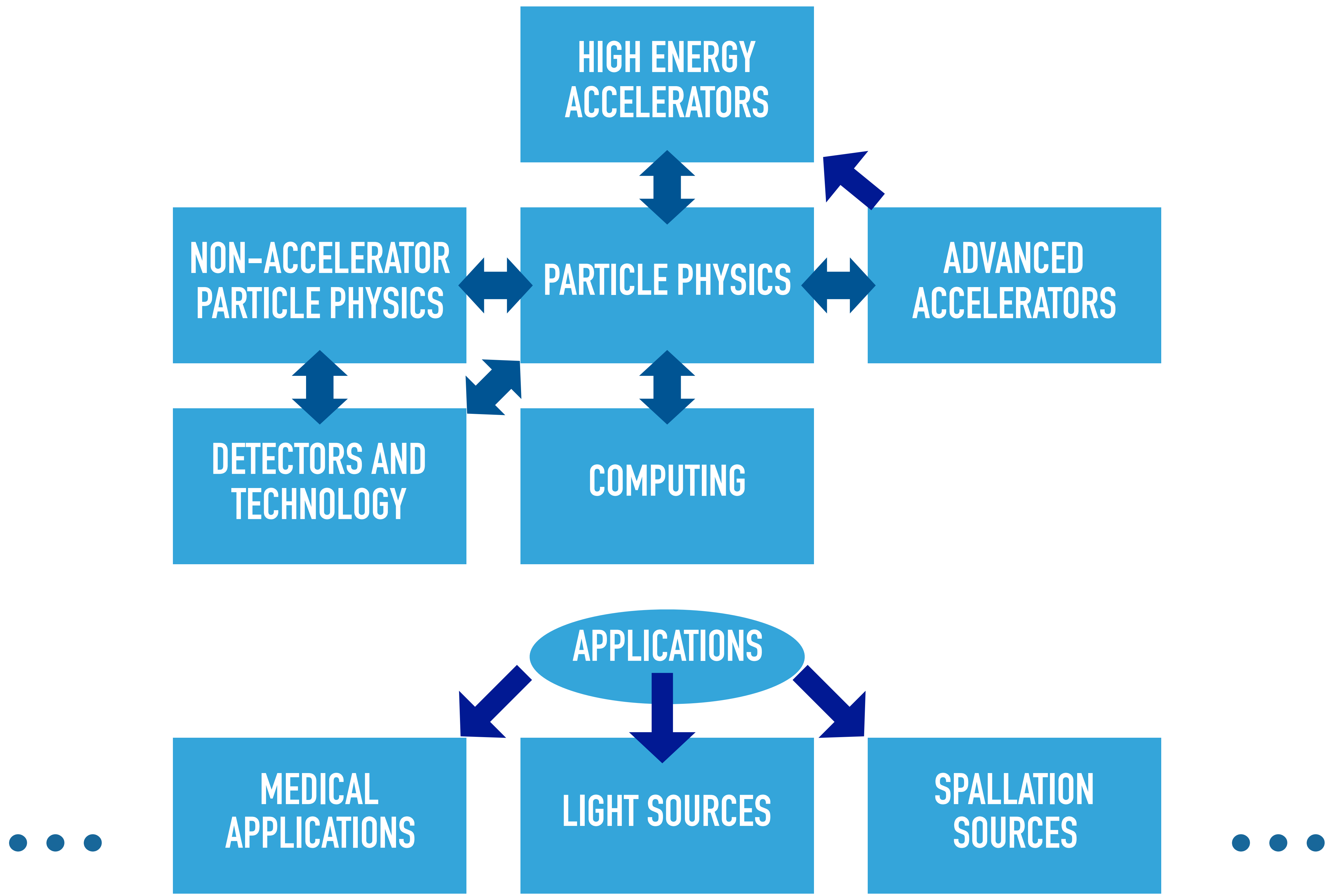
GEOFFREY TAYLOR, ICFA CHAIR-ELECT

SCIENTIST SUMMARY ICFA SEMINAR OTTAWA 2017

ICFA CHARGE

Created (1976 IUPAP) to facilitate international collaboration in the construction and use of accelerators for high energy physics.

- To promote international collaboration in all phases of the construction and exploitation of very high energy accelerators.
- To organize regularly world-inclusive meetings for the exchange of information on future plans for regional facilities and for the formulation of advice on joint studies and uses.
- To organize workshops for the study of problems related to super high-energy accelerator complexes and their international exploitation and to foster research and development of necessary technology.


HIGH ENERGY ACCELERATORS
NON-ACCELERATOR PARTICLE PHYSICS
PARTICLE PHYSICS
ADVANCED ACCELERATORS
DETECTORS AND TECHNOLOGY
COMPUTING
APPLICATIONS
MEDICAL APPLICATIONS
LIGHT SOURCES
SPALLATION SOURCES
...
...

APPLICATIONS

… MEDICAL APPLICATIONS | LIGHT SOURCES | SPALLATION SOURCES | DETECTOR, &COMPUTING …

Example:

Reactor and Cyclotron generated

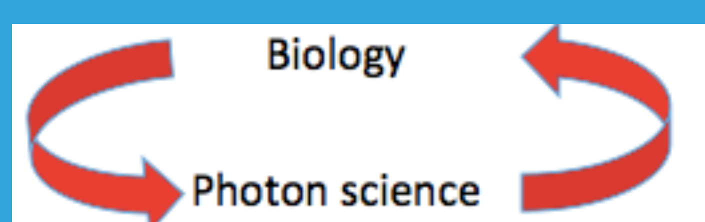
Medical radioisotopes

for imaging, diagnostic and radio-therapy of cancer.

(see presentation by P.Schaffer)

See John Womersley's Talk

Synchrotrons, XFEL bright sources.



(see presentation by Z. Sayers)

Range of industrial, medical and cultural uses of HEP detector technology and computation techniques

(see presentation by M. Demarteau)

PARTICLE PHYSICS

Characterised by rapid progress for over a century.

From cathode ray tubes to the LHC

- from the electron to the Higgs boson

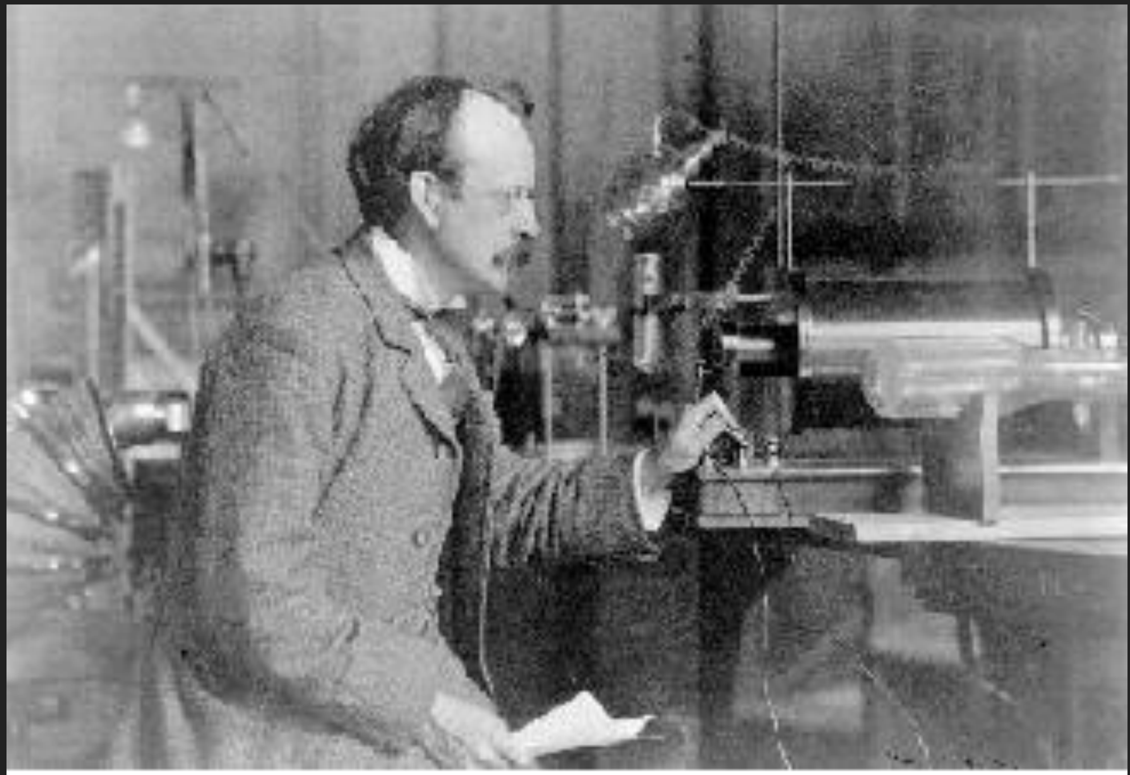
BUT

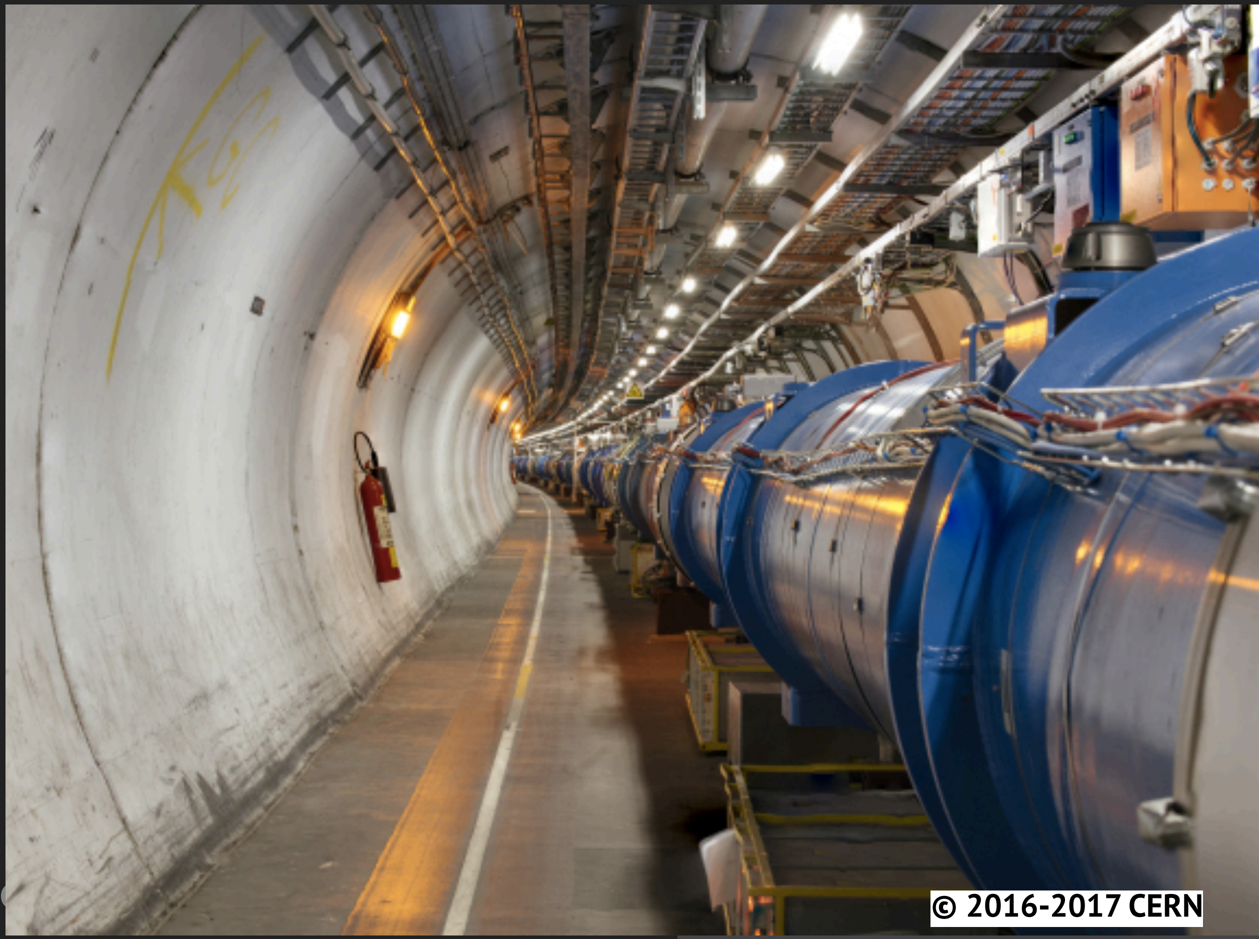
Timelines becoming long.

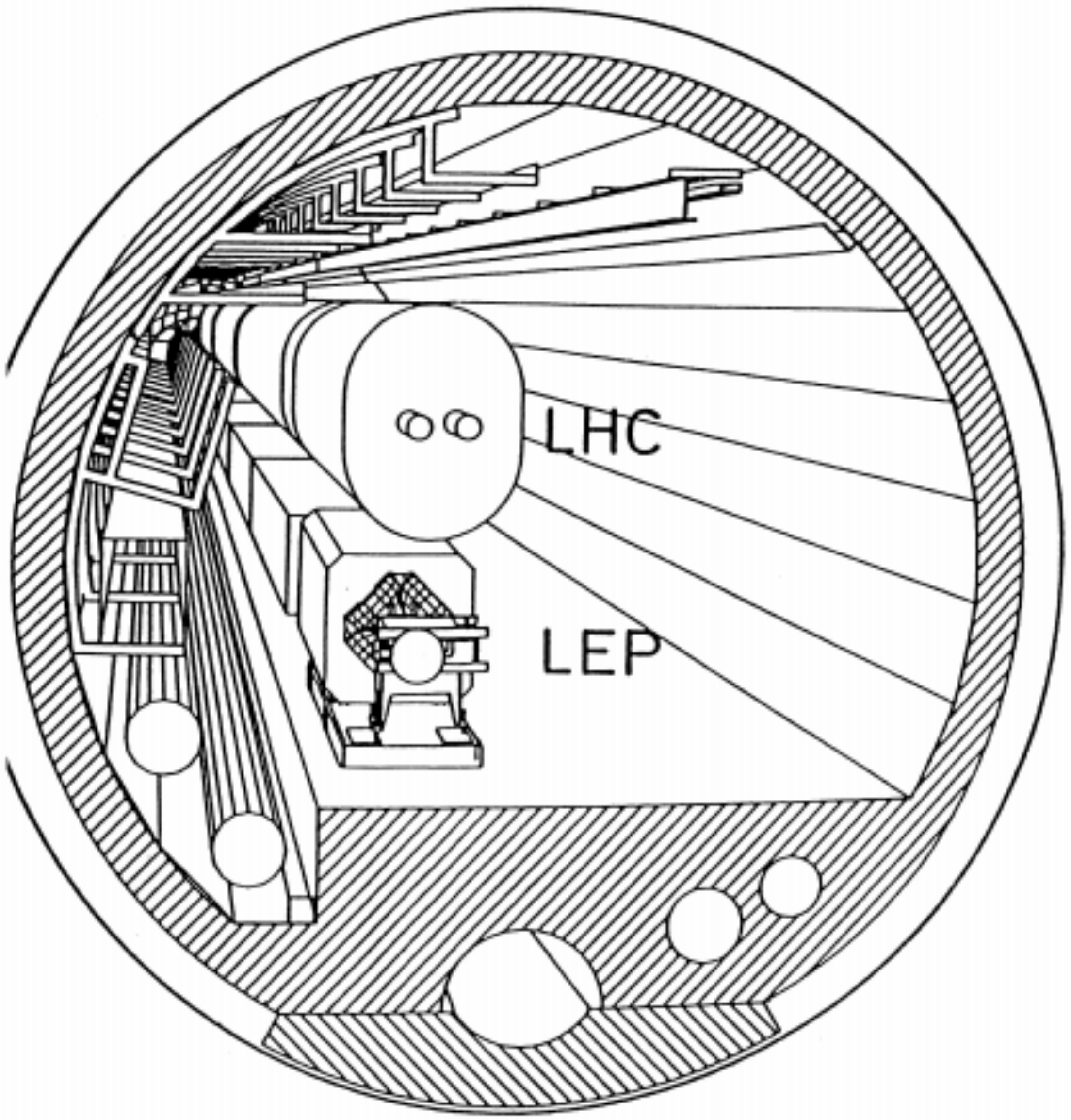
Requires:

- Long-term planning
- Long-term resources
- Intermediate or overlapping experiments.

ICFA HAS A MAJOR ROLE TO PLAY







ECFA 84/85
CERN 84–10
5 September 1984

LARGE HADRON COLLIDER
IN THE LEP TUNNEL

Vol. I

PROCEEDINGS OF THE ECFA–CERN WORKSHOP

held at Lausanne and Geneva,
21–27 March 1984

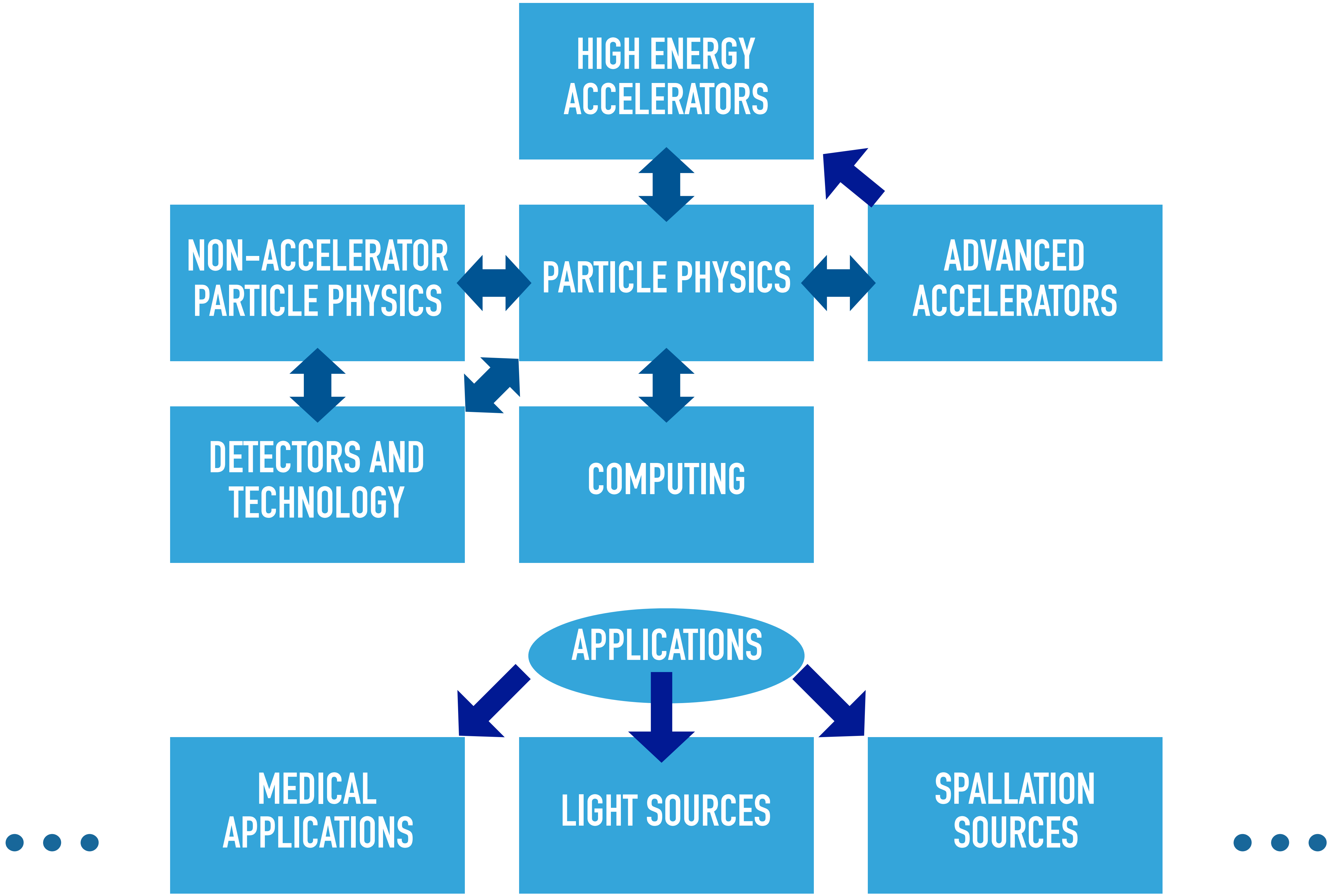
First Beam after 2009 LHC Restart
as seen in ATLAS Control Room

held at Lausanne and Geneva,
21–27 March 1984

CoEPP
ARC Centre of Excellence for
Particle Physics at the Terascale

WHERE ARE THE "BIG" ISSUES?

