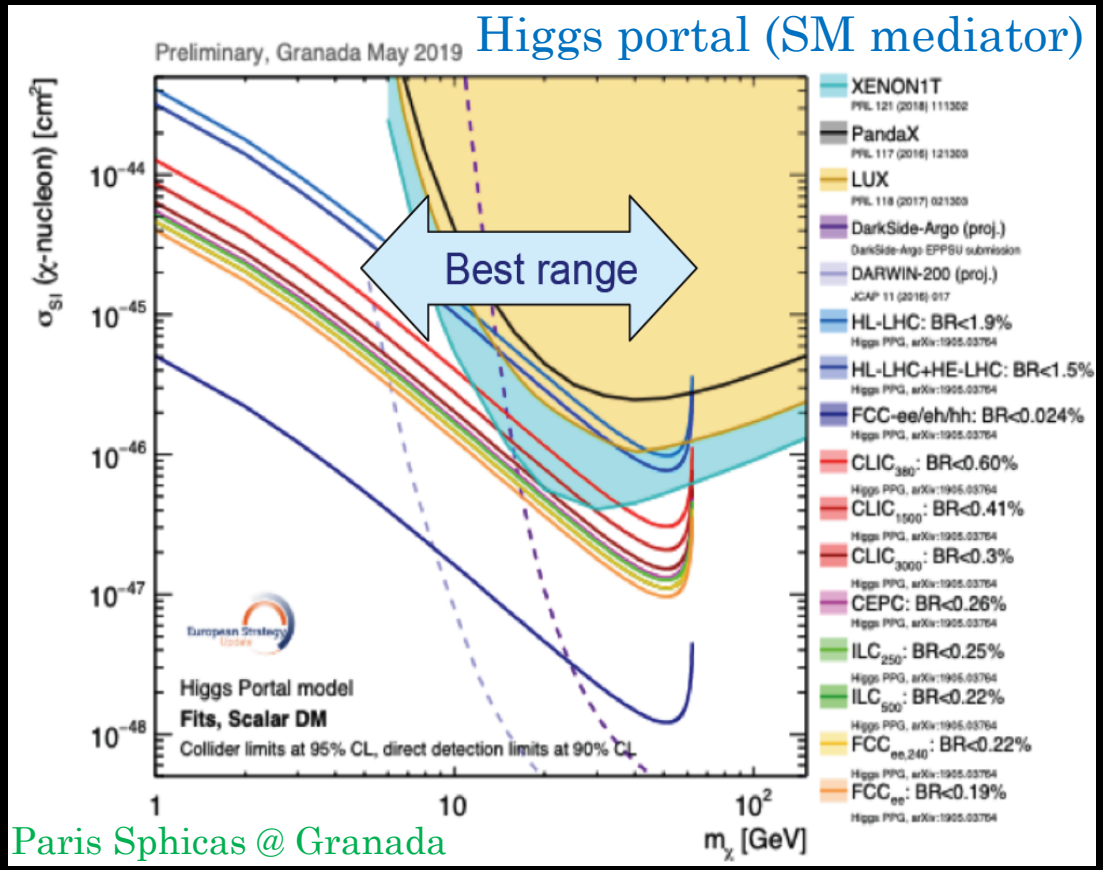
Marcela Carena @ Granada

The assumption of Thermal Equilibrium in the early Universe narrows the viable mass range.

Interesting phenomena like long-lived particles and feebly interacting particles.