- SM Sufficient for *ALL* LHC results to date!
- BSM(?) -
  - Dark Matter (Presentation by T. Slatyer): SM has no candidate for WIMP. (Still many other solutions for DM)
  - Neutrino mass (and CPV?) - SM $m_\nu=0$ (R. Volkas presentation)
  - Hints ?: $R_{K(*)}$; $R_{D(*)}$; g-2 anomalies!
- ~No (natural!) SUSY (see J.Feng presentation)
  - LHC Run 2, 3; HL-LHC Run 4,...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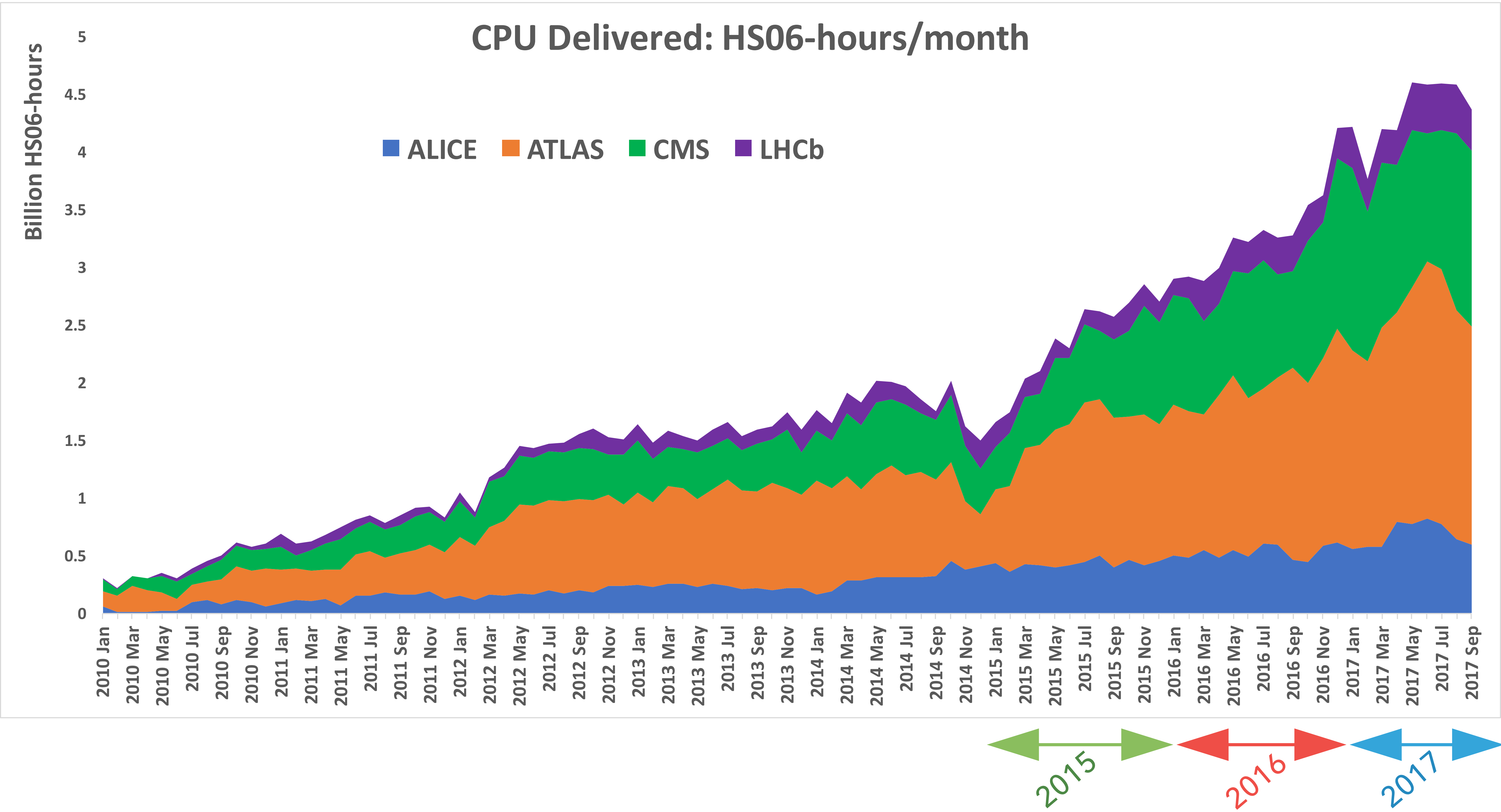
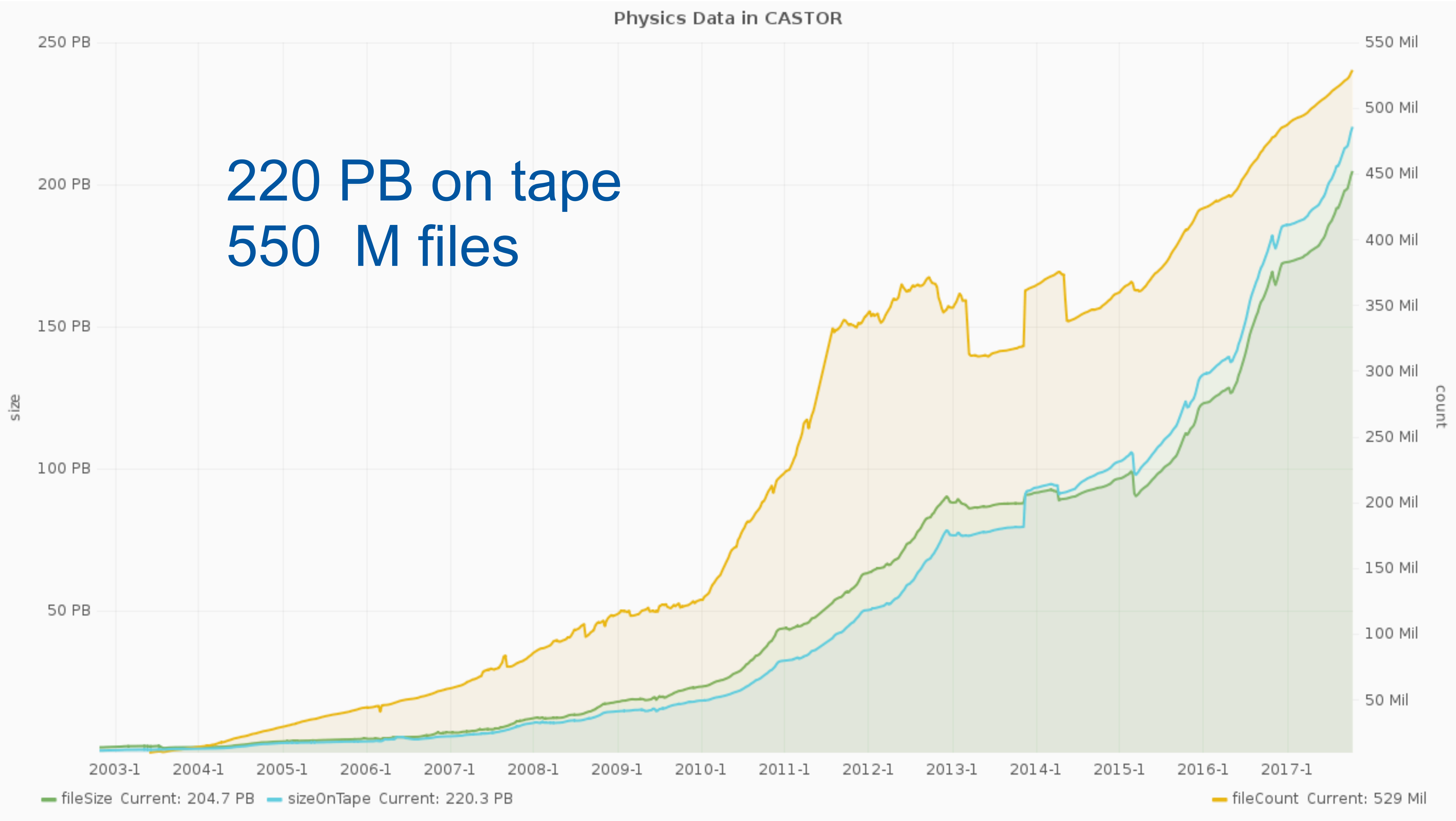


New peak: ~192 M HS06-days/month
~ 650 k cores continuous

I. Bird, RRB Mtg, October 2017



I. Bird, RRB Mtg, October 2017

Collaboration CERN – SKA

- Recognition on both sides of potential synergies and requirements
  - Various ad-hoc interactions between communities
  - Reviews and panels etc.
  - Planning a CERN-SKA “Big data” workshop in the UK Alan Turing Inst. in Spring 2018
- On July 13 CERN and SKAO DG’s signed a collaboration agreement on computing, data management, etc.
  - Recognizing that both HL-LHC and SKA will be Exabyte-scale scientific experiments on a 10-year timescale

COLLABORATION AGREEMENT
KN3644

Between

THE EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH (hereinafter referred to as “CERN”) an Intergovernmental Organization with its seat at Geneva, Switzerland, represented by its Director-General, Dr Fabiola Gianotti,

And

THE SKA ORGANISATION (hereinafter referred to as “SKAO”) with its headquarters at Jodrell Bank, Manchester, United Kingdom, represented by its Director-General, Professor Philip Diamond,

hereinafter individually and collectively referred to as the “Party” and “Parties” respectively,

CONSIDERING THAT:

1) Both Parties are constructing scientific instruments which will be capable of collecting scientific data at the Exabyte scale in the next decade;

2) The acquisition, storage, management, distribution and analysis of scientific data at such a scale represent technological and management challenges that are unique and unprecedented in science;

3) These data will be analysed by globally distributed scientific collaborations;

4) The computational and storage resources needed by the Parties and their respective scientific collaborations will, in many countries, be common;

5) The challenges faced by the Parties represent several areas that can potentially be addressed collaboratively;

HAVE AGREED AS FOLLOWS:

CERN COURIER

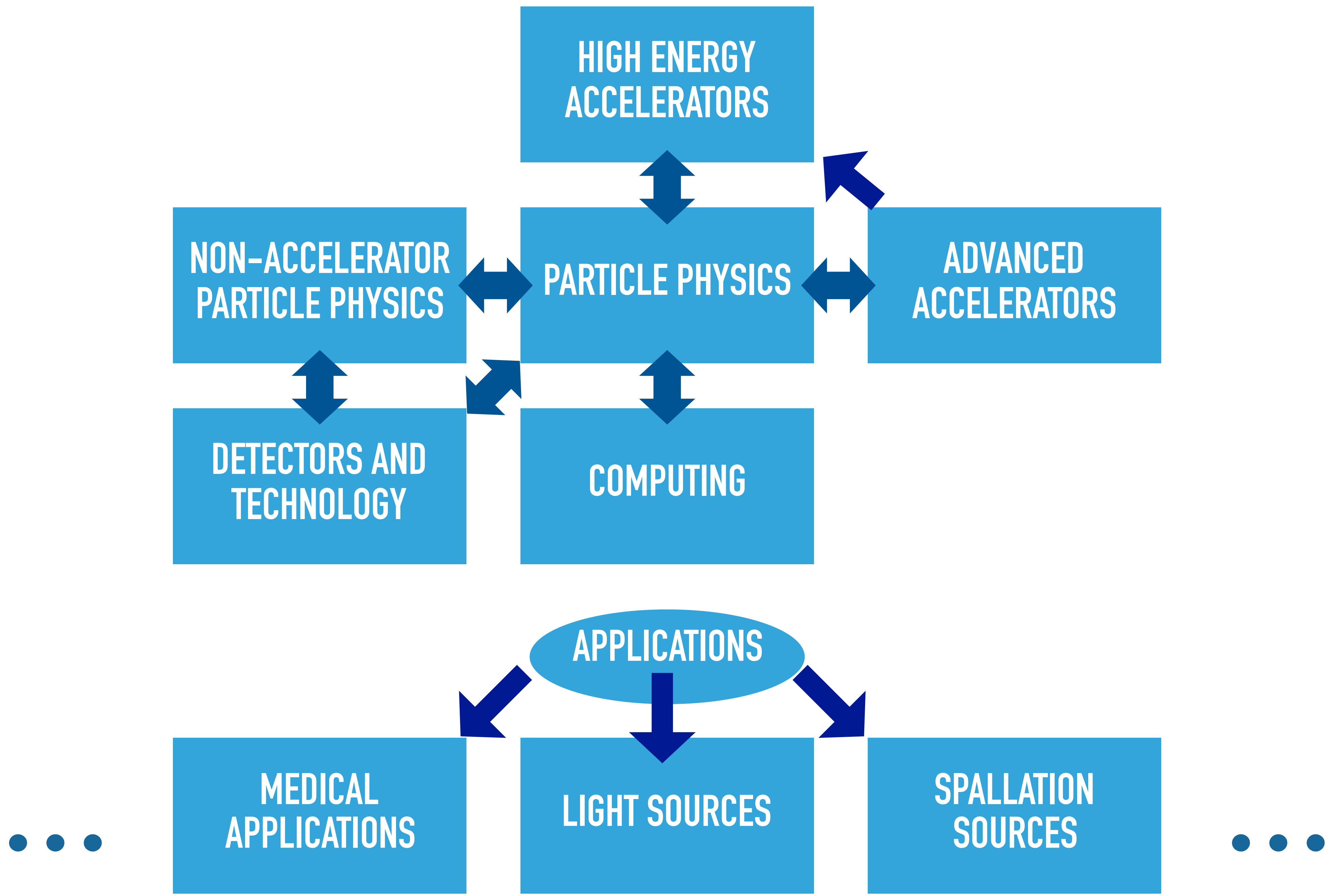
Aug 11, 2017

SKA and CERN co-operate on extreme computing

Big-data co-operation agreement

C-RRB: 24 Oct 2017

Presentation , K. Copic
Insight Fellows Program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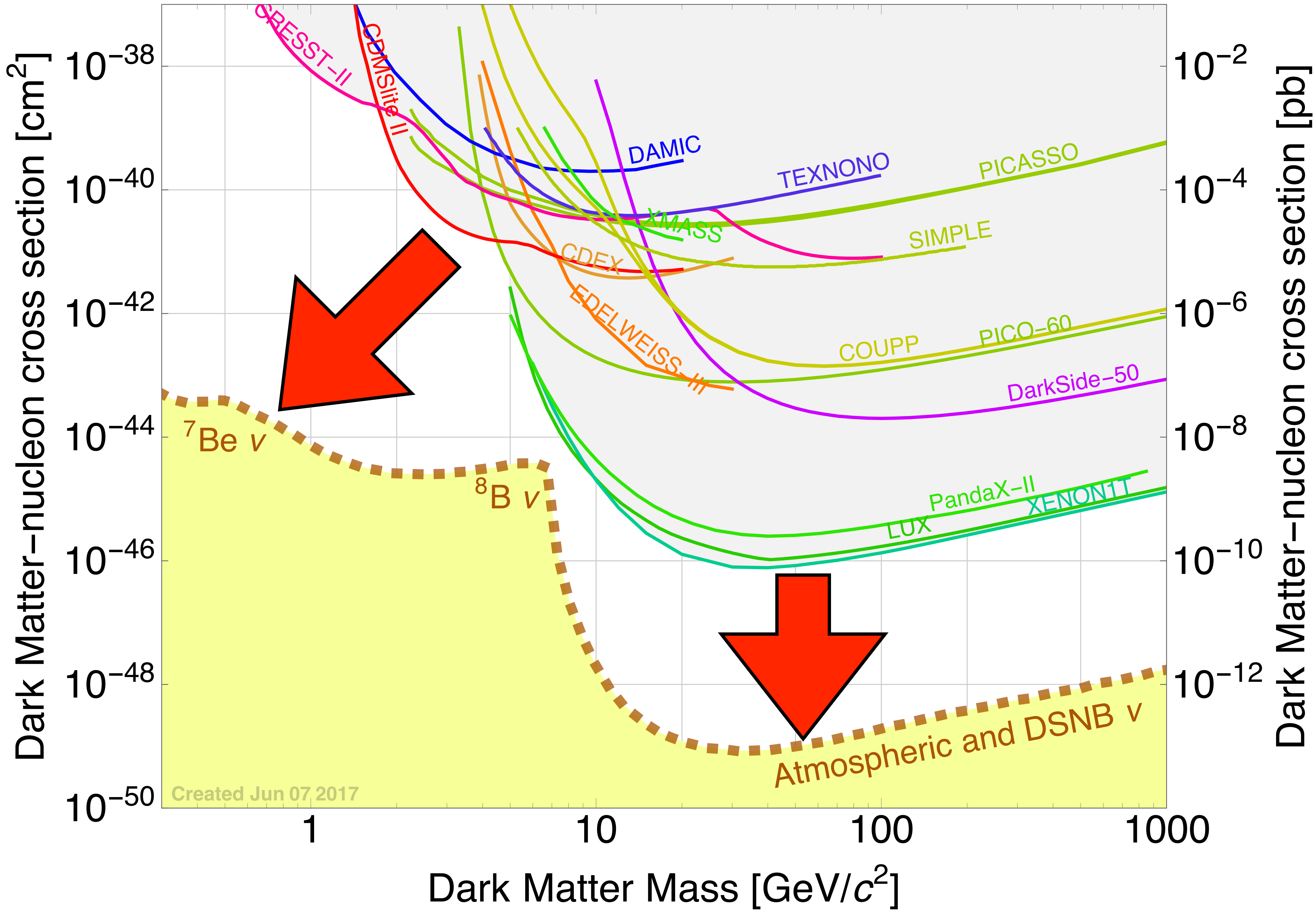
- Cosmology/ Astrophysics seriously impacting particle physics
- Direct DM Searches
  - WIMP searches becoming very hard!
- *0ν2β decay*
- *EDM (various)*

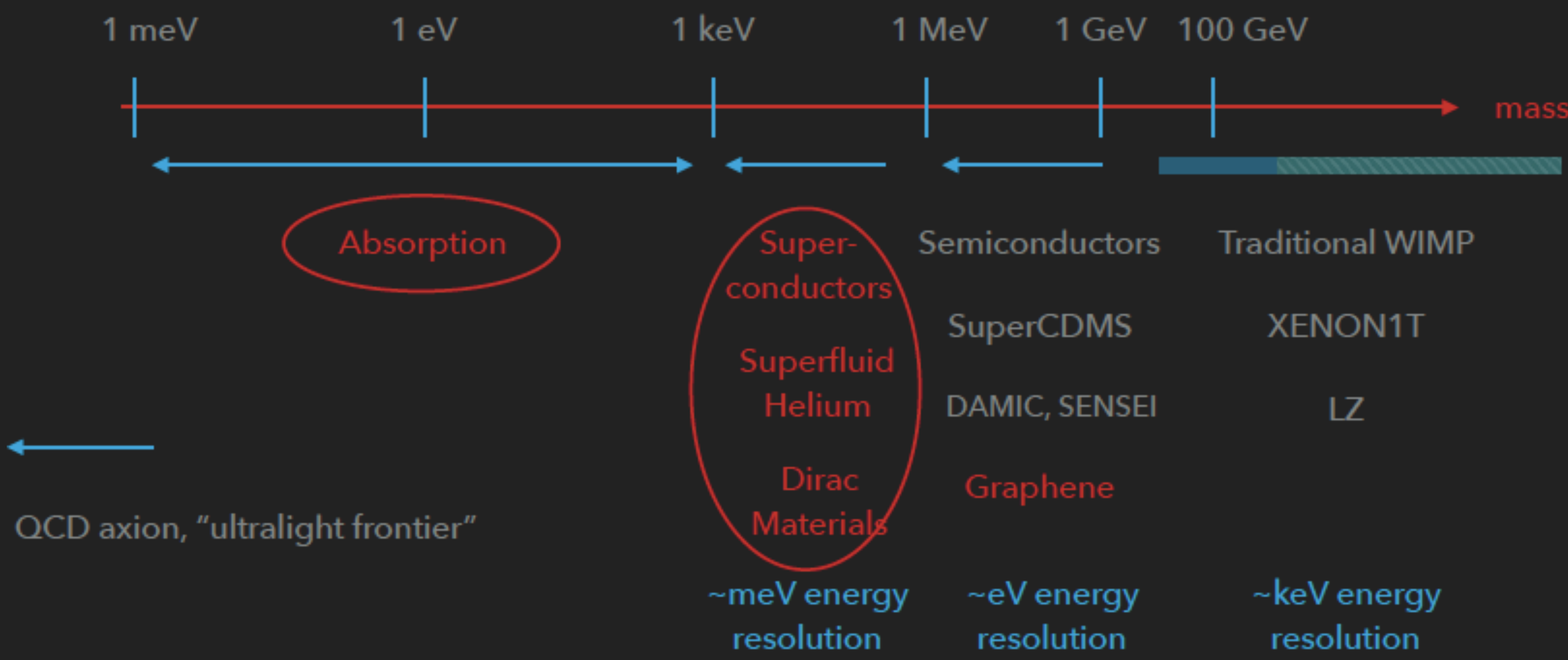
Talks by M. Trodden, O. Lahav, S. Staggs


Greenland
Iceland
Finland
Sweden
Norway
Russia
Canada
Ukraine
Kazakhstan
Mongolia
North Pacific Ocean
North Atlantic Ocean
Turkey
China
Iraq
Iran
Afghanistan
Pakistan
Algeria
Libya
Egypt
Saudi Arabia
India
Mexico
Thailand
Mali
Niger
Sudan
Chad
Nigeria
Ethiopia
Venezuela
Colombia
Kenya
DR Congo
Indonesia
Papua New Guinea
Tanzania
Brazil
Peru
Bolivia
Angola
Namibia
Botswana
Madagascar
Indian Ocean
South Pacific Ocean
South Atlantic Ocean
Australia
South Africa
Argentina
New Zealand
Southern Ocean
Southern Ocean



"Make It" - WIMP production searches LHC
"Break It" - WIMP Annihilation searches - astrophysical gamma-ray searches
"Shake It" - Direct DM searches underground

DARK MATTER LANDSCAPE – NEW TECHNOLOGIES



- Direct DM Searches
  - WIMP searches becoming very hard!
  - Nature (yesterday)
- *0ν2β decay*
- *EDM (various)*

nature International weekly journal of science

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News & Comment > News > 2017 > November > Article

NATURE | NEWS

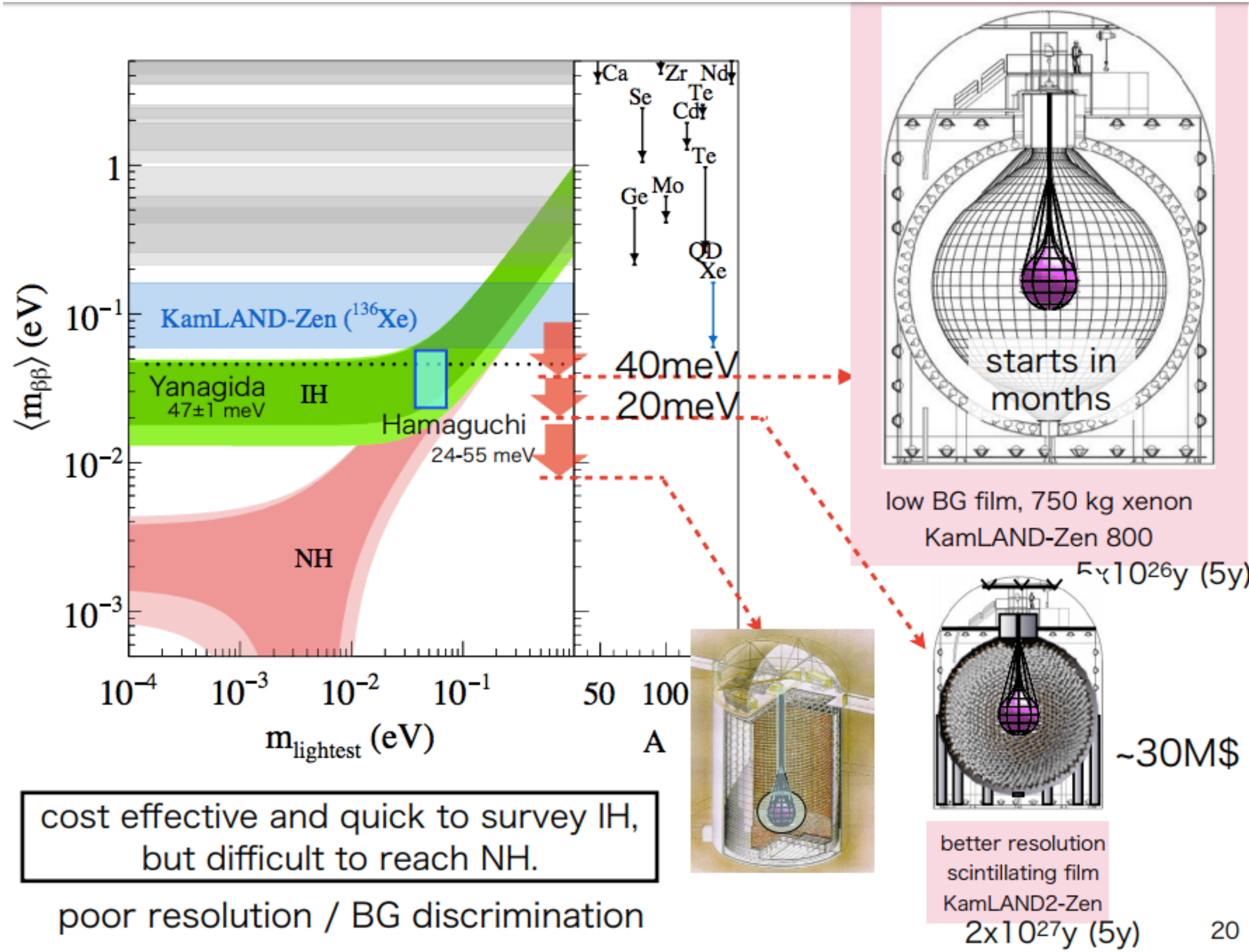
Dark-matter hunt fails to find the elusive particles