Complementarity between Direct Detection and Collider



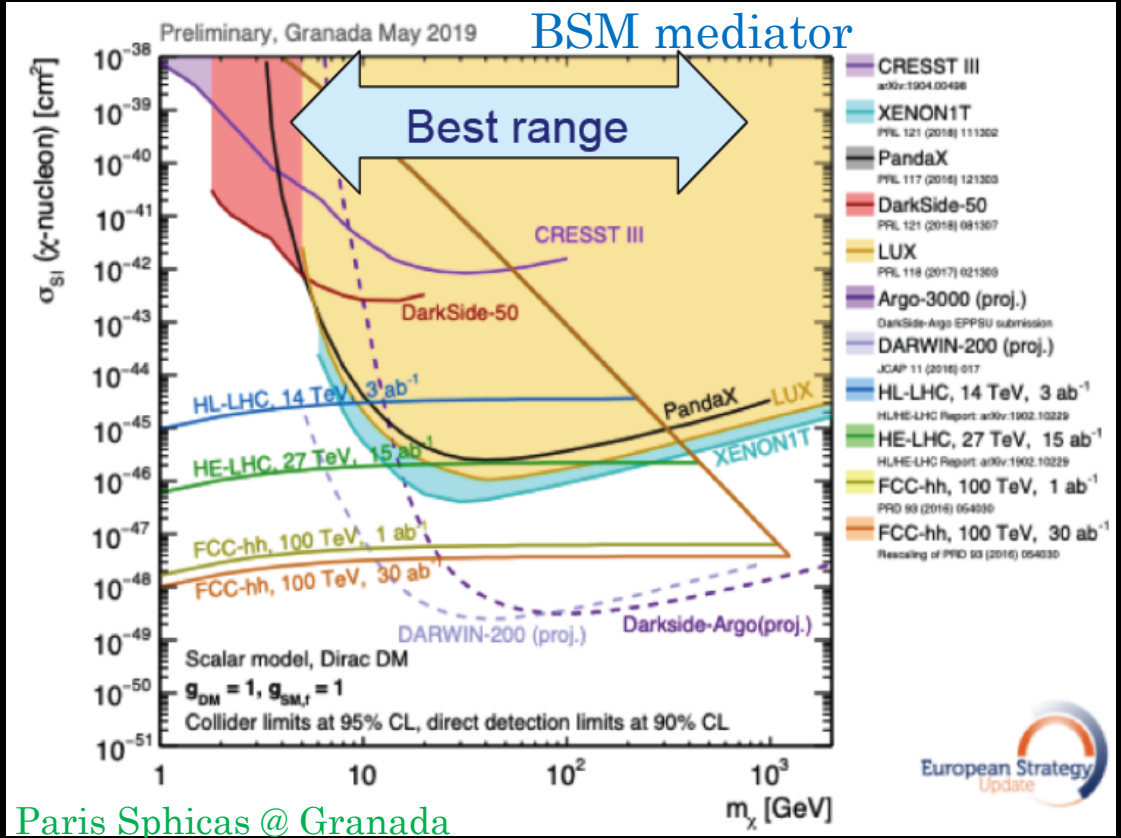
Paris Sphicas @ Granada

A collider discovery will need confirmation from DD/ID for cosmological origin

A DD/ID discovery will need confirmation from colliders to understand the nature of the interaction

A future collider program that optimizes sensitivity to invisible particles coherently with DD/ID serves us well. Need maximum overlap with DD/ID.