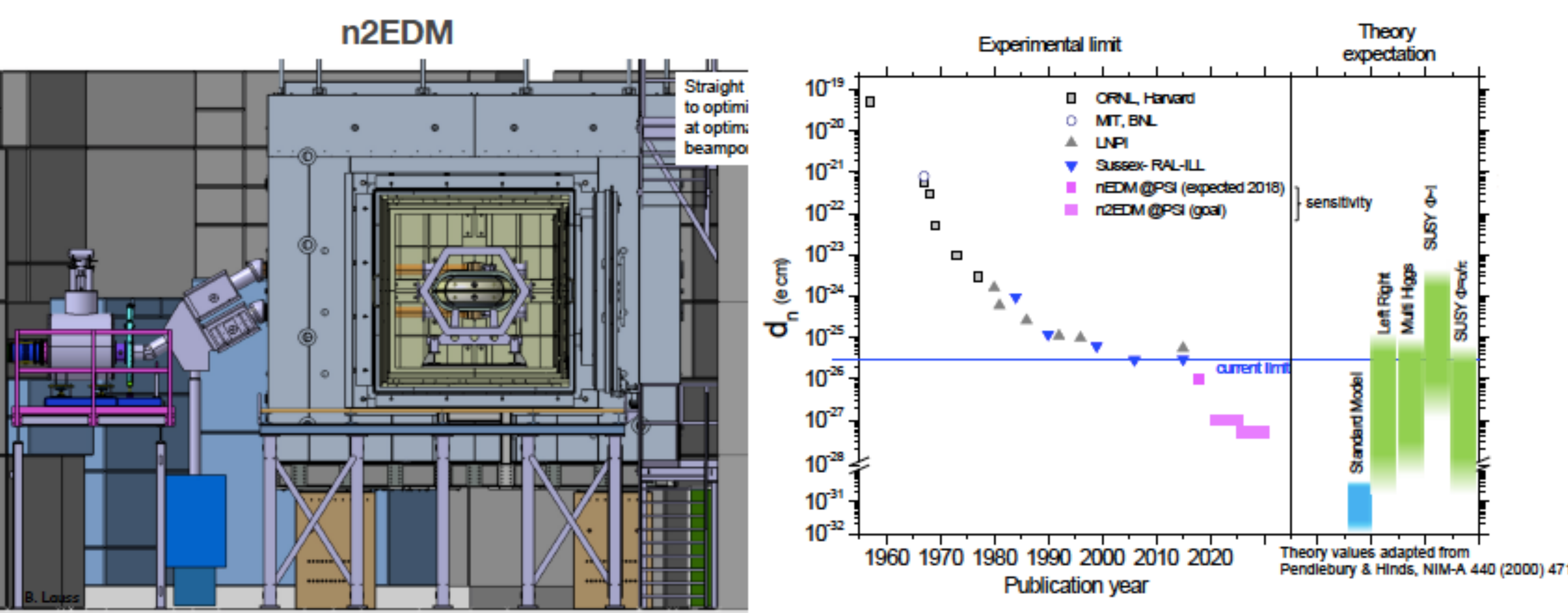
Physicists begin to embrace alternative explanations for the missing material.

Elizabeth Gibney

08 November 2017

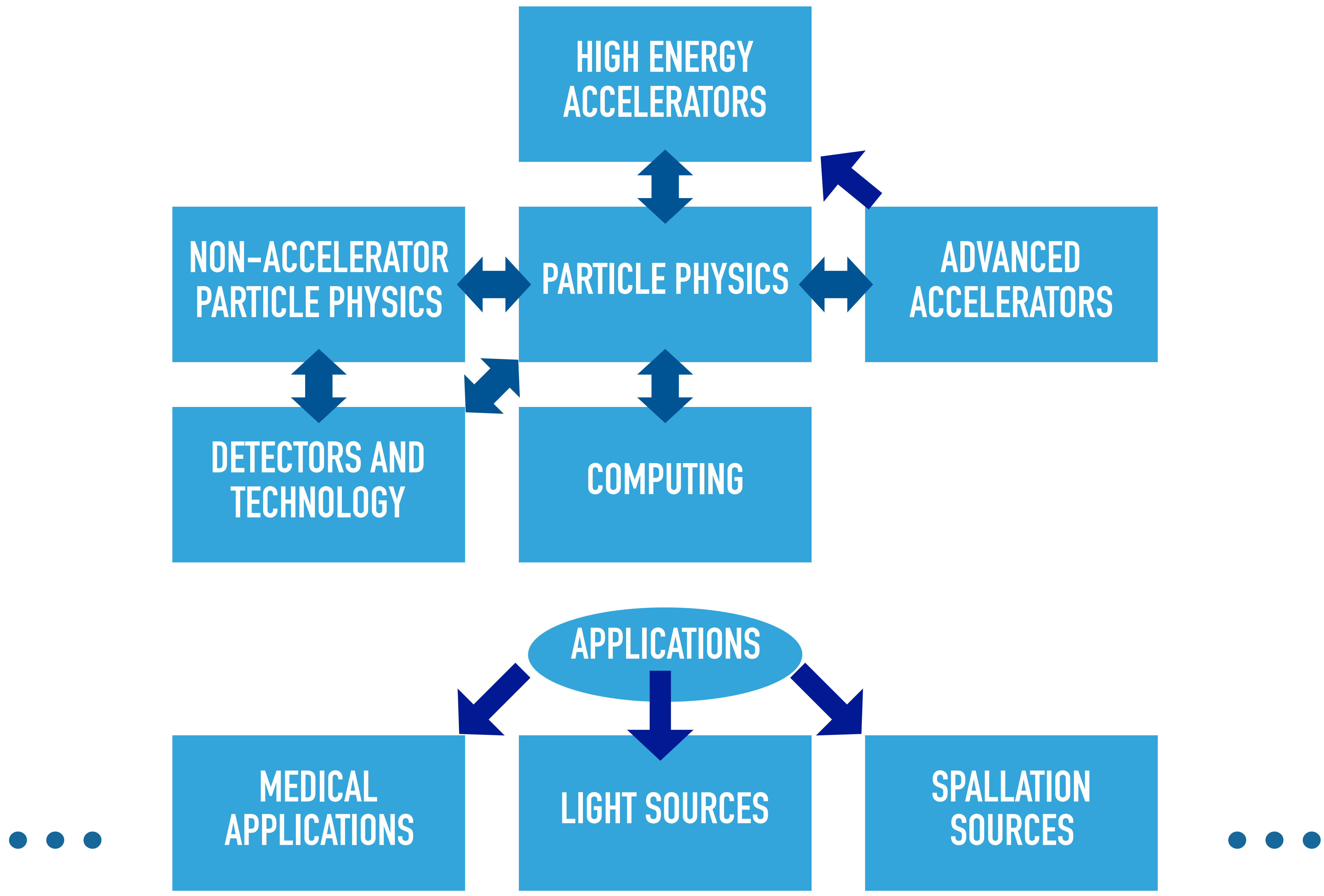
SEE PRESENTATION BY K. INOUE





B. Lauss, nEDM Workshop 2017

SEE TALK BY W. OOTANI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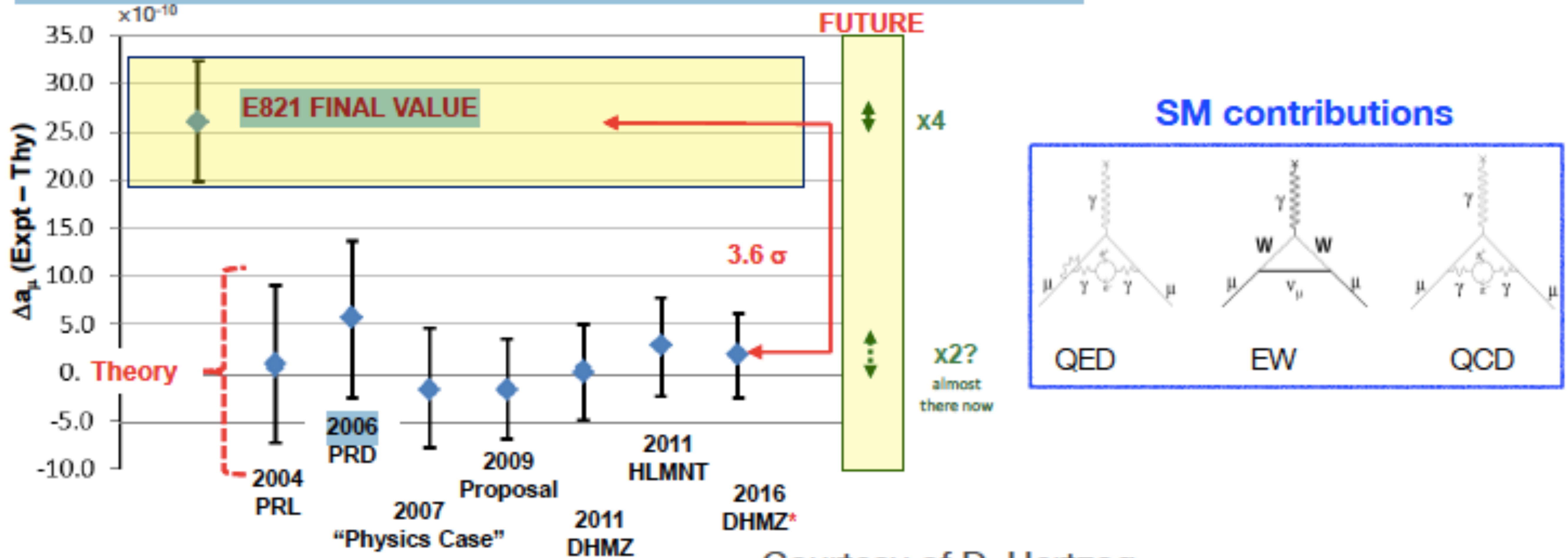
HIGH INTENSITY FRONTIER

- g-2 anomaly
- Lepton Flavour Violation
  - $R_{K(*)}$, $R_{D(*)}$?
  - Is the τ special? (W -> τ ν_τ see M. Valesco presentation)
- Flavour factories
  - DaΦne ϕ -factory
  - BEPC c/τ (upgrade to factory?)
  - Belle II B-factory (see Iijima presentation)
- Cold neutron facilities (n_{EDM})

- Two experiments are in preparation to test BNL results with improved precision (FNAL/E989, J-PARC/E34)



Courtesy of D. Hertzog

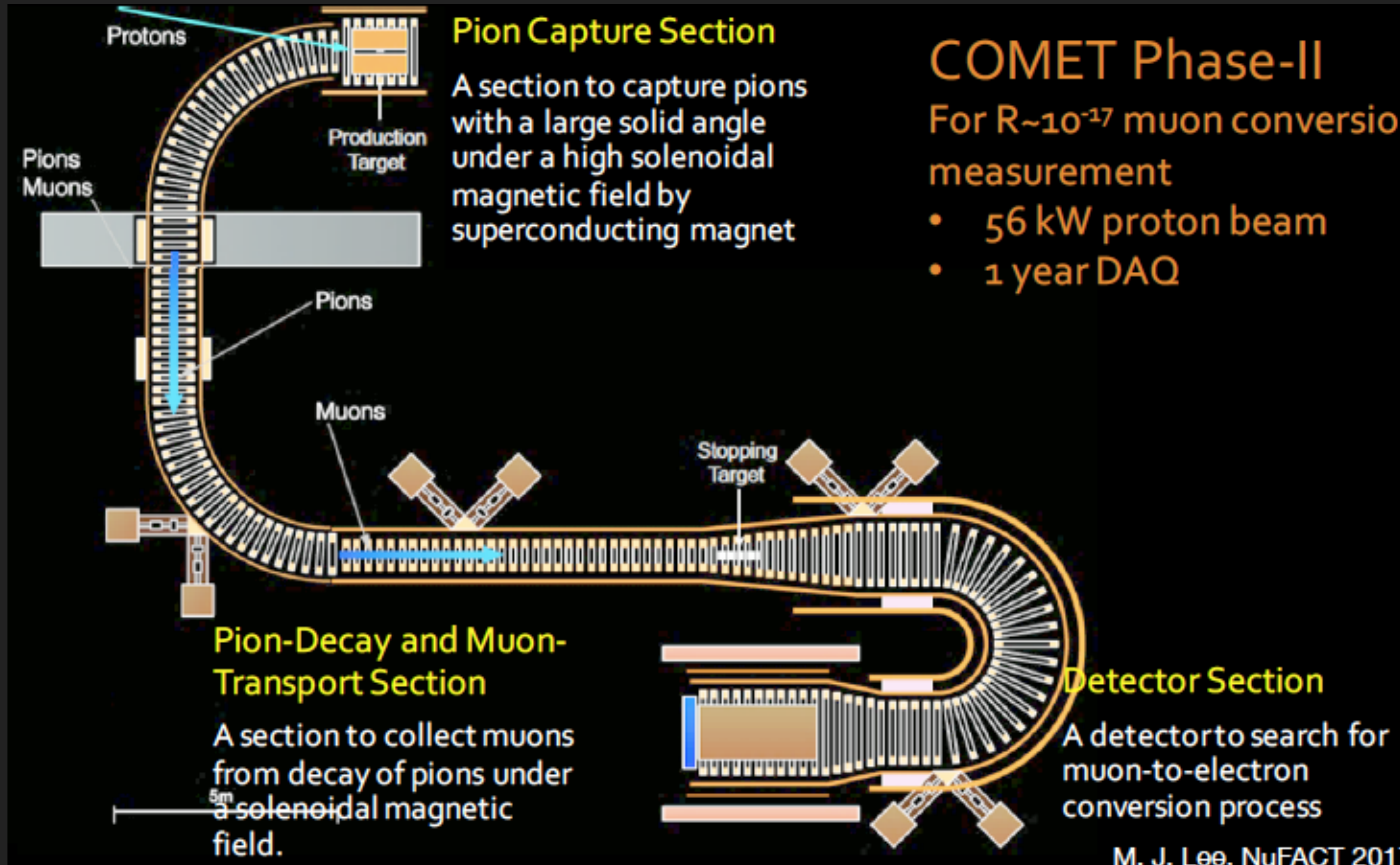
SEE PRESENTATION BY W. OOTANI

LEPTON FLAVOUR VIOLATION

From presentation W. Ootani

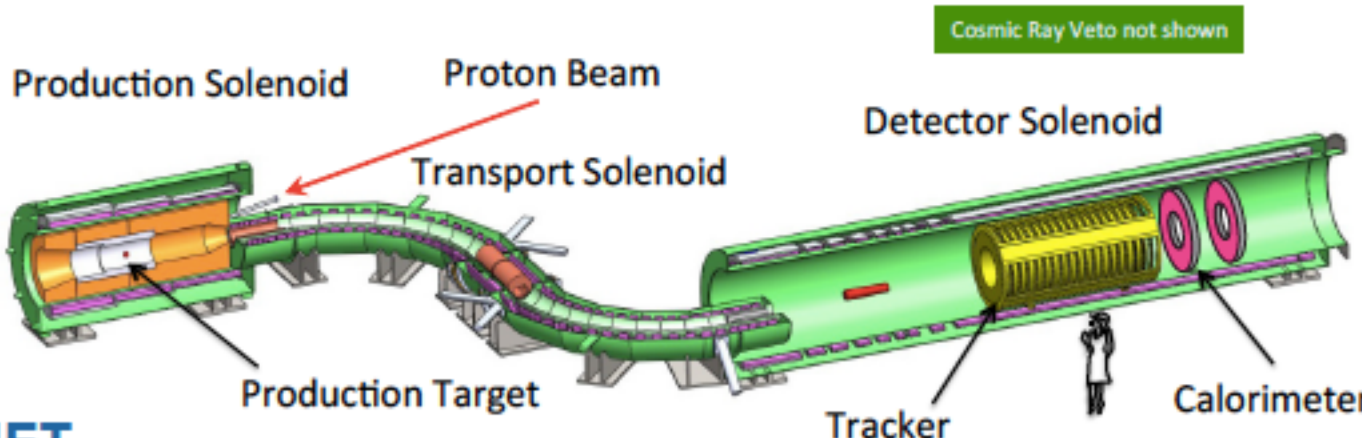
μ-N→e-N COMET@J-PARC

- Staging approach @COMET
  - Phase-I: SES 3×10^{-15} (~5 month) + beam BG study
  - Phase-II: SES 2.6×10^{-17} (~1year)

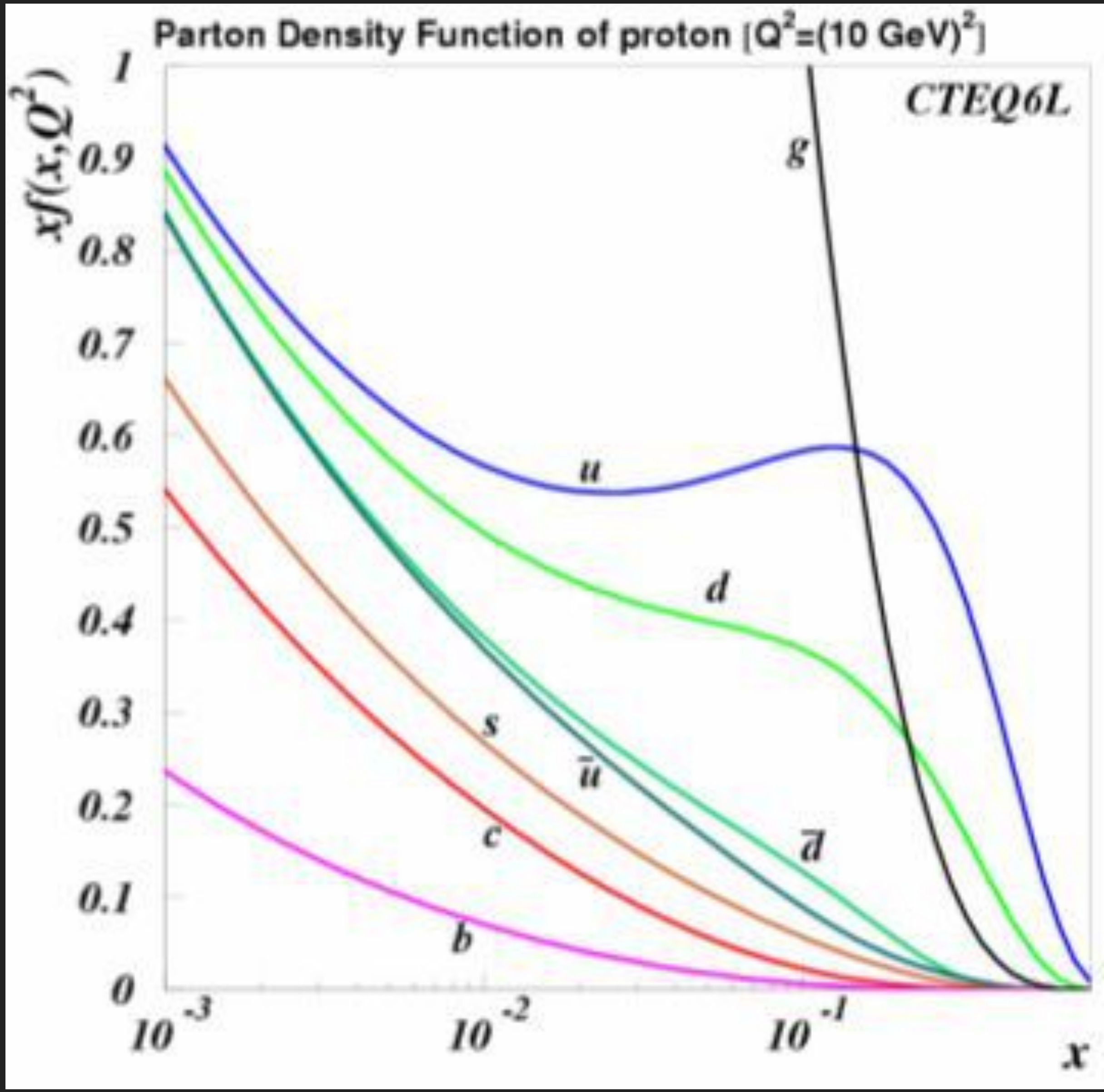


μ-N→e-N Mu2e@Fermilab

- Target S.E.S.: 3×10^{-17}
- Existing Recycler and Debuncher at Fermilab (8GeV, 8kW, rebunched@1695ns)
- Important differences w.r.t. COMET

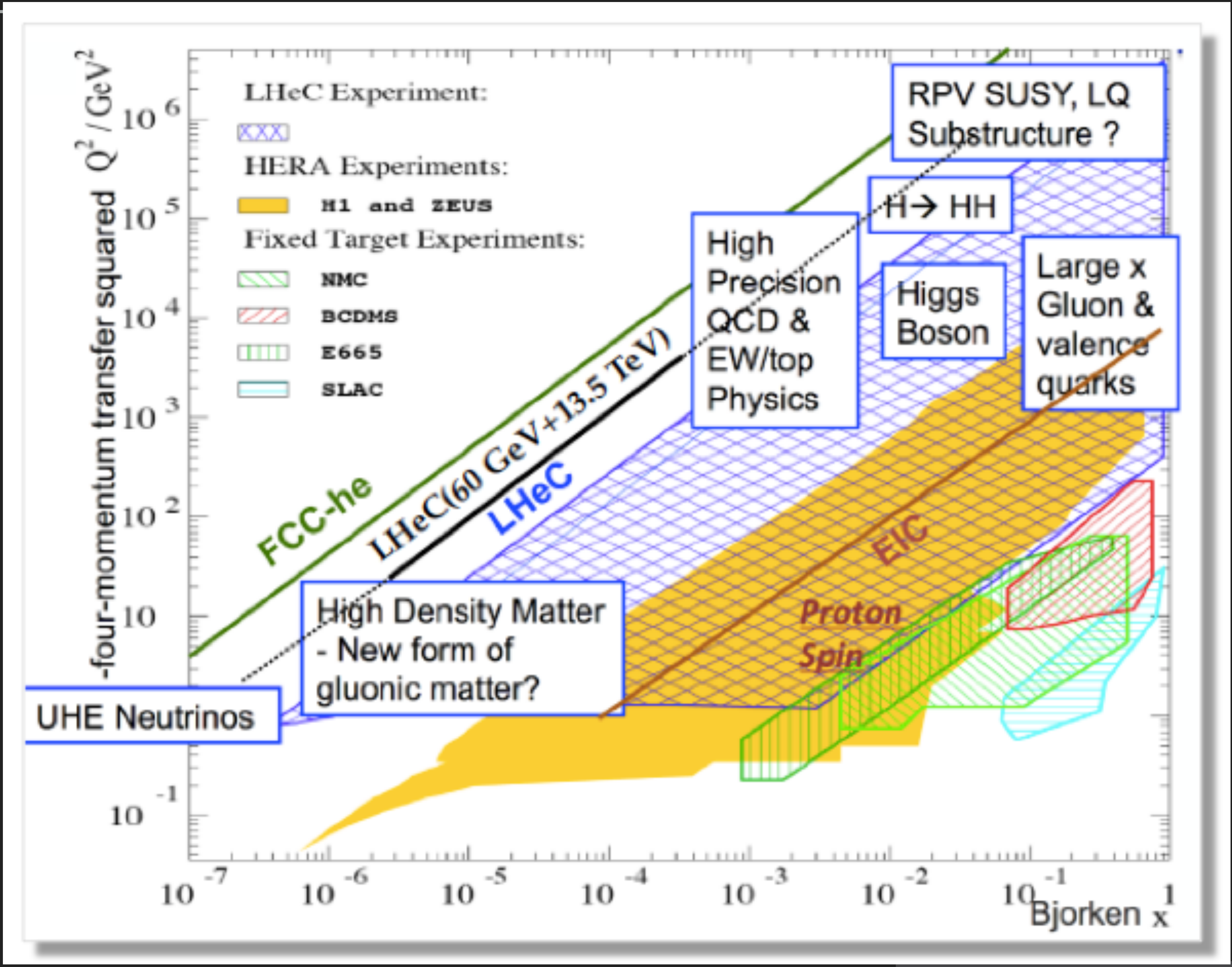


DEEP INELASTIC SCATTERING



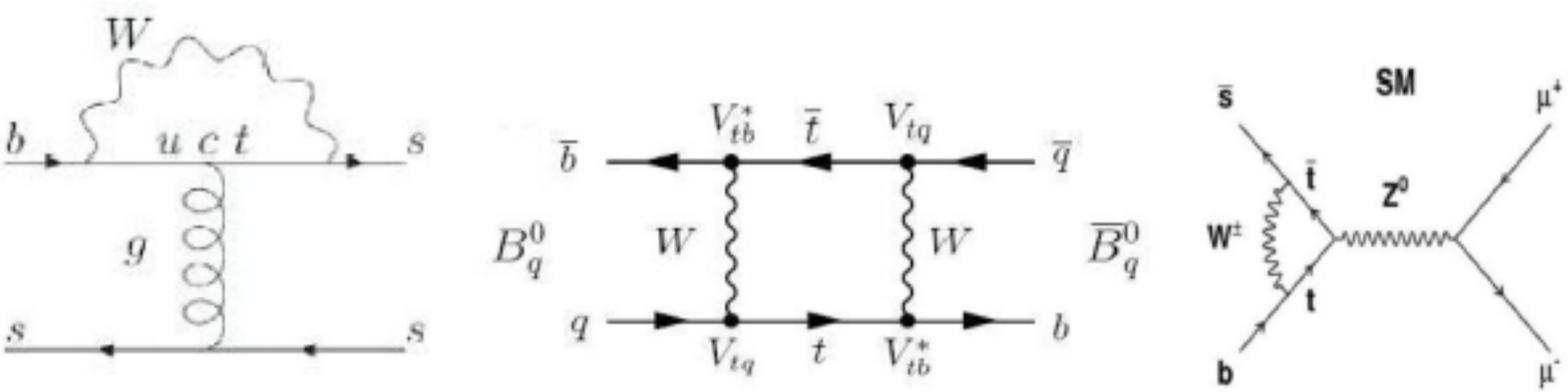
Main uncertainty in important EWK precision measurements (Presentation of M. Velasco)

- **e-p, e-A proposed at:**
  - **LHeC,**
  - **FCC-he**
- **Dedicated EIC in US**



(See presentation by T.Horn)

In flavour physics the guiding principle is to probe processes where loop diagrams are important, as here non-SM particles may contribute

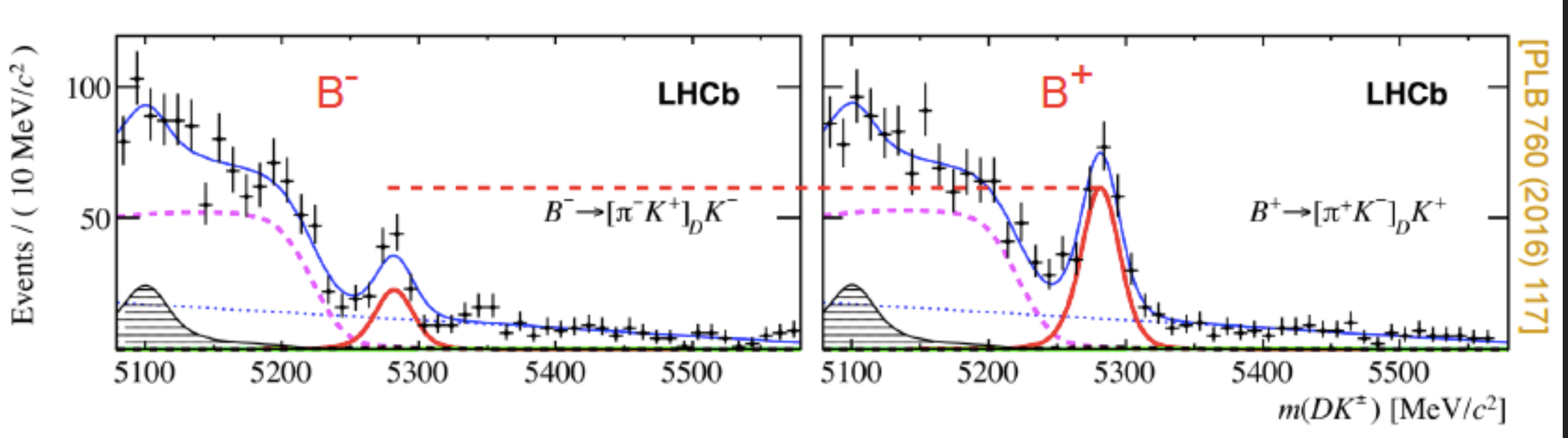


(but as we will see, tree-mediated decays also have their role to play)

Indirect search principle ➡ Precise measurements of low energy phenomena tells us about unknown physics at higher energies

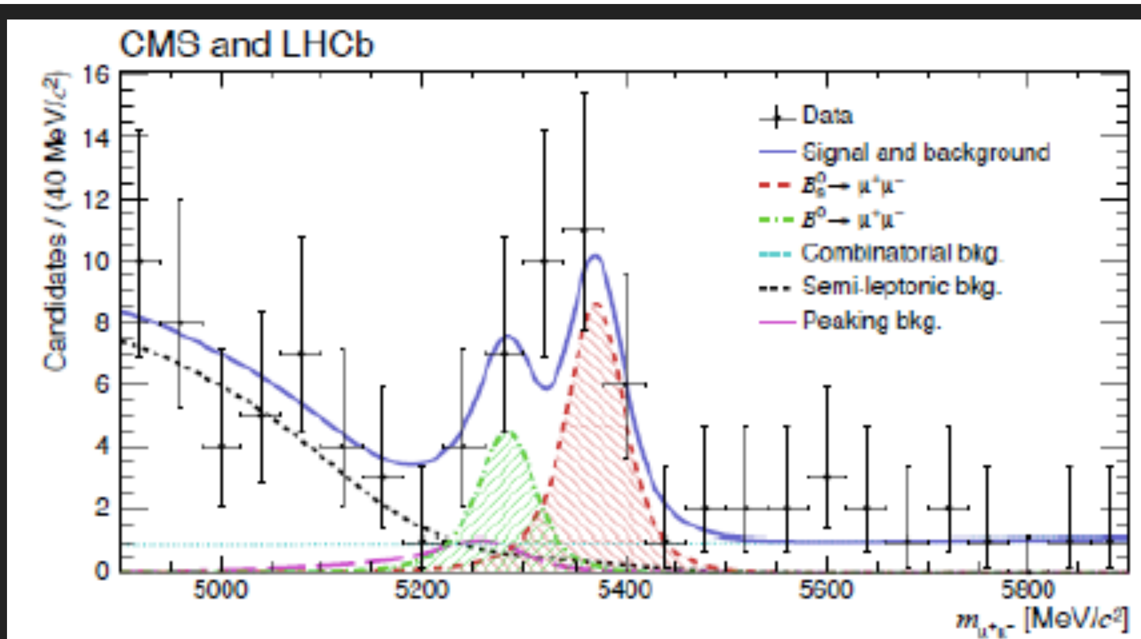
PRECISION AT THE LHC – LHCB

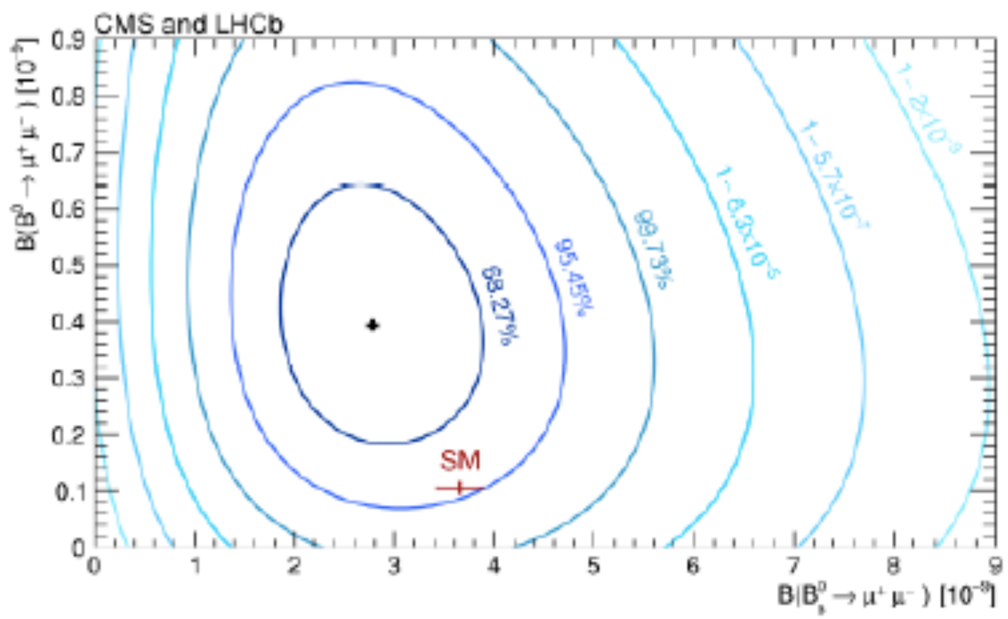
See G. Wilkinson presentation



[PLB 760 (2016) 117]

Very significant CP violation observed, that can be cleanly related to the phase γ.





$$\mathcal{B}(B_s^0 \to \mu^+\mu^-) = \left(2.8\,^{+0.7}_{-0.6}\right) \times 10^{-9} \quad (6.2\sigma)$$

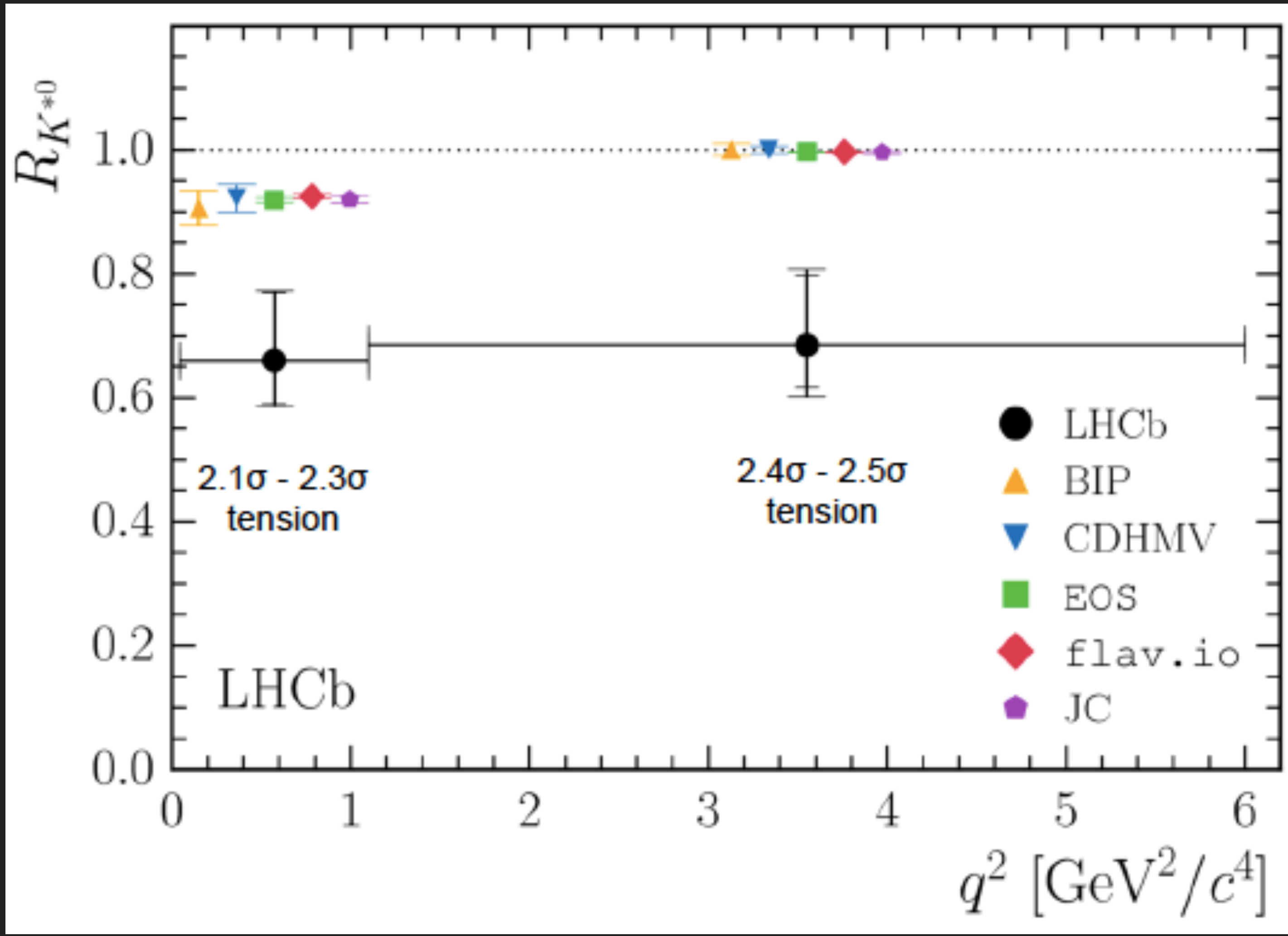
$$\mathcal{B}(B^0 \to \mu^+\mu^-) = \left(3.9\,^{+1.6}_{-1.4}\right) \times 10^{-10} \quad (3.0\sigma)$$

[arXiv:1411.4413, Nature 522 (2015) 68]

LEPTON UNIVERSALITY ANOMALY? LHCB

$$\mathcal{R}_{K^{*0}} = \frac{\mathcal{B}(B^0 \to K^{*0}\mu^+\mu^-)}{\mathcal{B}(B^0 \to K^{*0}J/\psi(\to \mu^+\mu^-))} \Bigg/ \frac{\mathcal{B}(B^0 \to K^{*0}e^+e^-)}{\mathcal{B}(B^0 \to K^{*0}J/\psi(\to e^+e^-))}$$

See G. Wilkinson presentation



[JHEP 08 (2017) 055]

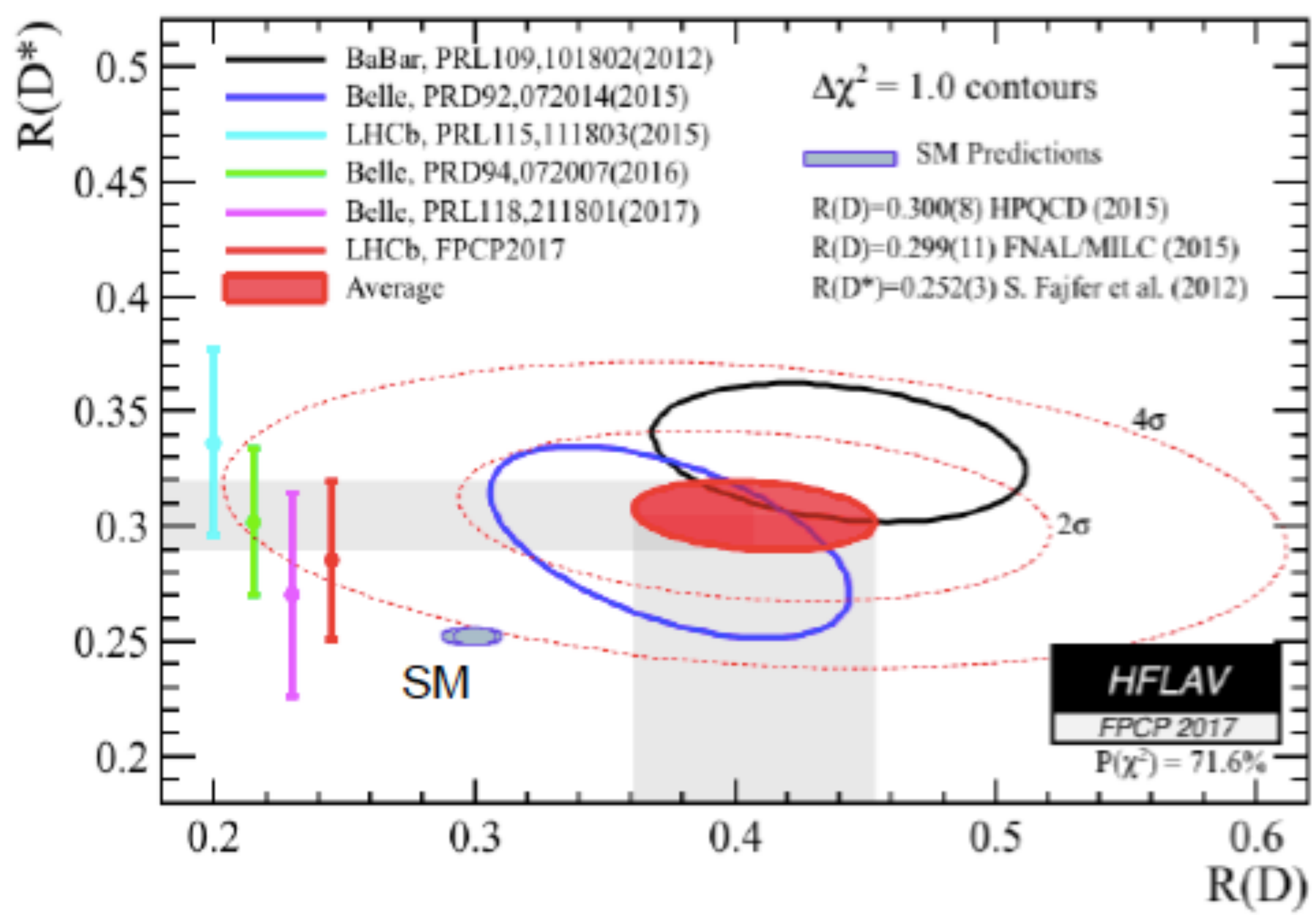
$$R(D^{(*)}) \equiv BR(B \to D^{(*)}\tau\nu)/BR(B \to D^{(*)}\mu\nu)$$

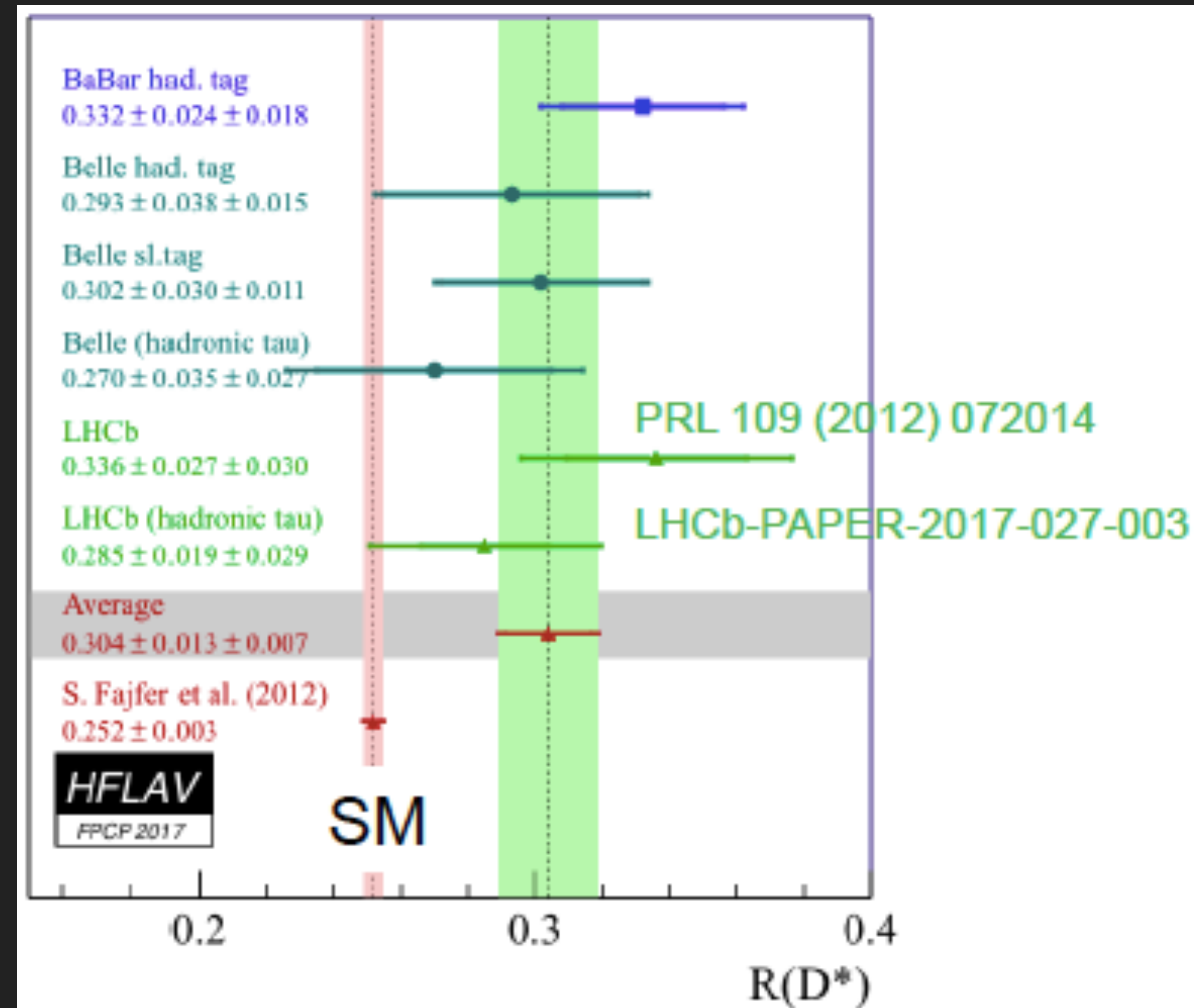
See presentation by G. Wilkinson

Charged Higgs?