Complementarity between Direct Detection and Collider



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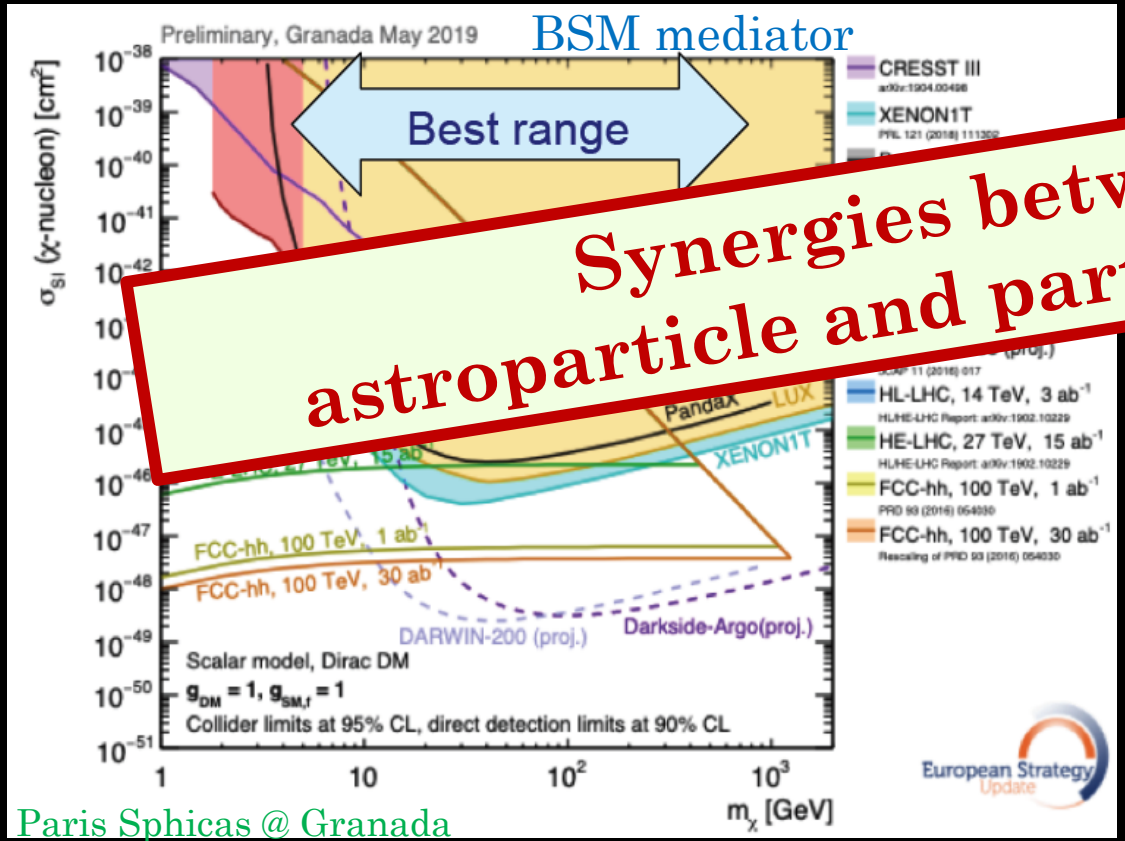


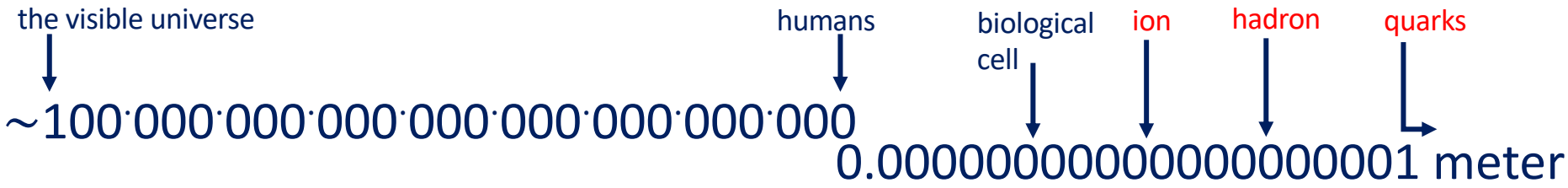
Synergies between astroparticle and particle physics

A collider discovery will need confirmation from colliders to understand the nature of the interaction

A future collider program that optimizes sensitivity to invisible particles coherently with DD/ID serves us well. Need maximum overlap with DD/ID.

Paris Sphicas @ Granada

Wrapping-up


the visible universe
humans
biological cell
ion
hadron
quarks
~100·000·000·000·000·000·000·000·000
0.00000000000000000001 meter

the visible universe

humans

biological cell

ion

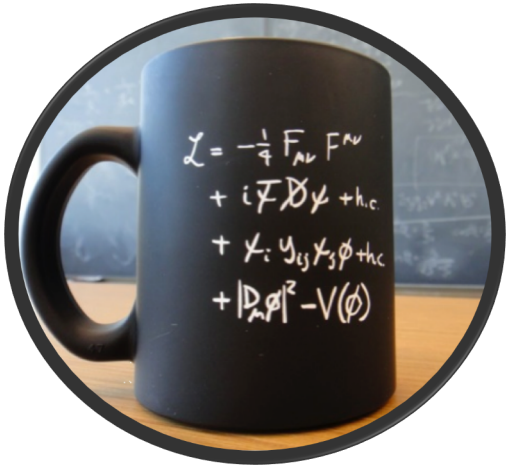
hadron

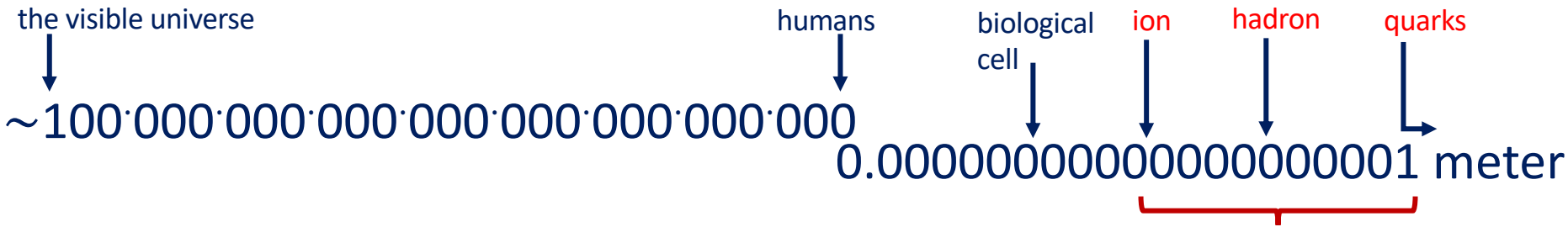
quarks

~100·000·000·000·000·000·000·000·000

0.00000000000000000001 meter

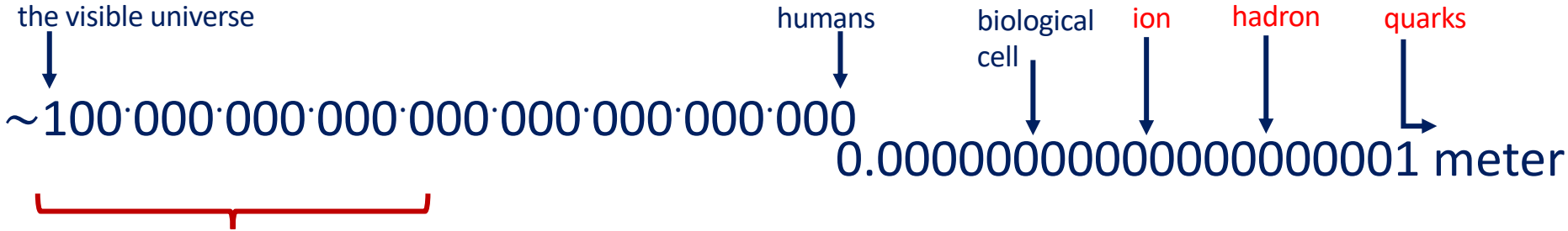
first principles of particle physics