Lepto-quarks?

Combination of results give a 4.1 σ (!) discrepancy w.r.t. SM.



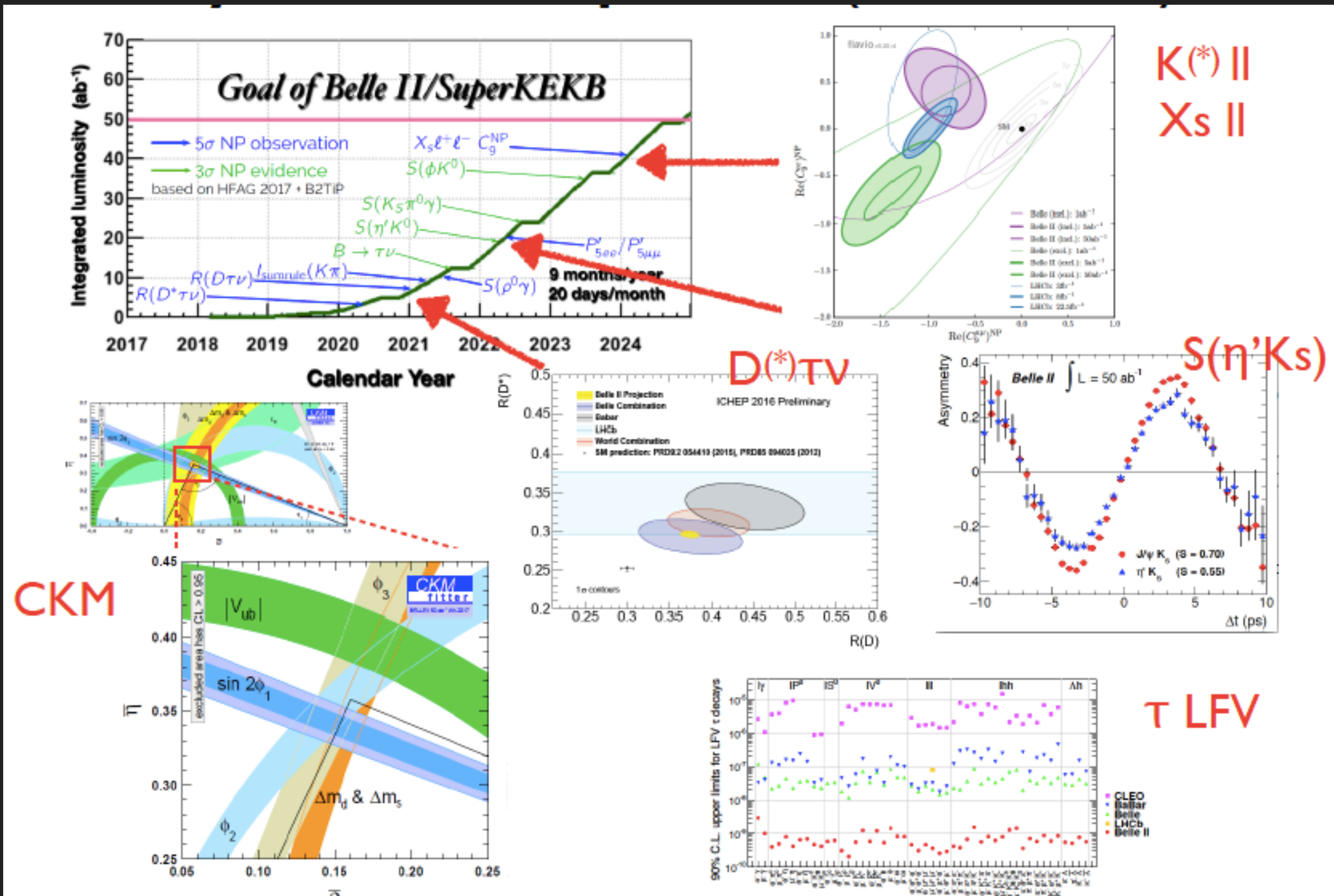


Belle II to add precision here (see talk by E. You)

CoEPP ARC Centre of Excellence for Particle Physics at the Terascale

SUPERKEKB AND BELLE II

See presentation by T. Iijima

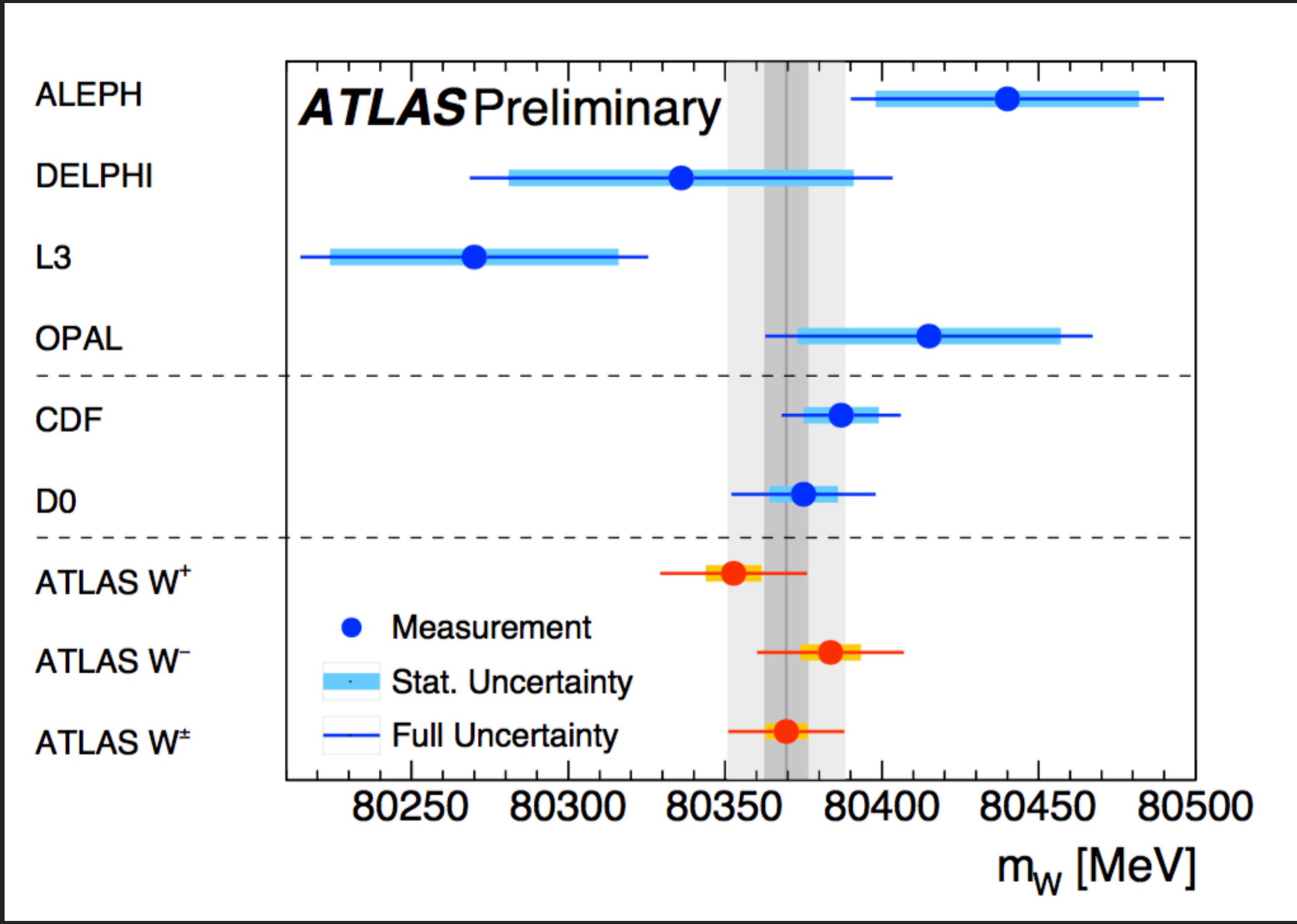


LHC – HIGGS DISCOVERY TO HIGGS PRECISION?

- Higgs Studies G. Zanderighi; H. Gray
- Electroweak Studies G. Zanderighi; M. Velasco
- Searches continue:
  - Super Symmetry I. Melzer-Pellmann
  - Exotics C. Issever

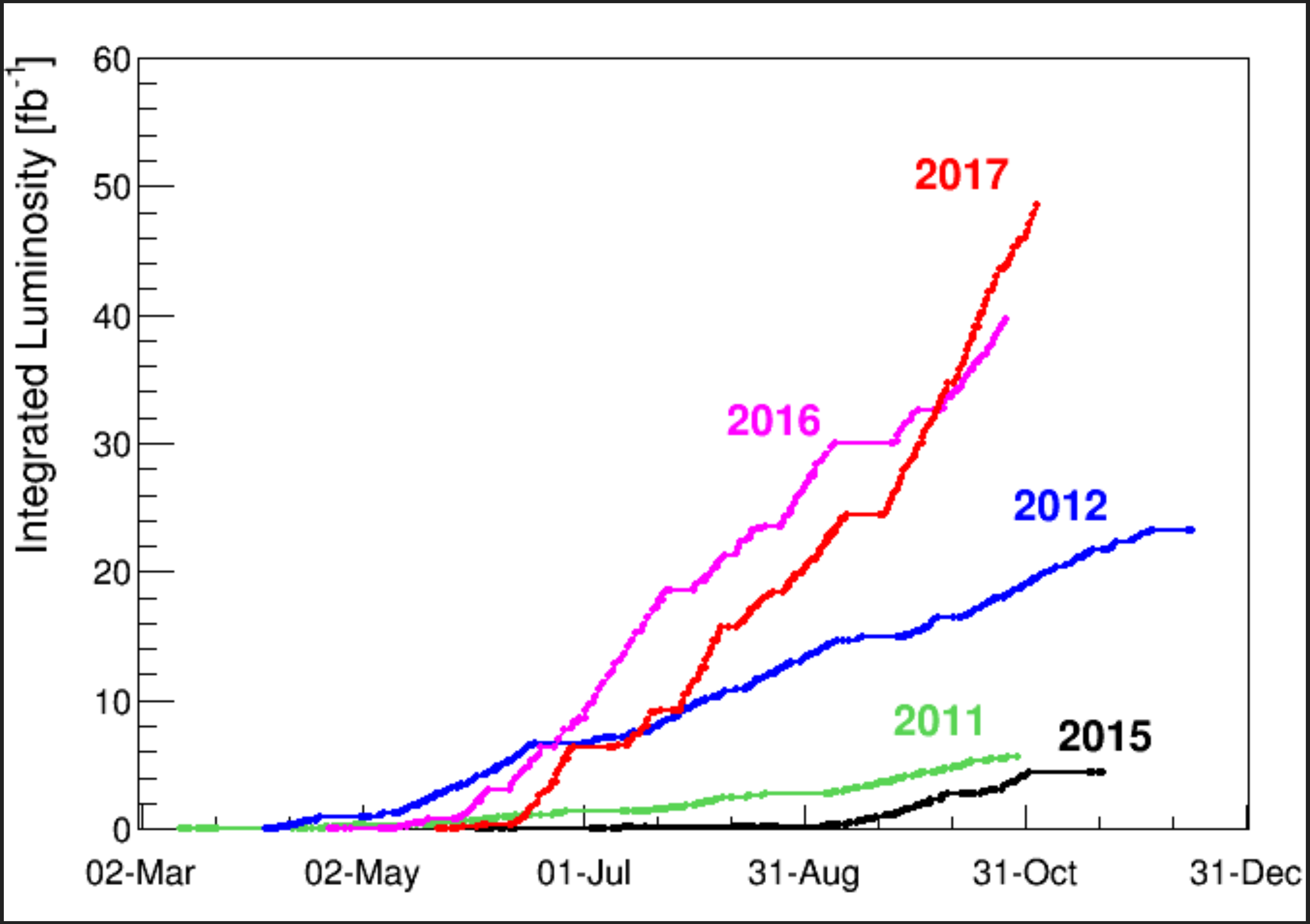
ENERGY + PRECISION

LHC Experiments Already Precision



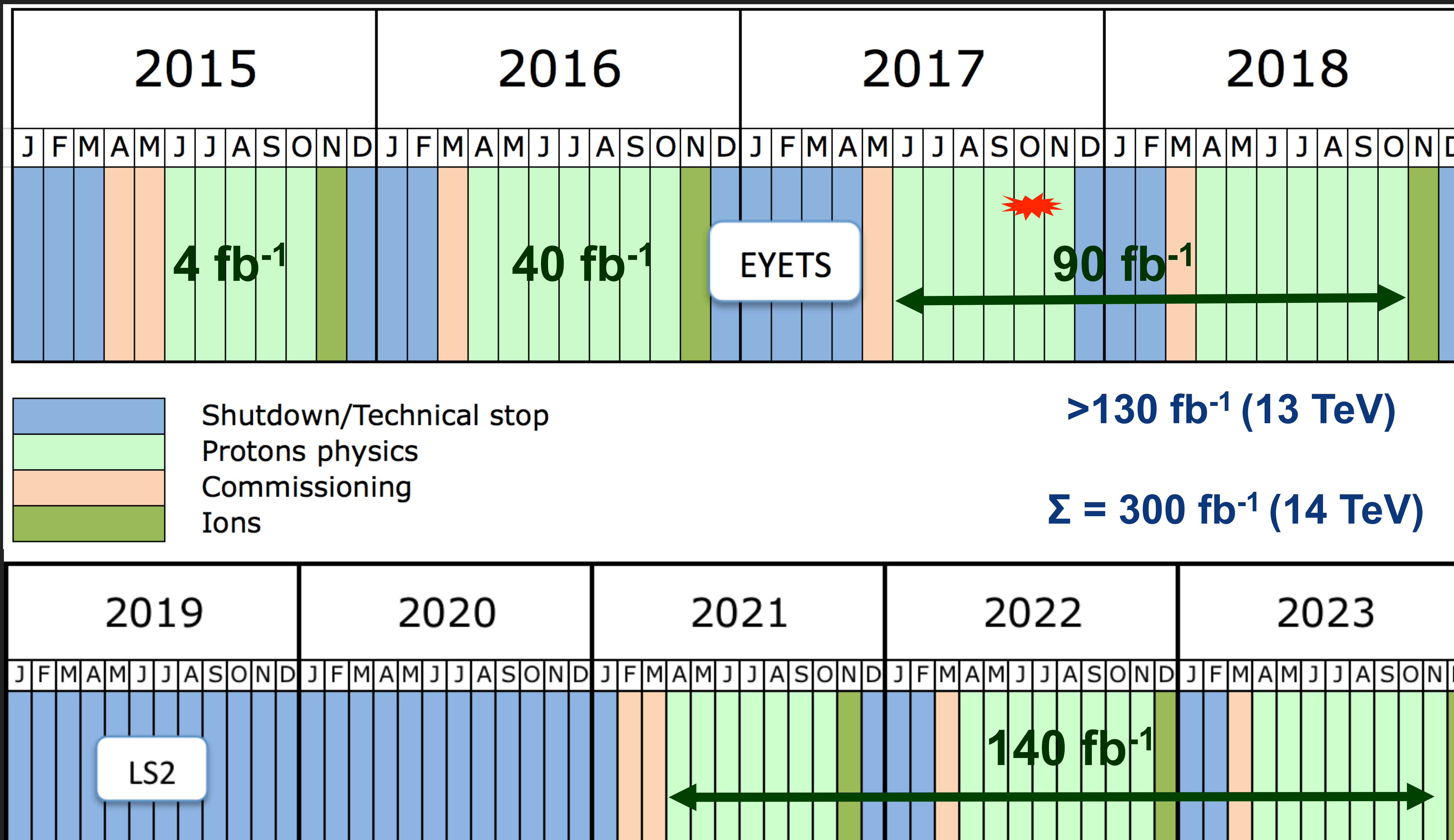
Example: Wmass from ATLAS

See presentation, M. Velasco



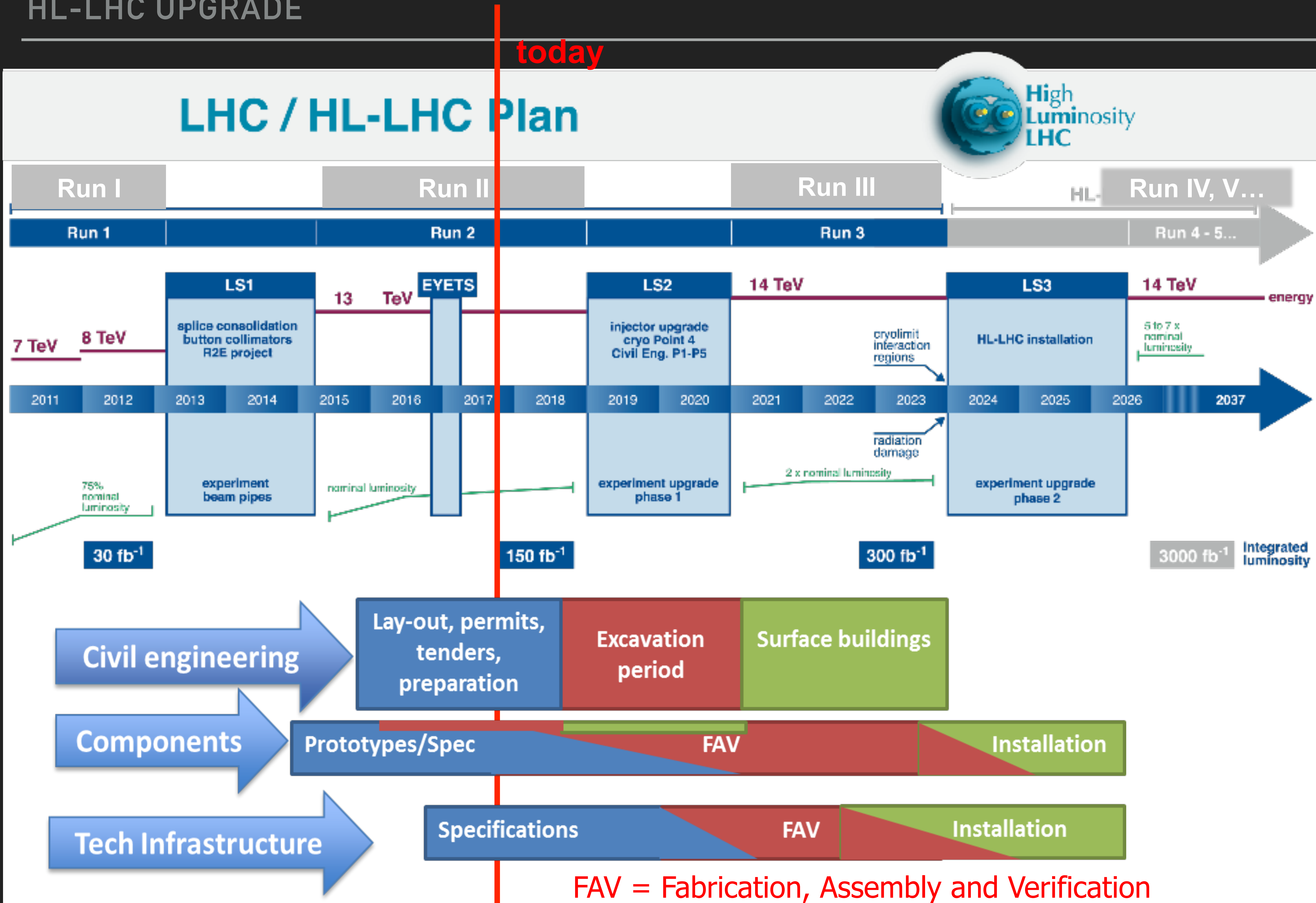
2017 Integrated Luminosity well surpassed that of 2016

Freddie Bordry - "The LHC is a very flexible machine"