synergy nuclear & particle physics

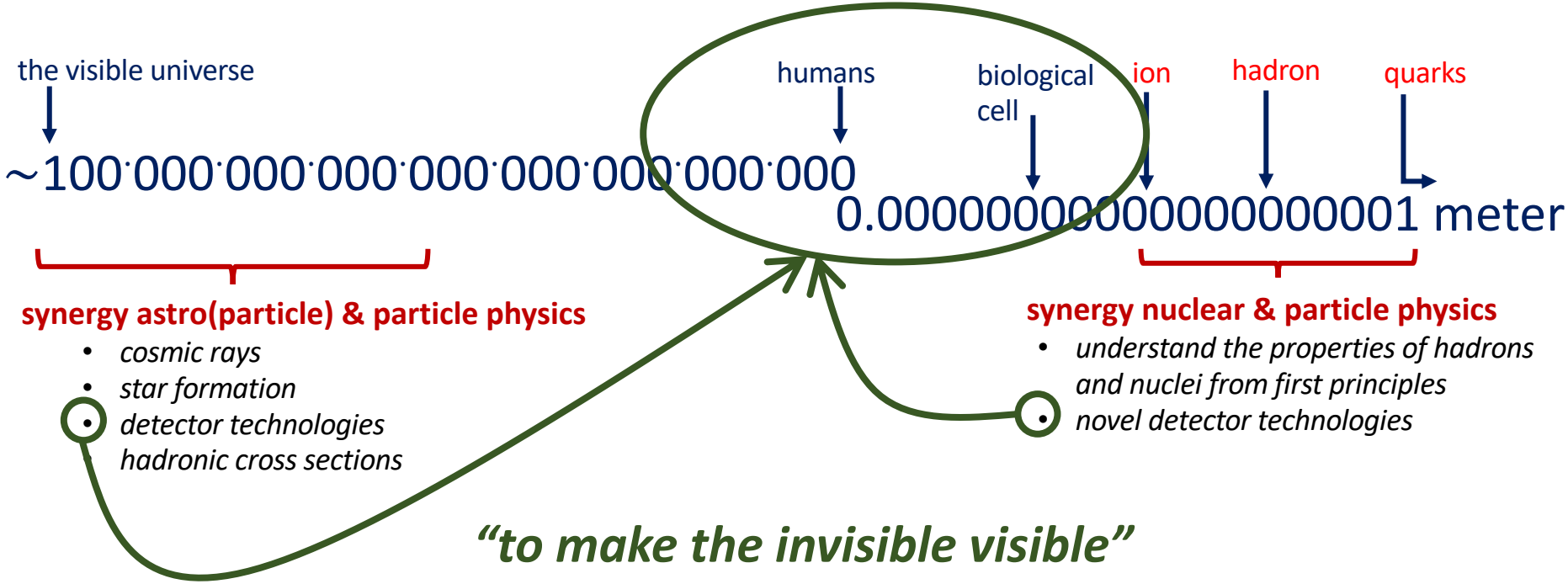
- *understand the properties of hadrons and nuclei from first principles*
- *nuclear cross sections*
- *novel detector technologies*



synergy astro(particle) & particle physics

- *cosmic rays*
- *star formation*
- *neutrino physics*
- *detector technologies*
- *hadronic cross sections*
- *neutron stars equation of state*
- *ultrahigh-energy neutrino interactions*