Pre-HL-LHC Luminosity Target is entrain

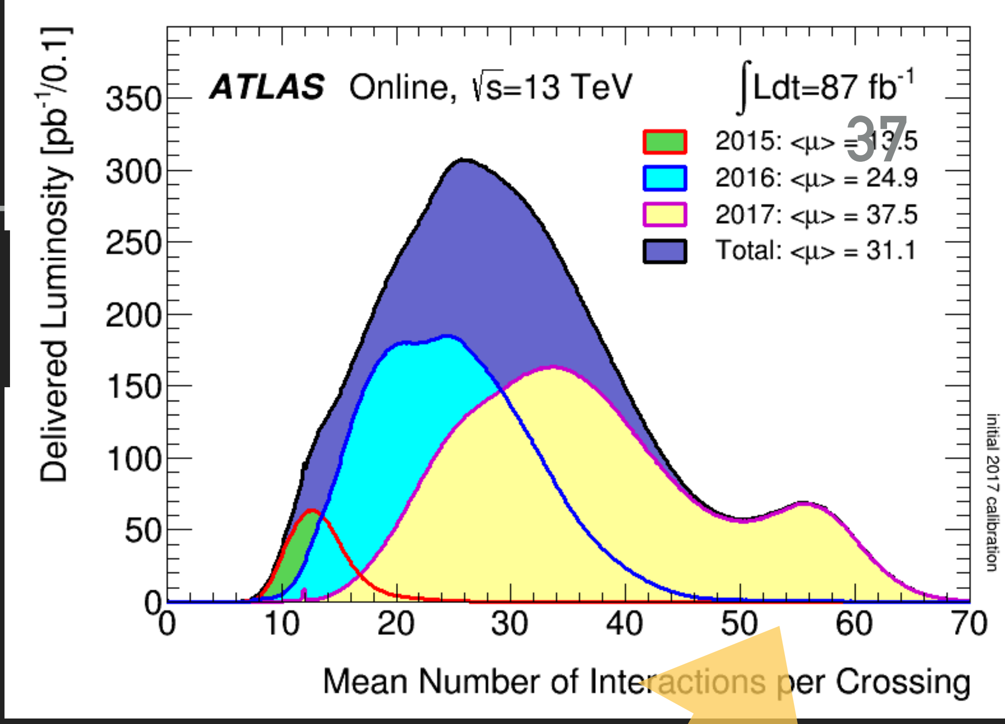
HL-LHC UPGRADE



From: Frédérick Bordry, LHC Machine Status, CERN-RRB 23rd October 2017

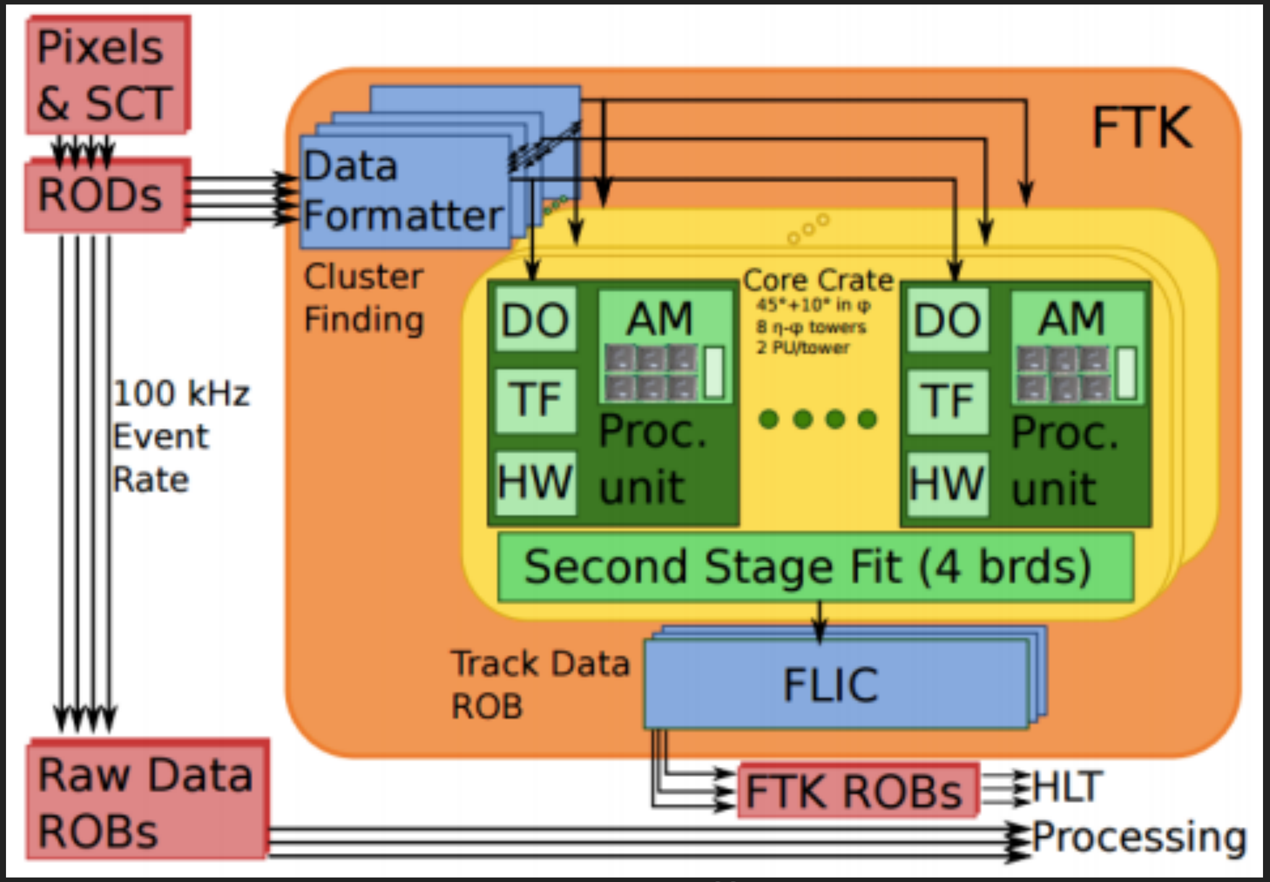
WITH LUMINOSITY COMES DETECTOR CHALLENGES

- At HL-LHC expect average 140 interactions per beam crossing up to max of 200
- (400-800 at HE-LHC!!)
- Example: Trigger improvements

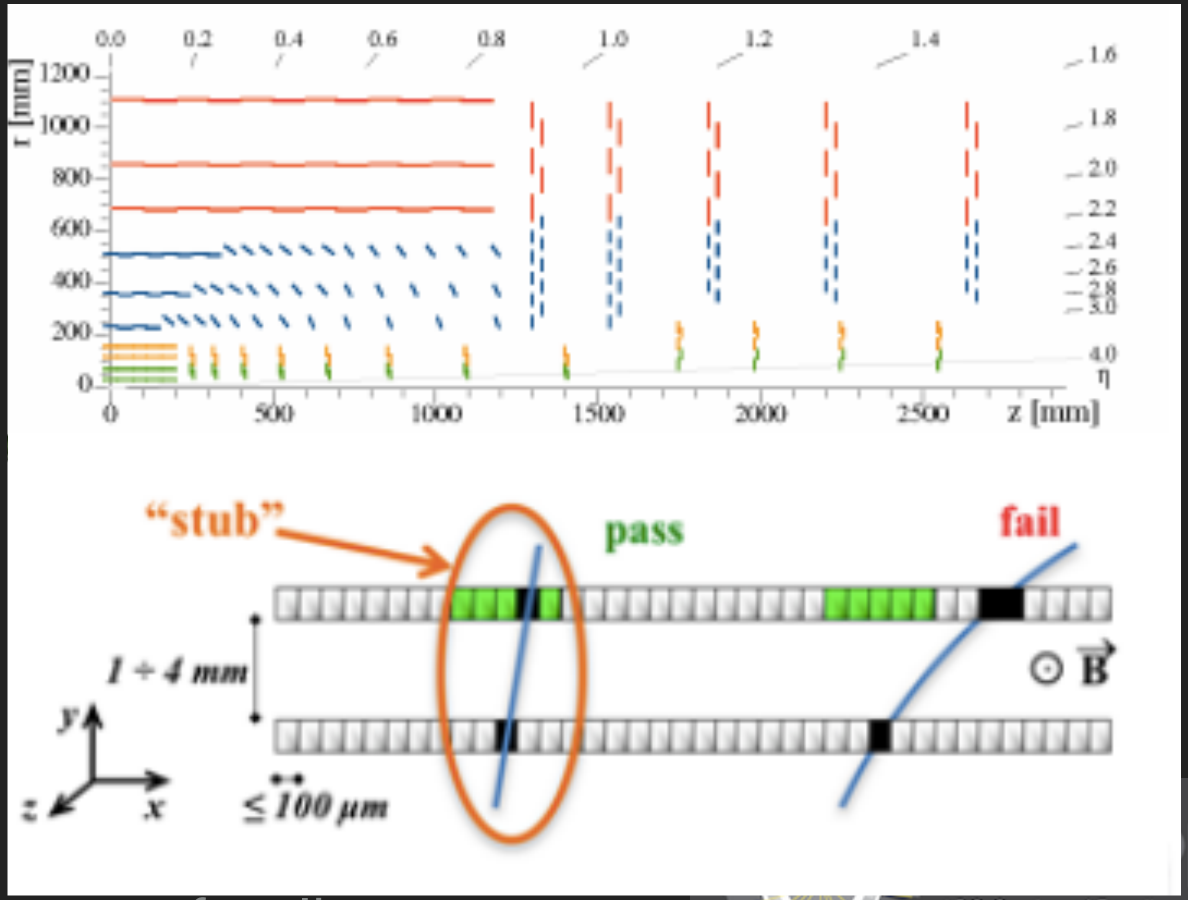


Already problematic!
Presentation by M. Velasco

ATLAS - Fast Track Trigger FTK



CMS See presentation by M. Narain

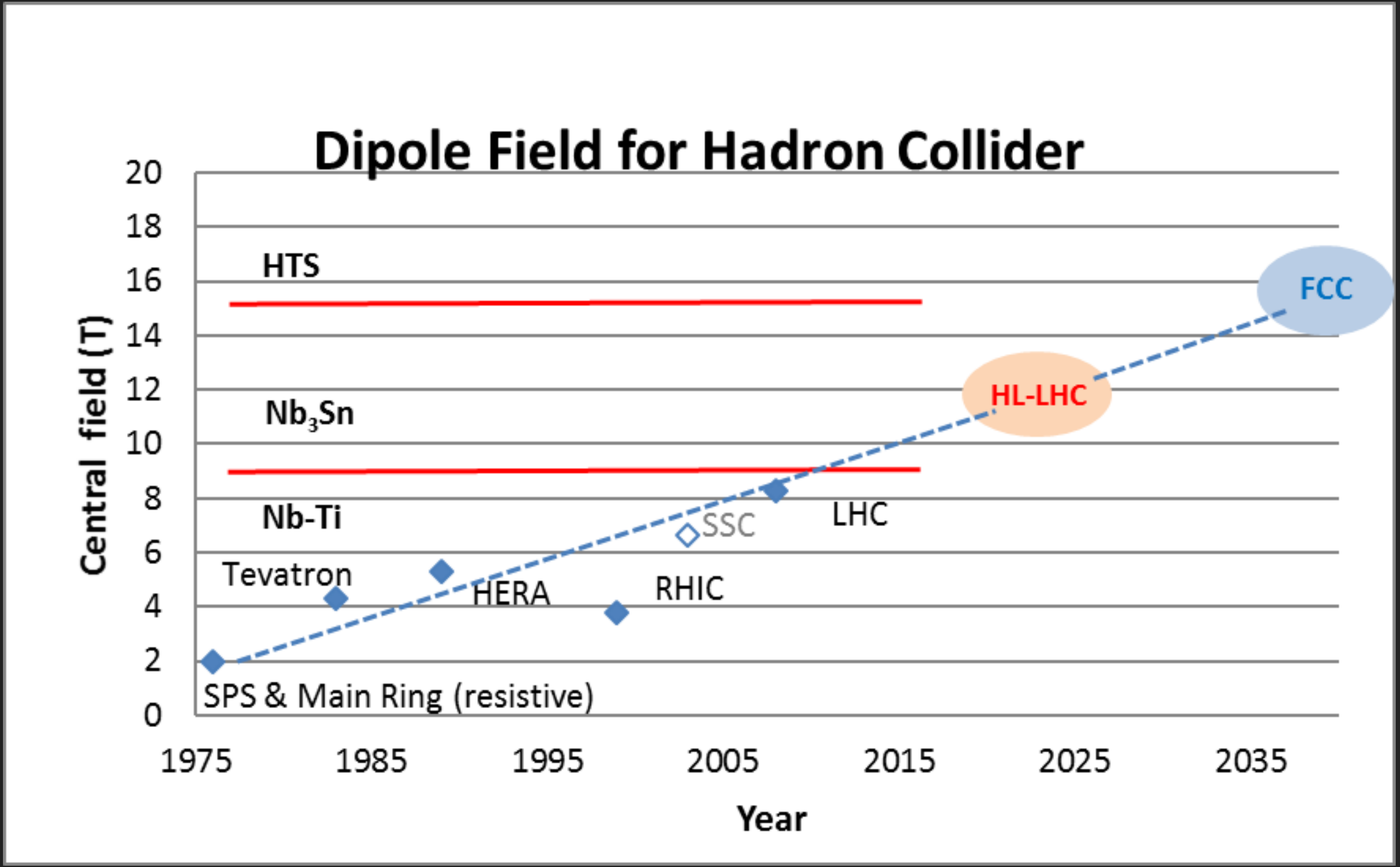


HE-LHC

- Basic Parameters:
  - 2 x LHC Collision Energy (FCC-hh magnet development)
    - Existing LHC TunnelCoM Energy 27TeV
      - (LHC 14.0TeV x 16T/8.33T)
  - 4 x HL-LHC luminosity (cross–section ~ $1/E^2$)
    - Integrated luminosity of 10-20ab^{-1} over 10-20 years??
- Timeline?
  - Magnet development already advanced
  - HL-LHC CAPEX within CERN budget
  - HE-LHC natural successor to HL-LHC
- ***Will keep CERN at the High-Energy Frontier for Decades***

DIPOLE FIELD DEVELOPMENT

- Low Temp. Superconductor (LTS) Development Nb_3Sn (16T):
  - Critical Current
  - Mechanical Stress
  - Training and Memory
- HTS?
- Combination LTS/HTS (20T?)



See Freddie Bordry Presentation

PROGRESS ON Nb_3Sn

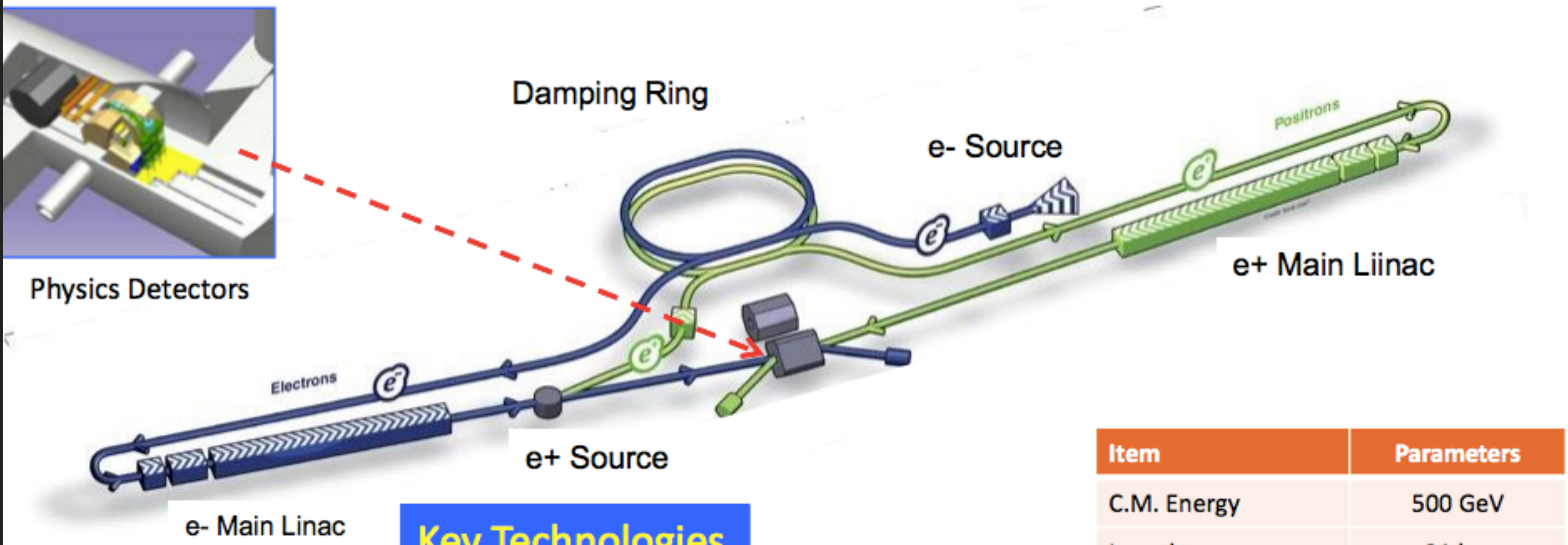
Insertion of coil package inside mechanical structure of the first IT quad prototypes (4.2 m long) in LBNL

Manufacturing 5.5 m long coil

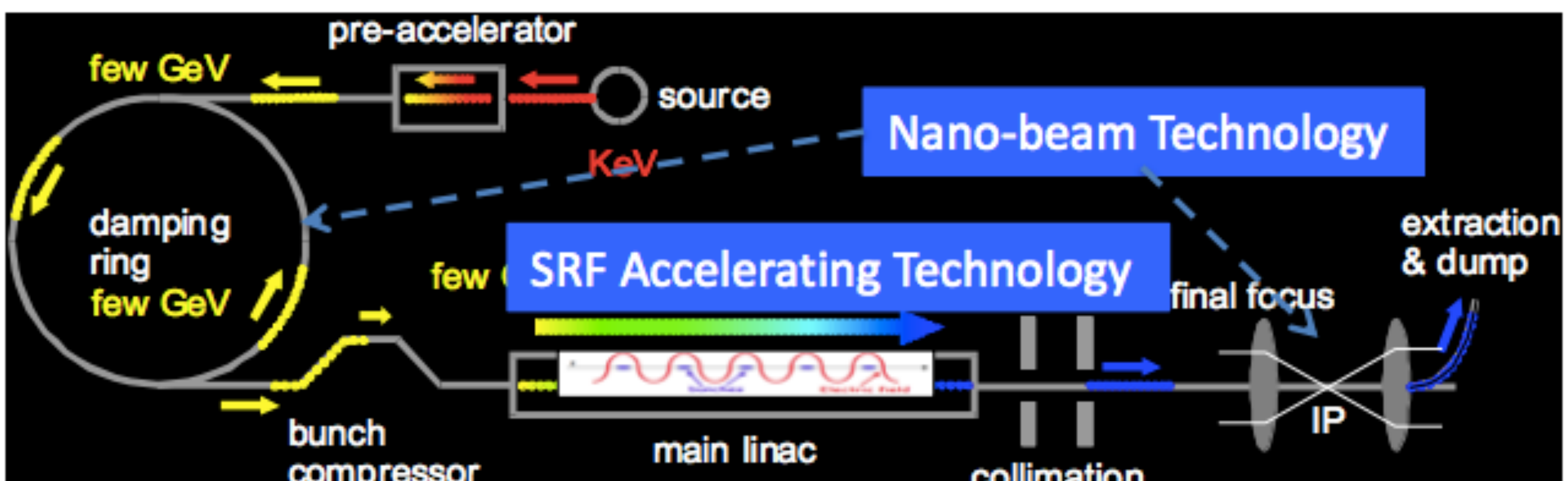
FOR DISCOVERY ENERGY IS BETTER/EASIER??

(BUT REMEMBER THE TIMESCALE FOR NEW MACHINES!)

- In the past:
  - Discovery in proton machine
  - Precision measurements (and discovery) in e+e-
- Charm, Bottom, W/Z, … discoveries to factories
  - Now the Higgs?
  - HL-LHC moves in the precision direction.
  - But a e+e- Higgs factory (and discovery machine)?



Key Technologies

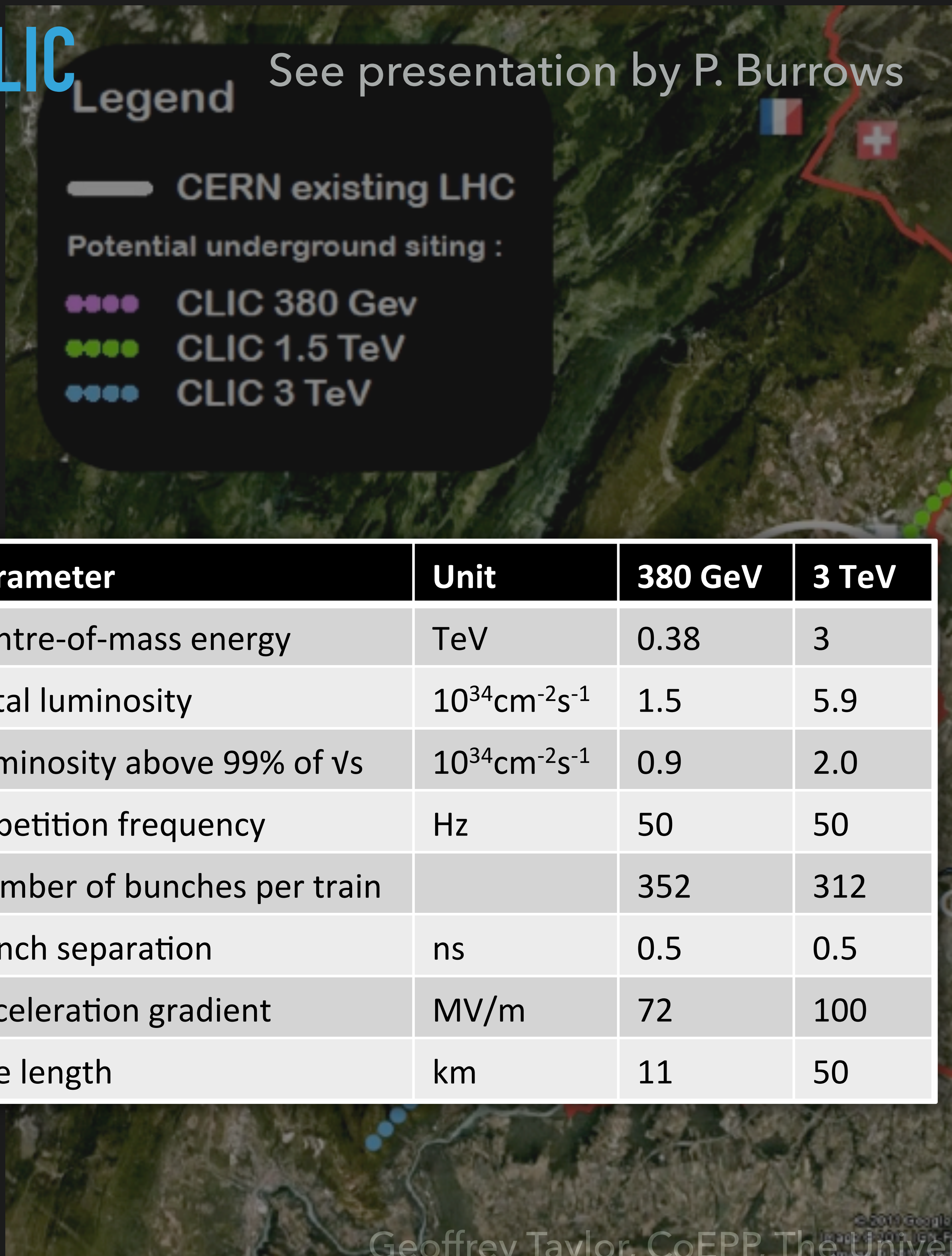


Item	Parameters
C.M. Energy	500 GeV
Length	31 km
Luminosity	1.8 x10^{34} $cm^{-2}s^{-1}$
Repetition	5 Hz
Beam Pulse Period	0.73 ms
Beam Current	5.8 mA (in pulse)
Beam size (y) at FF	5.9 nm
SRF Cavity G. Q_0	31.5 MV/m Q_0 = 1x10^{10}

See presentation by S. Michizono

CLIC

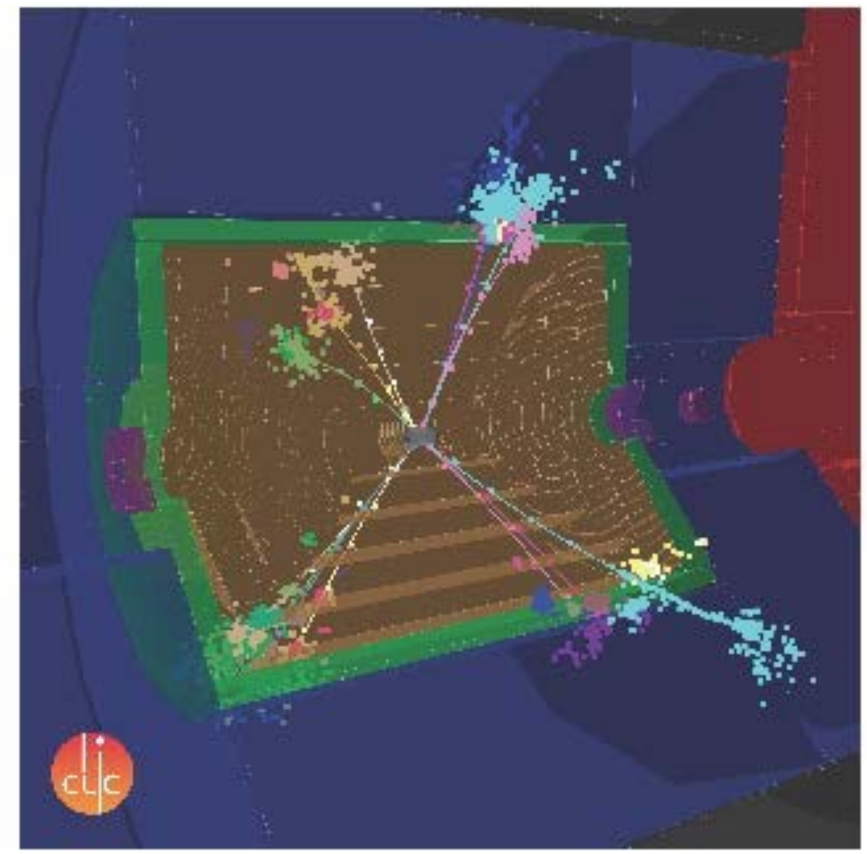
See presentation by P. Burrows



Parameter	Unit	380 GeV	3 TeV
Centre-of-mass energy	TeV	0.38	3
Total luminosity	$10^{34}cm^{-2}s^{-1}$	1.5	5.9
Luminosity above 99% of √s	$10^{34}cm^{-2}s^{-1}$	0.9	2.0
Repetition frequency	Hz	50	50
Number of bunches per train		352	312
Bunch separation	ns	0.5	0.5
Acceleration gradient	MV/m	72	100
Site length	km	11	50

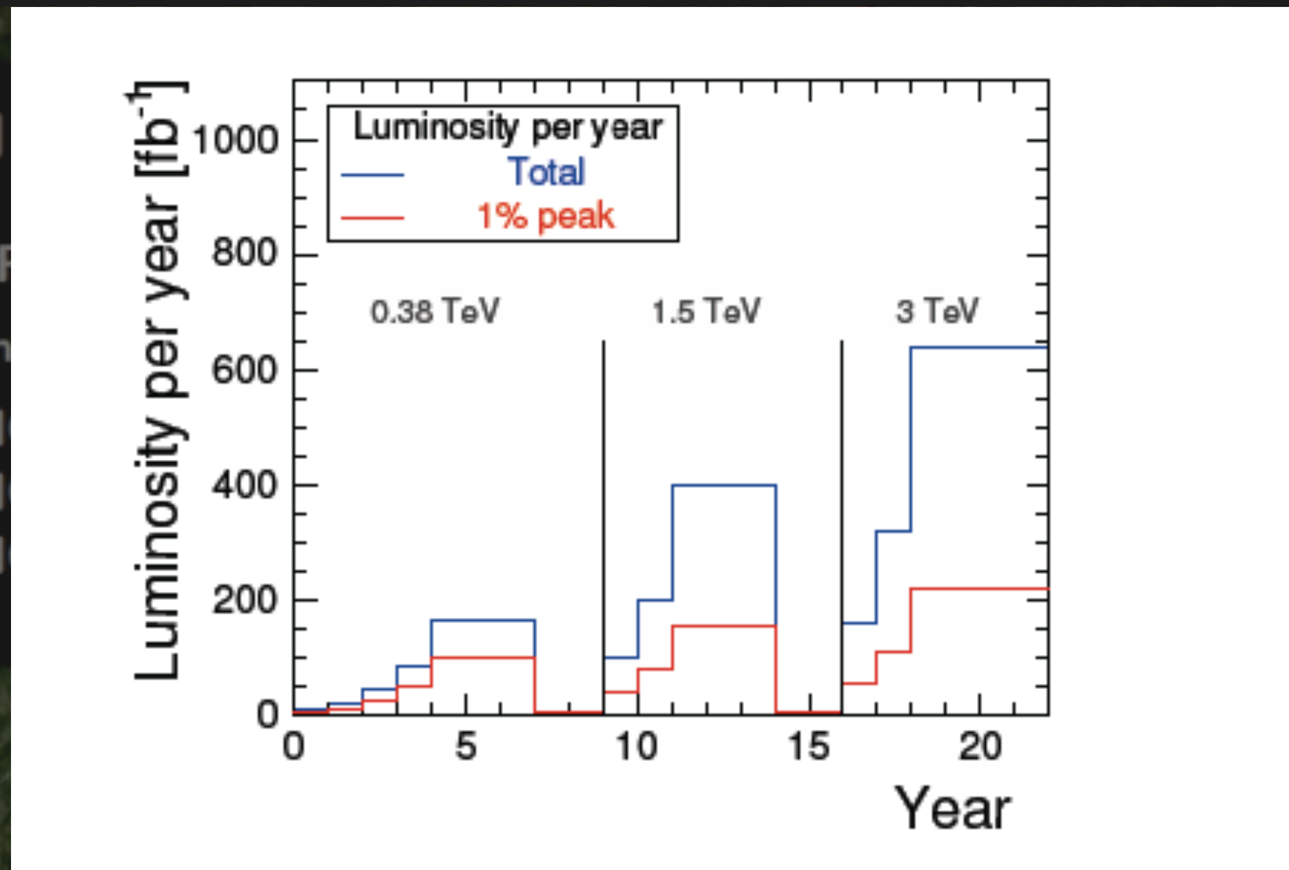
CERN-2016-004
12 August 2016

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH



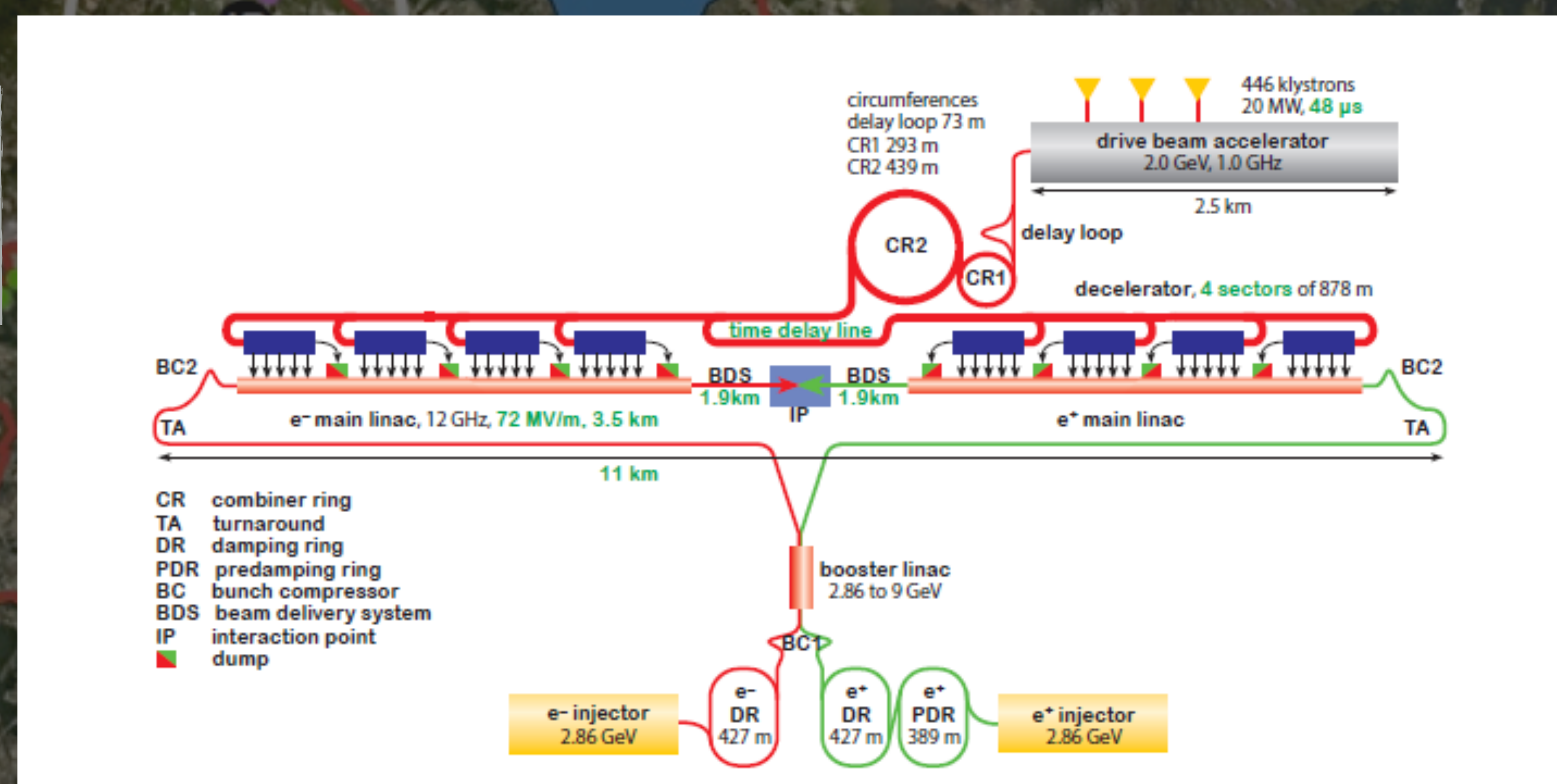
UPDATED BASELINE FOR A STAGED COMPACT LINEAR COLLIDER

CLIC



380 GeV -> Higher Energy

Will also study klystron based machine for initial stage.



CLIC TIMELINE

2013 - 2019 Development Phase

Development of a Project Plan for a staged CLIC implementation in line with LHC results; technical developments with industry, performance studies for accelerator parts and systems, detector technology demonstrators

2020 - 2025 Preparation Phase

Finalisation of implementation parameters, preparation for industrial procurement, Drive Beam Facility and other system verifications, Technical Proposal of the experiment, site authorisation

2026 - 2034 Construction Phase

Construction of the first CLIC accelerator stage compatible with implementation of further stages; construction of the experiment; hardware commissioning

2019 - 2020 Decisions

Update of the European Strategy for Particle Physics; decision towards a next CERN project at the energy frontier (e.g. CLIC, FCC)

2025 Construction Start

Ready for construction; start of excavations

2035 First Beams

Getting ready for data taking by the time the LHC programme reaches completion

CEPC

See Update by Q. Qin

ELECTRON-POSITRON COLLIDER (45.5, 80, 125 GEV)

Higgs Factory

- Precision study of Higgs (m_H, J^{PC}, couplings)
- Looking for hints of new physics
- Luminosity > 2.0×10^{34}cm^{-2}s^{-1}

Z & W factory

- Precision test of standard model
- Rare decays
- Luminosity > 1.0×10^{34}cm^{-2}s^{-1}

Flavor factory: b, c, t and QCD studies

FCC

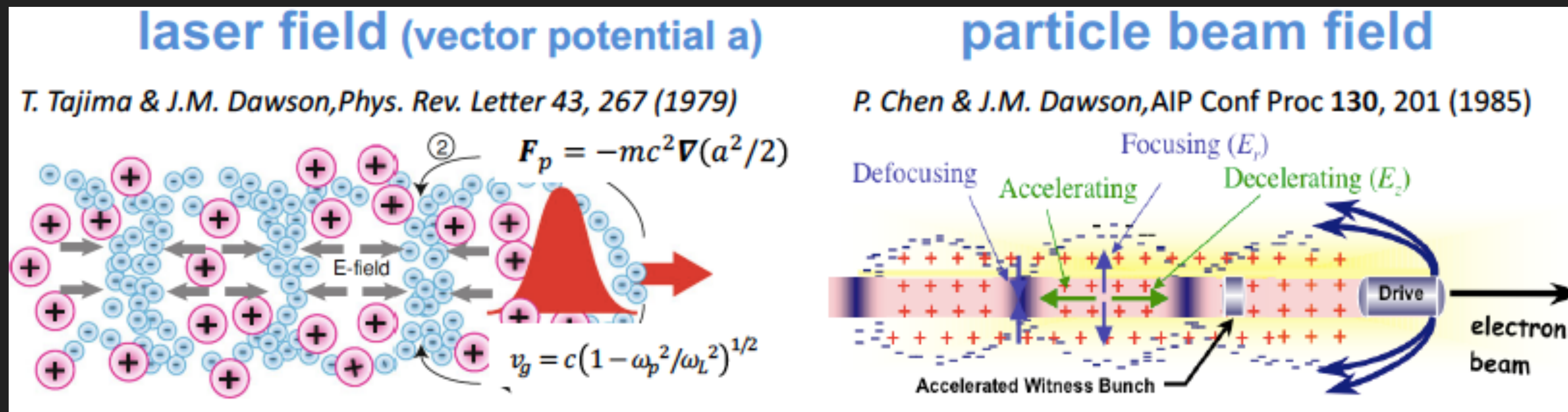
See F. Zimmermann presentation

- Technical Feasibility/Timescale/Cost - For the long-term futureFCC

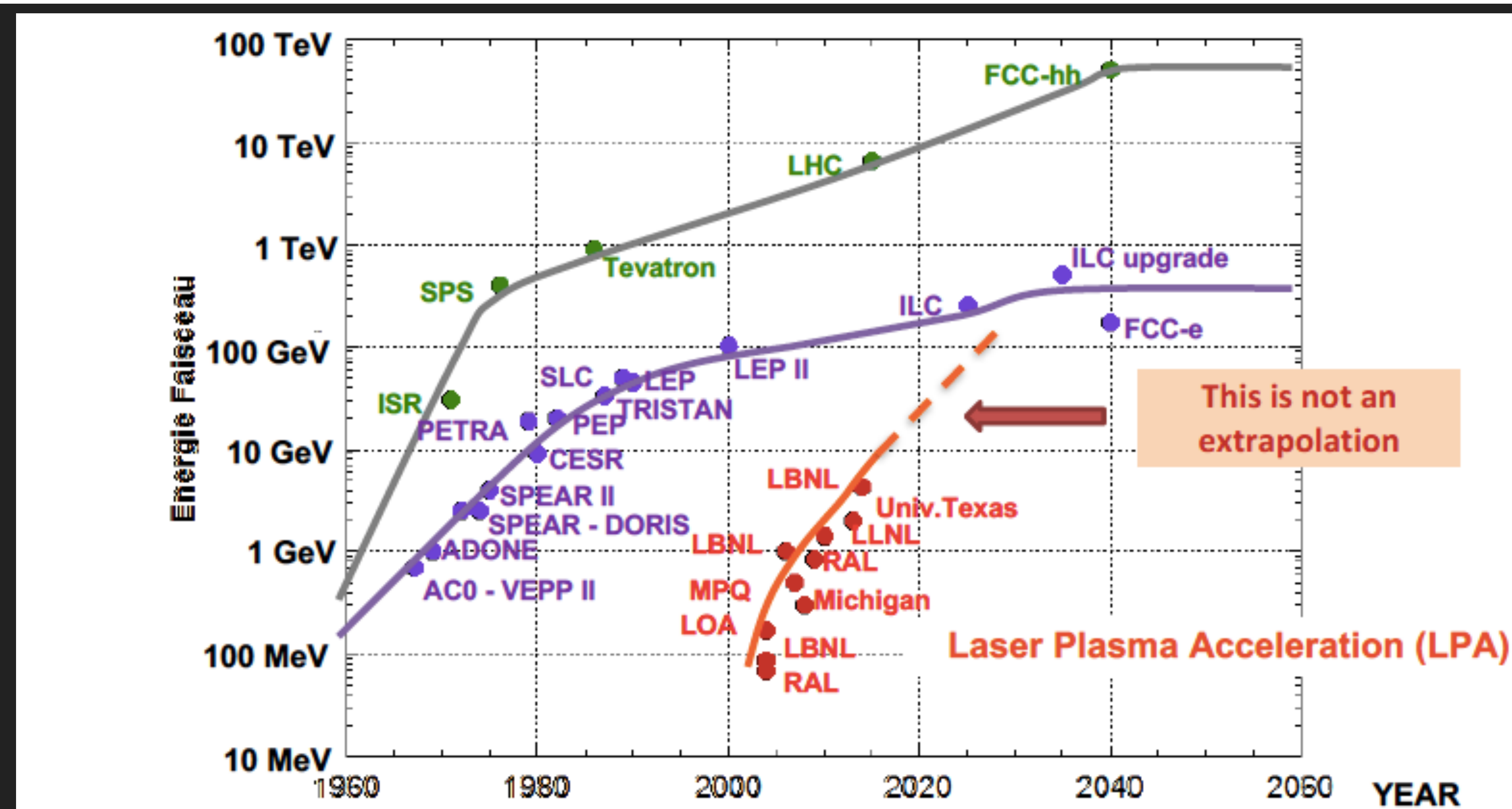
FCC/SPPC

- ***Natural future beyond HE-LHC and CepC respectively***
- ***Long term - But we need keep looking ahead***