APPEC

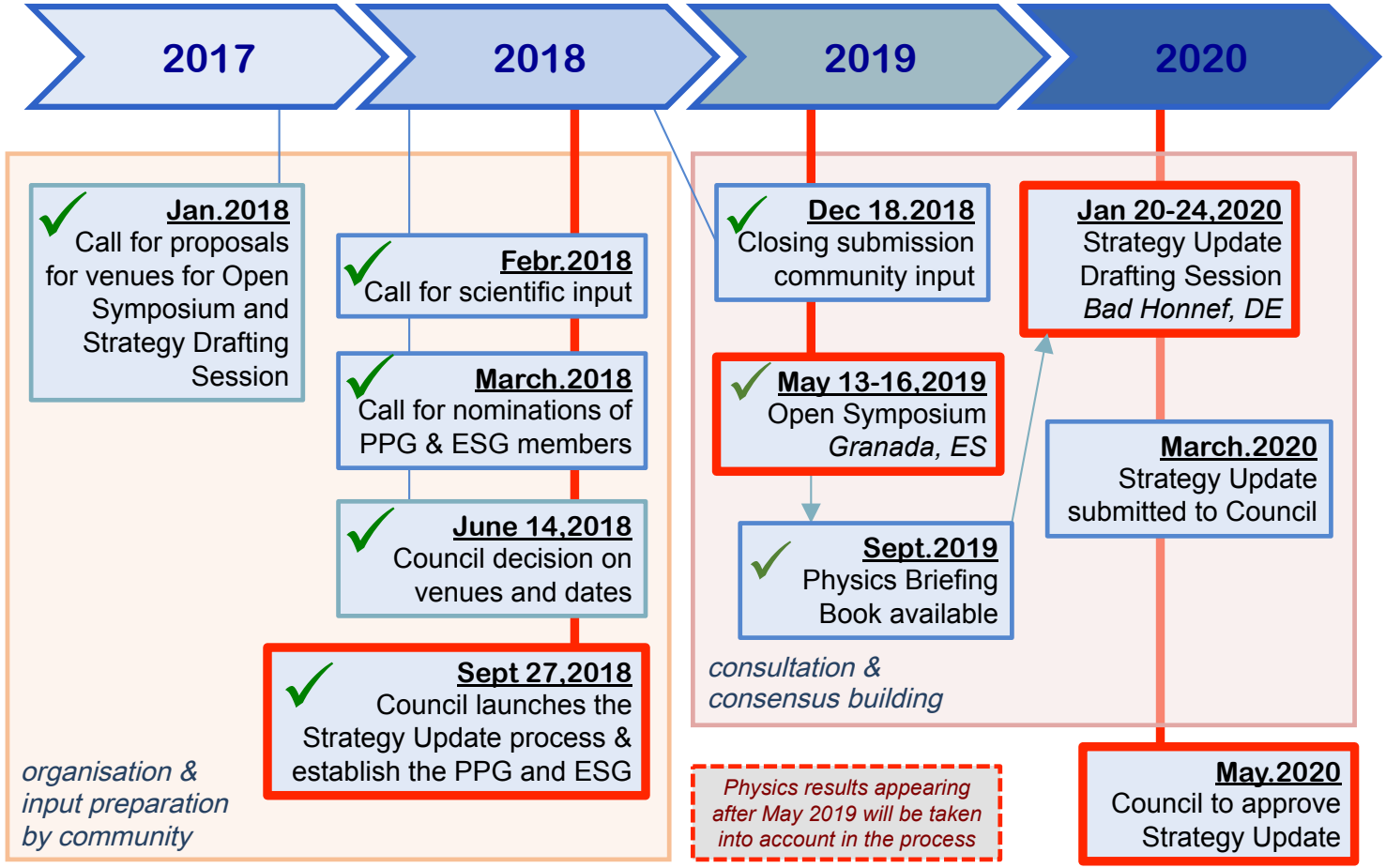


APPEC

ECFA
European Committee for Future Accelerators

NuPECC

Thank you for your attention


2017
2018
2019
2020
Jan.2018
Call for proposals for venues for Open Symposium and Strategy Drafting Session
Febr.2018
Call for scientific input
March.2018
Call for nominations of PPG & ESG members
June 14,2018
Council decision on venues and dates
Sept 27,2018
Council launches the Strategy Update process & establish the PPG and ESG
organisation & input preparation by community
Dec 18.2018
Closing submission community input
May 13-16,2019
Open Symposium
Granada, ES
Sept.2019
Physics Briefing Book available
consultation & consensus building
Physics results appearing after May 2019 will be taken into account in the process
Jan 20-24,2020
Strategy Update Drafting Session
Bad Honnef, DE
March.2020
Strategy Update submitted to Council
May.2020
Council to approve Strategy Update