PROGRESS ALSO IN ADVANCED AND NOVEL ACCELERATION TECHNIQUES



See presentation by A. Specka

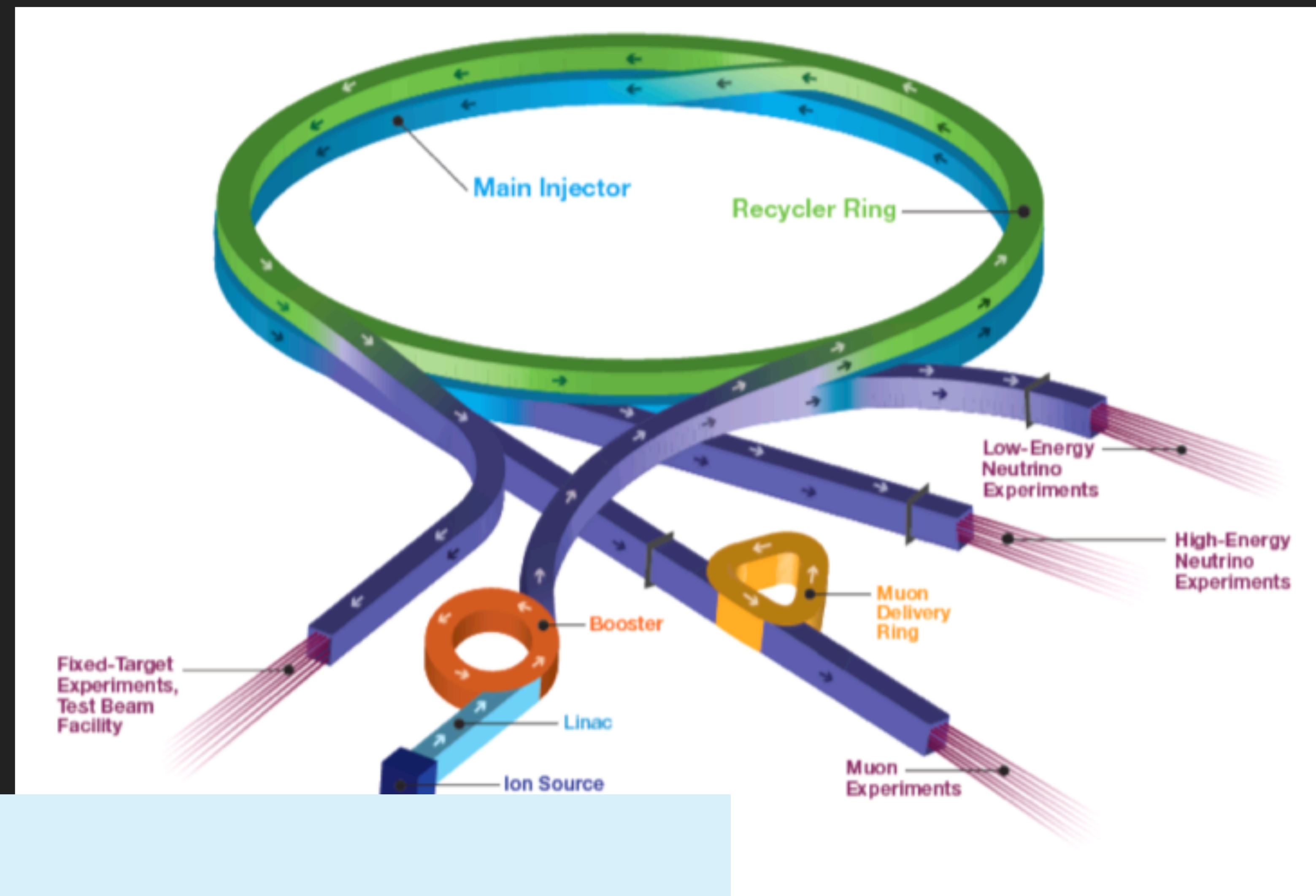


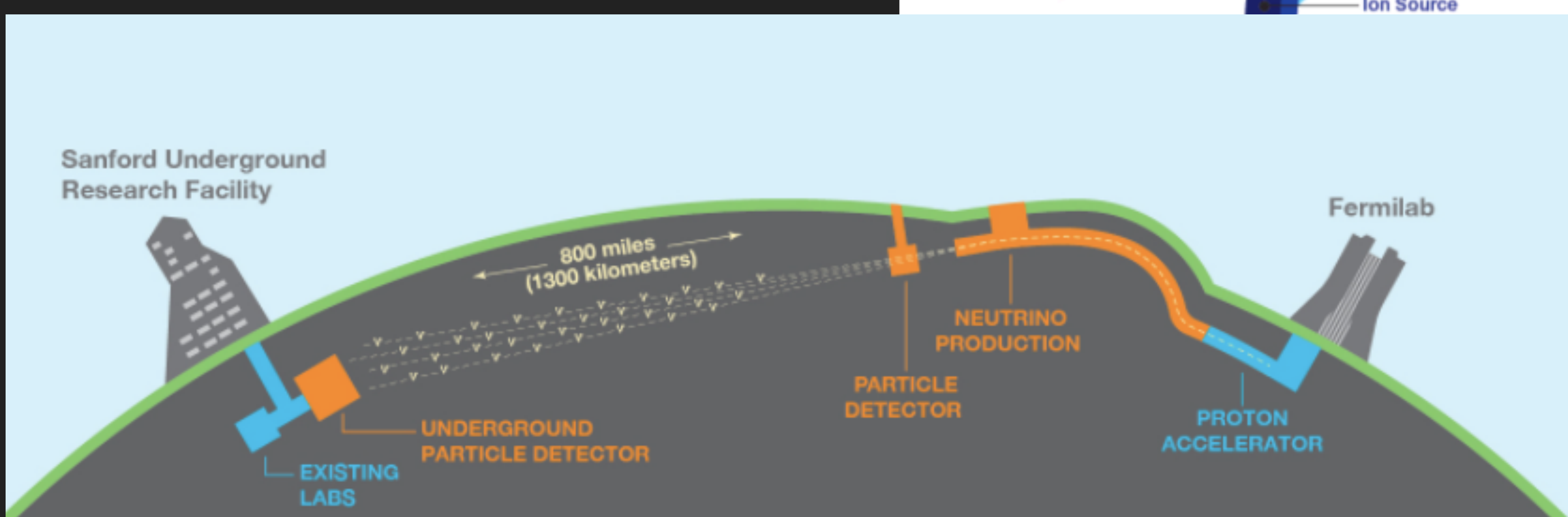
LPA gradients 10 to 100 times higher than conventional RF LINACs

OTHER LARGE PROJECTS IN PROGRESS …

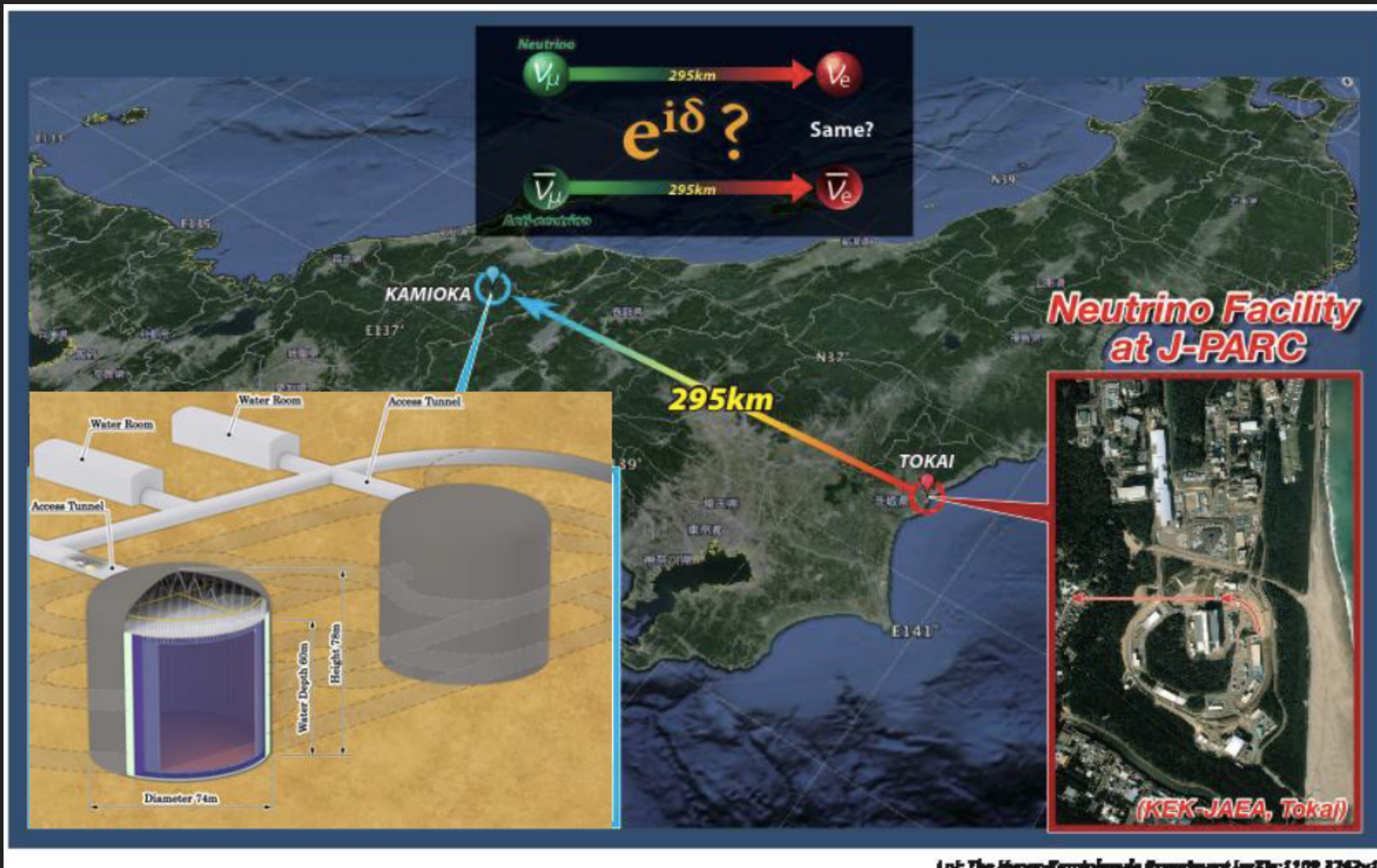
FERMILAB/J-PARC HIGH POWER PROTON BEAMS FOR NEUTRINOS

- FERMILAB - PIP
  - 2017 0.7MW
  - 2025 1.2MW
  - ~2030 >2.4MW ??

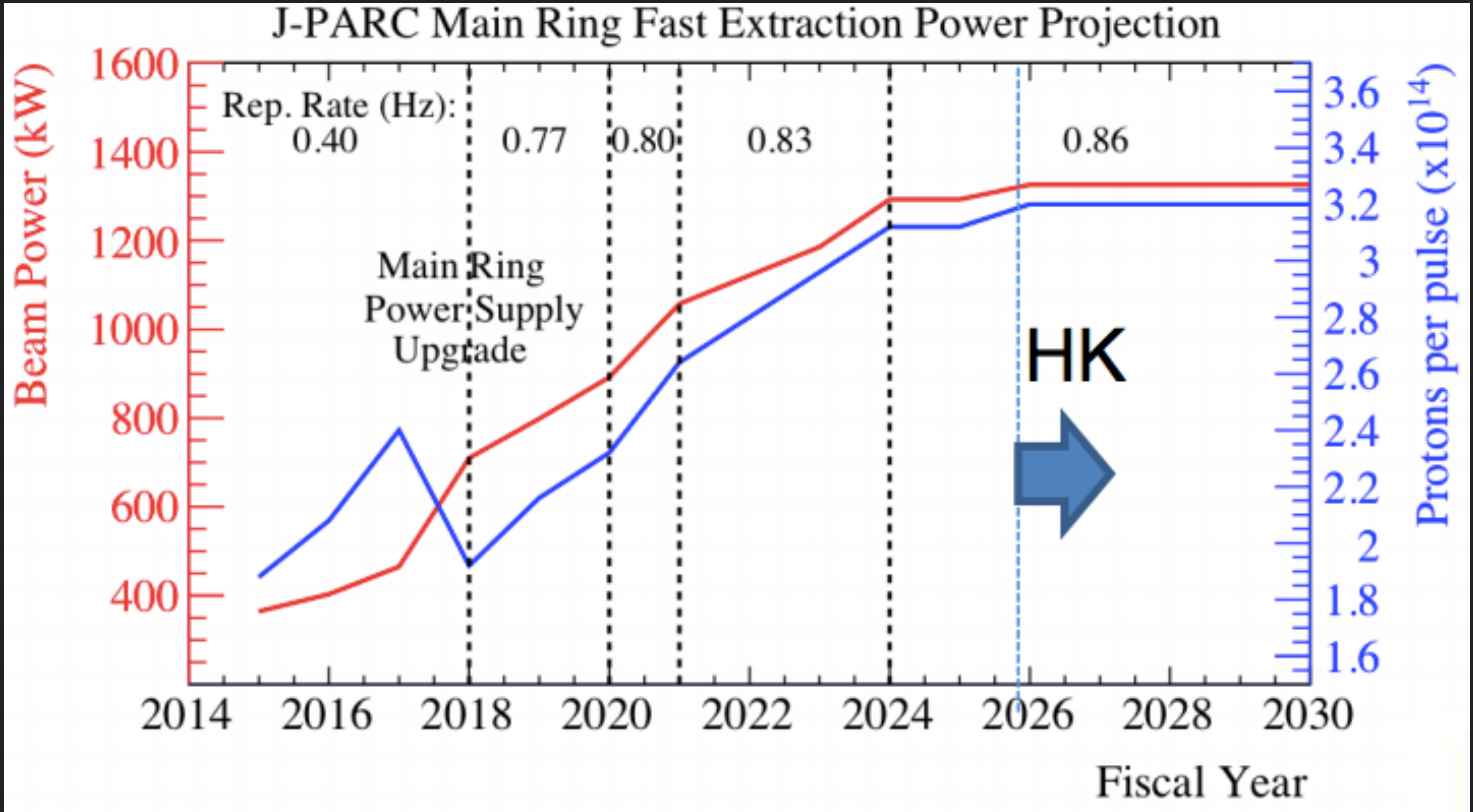




T2HK


Neutrino
295km
$e^{i\delta}$?
Same?
295km
KAMIOKA
295km
TOKAI
Neutrino Facility at J-PARC
(KEK-JAEA, Tokai)
Water Room
Water Room
Access Tunnel
Access Tunnel
Water Depth 60m
Height 78m
Diameter 74m

T2HK



- Full Power by 2026

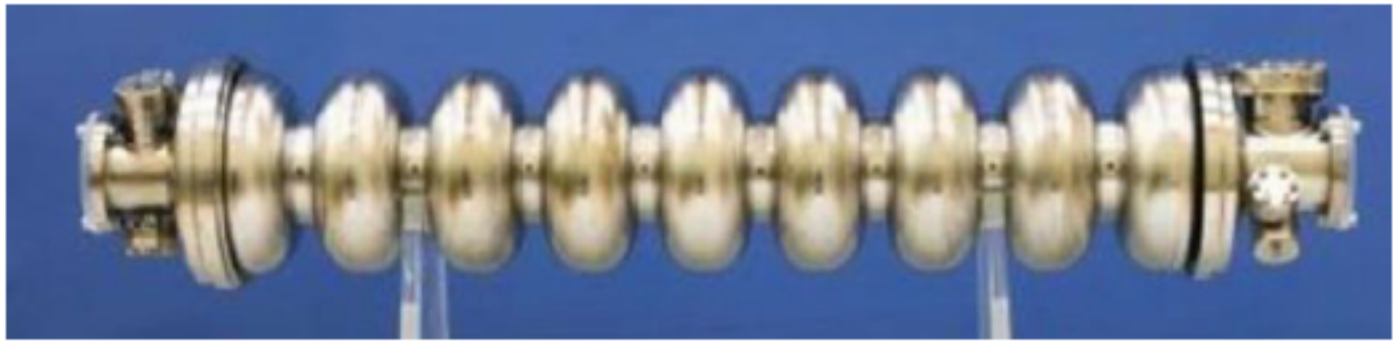
BY 2026–2027, CAPACITY FOR NEW CONSTRUCTION PROJECT(S)

- Fermilab: LBNF/DUNE construction Complete.
- J-PARC: Proton Driver/T2HK Complete
- (SuperKEKB Program Complete)
- HL-LHC Construction Complete
- ILC (Ready); CEPC (Ready?); CLIC (??Ready); HE-LHC (will need further development)
- [FCC (ee, hh); SppC - still in the future]

ILC – READY FOR APPROVAL?

- Many reports demonstrating advanced status of
  - Physics Motivation
  - Machine Design
  - Experiment Concepts and Technology
- But the price tag close to O($\$10^{10}$)
  - ILC250 (with Upgrade capacity)
  - Major cost reduction.
  - Higgs Factory - excellent first stage for ILC

US-Japan cost reduction



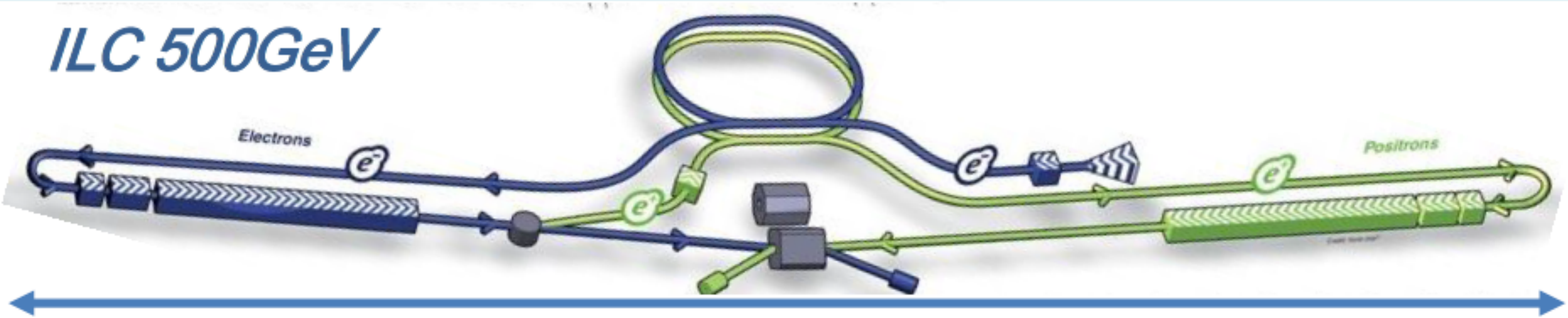
Cost reduction by technological innovation

Innovation of Nb (superconducting) material process: decrease in material cost

Innovative surface processing for high efficiency cavity by FNAL: decrease in number of cavities

Staging

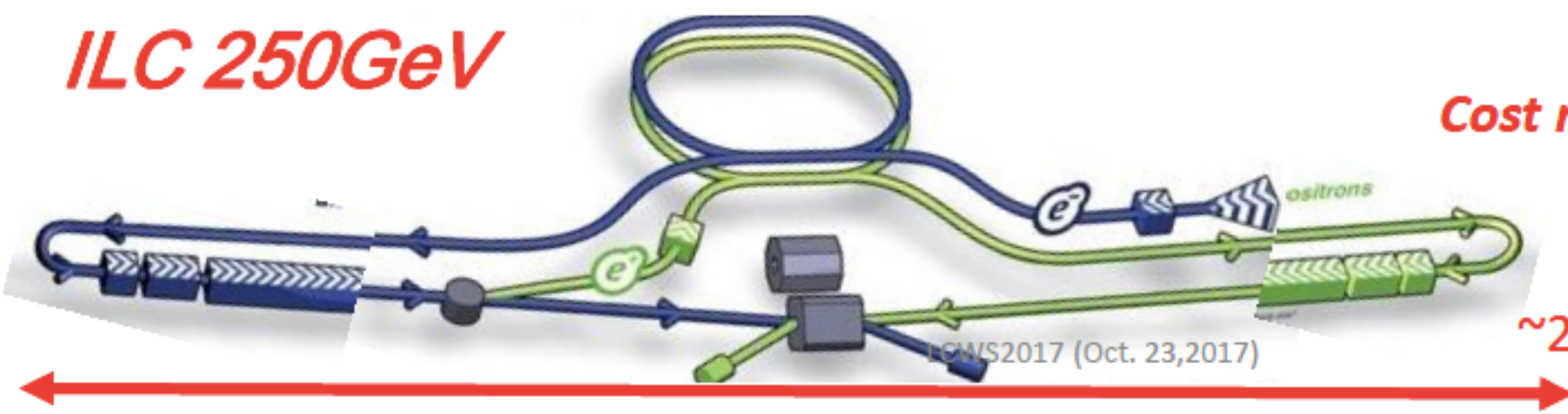
ILC 500GeV



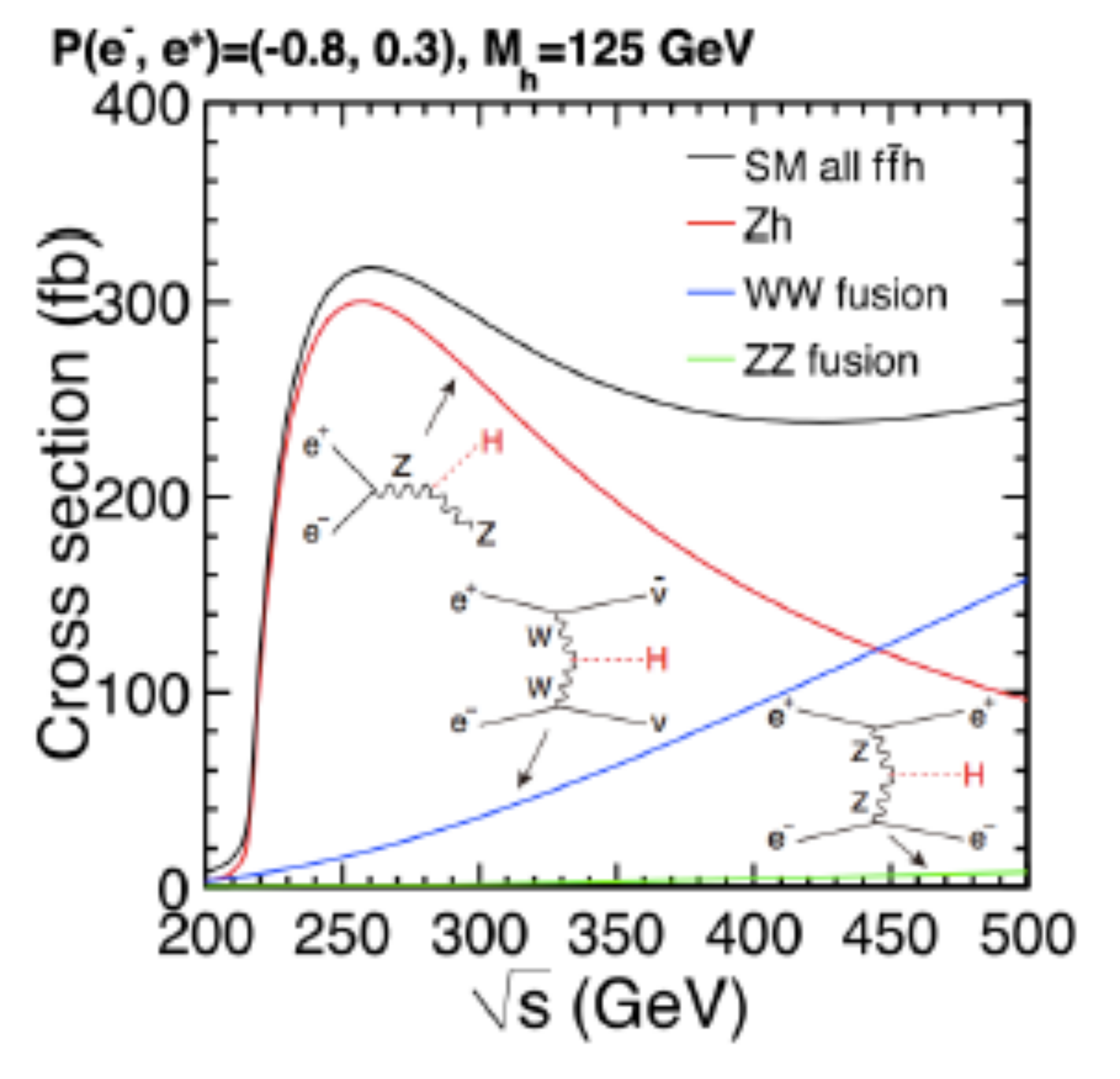
~31km

ILC 250GeV

Cost reduction by compact ILC



~20km



H. Baer et al., The International Linear Collider Technical Design Report - Vol 2: Physics, arXiv 1306.6352.

See presentation by M. Peskin

Higgs events are readily isolated from background.
All standard Higgs decay modes are visible.

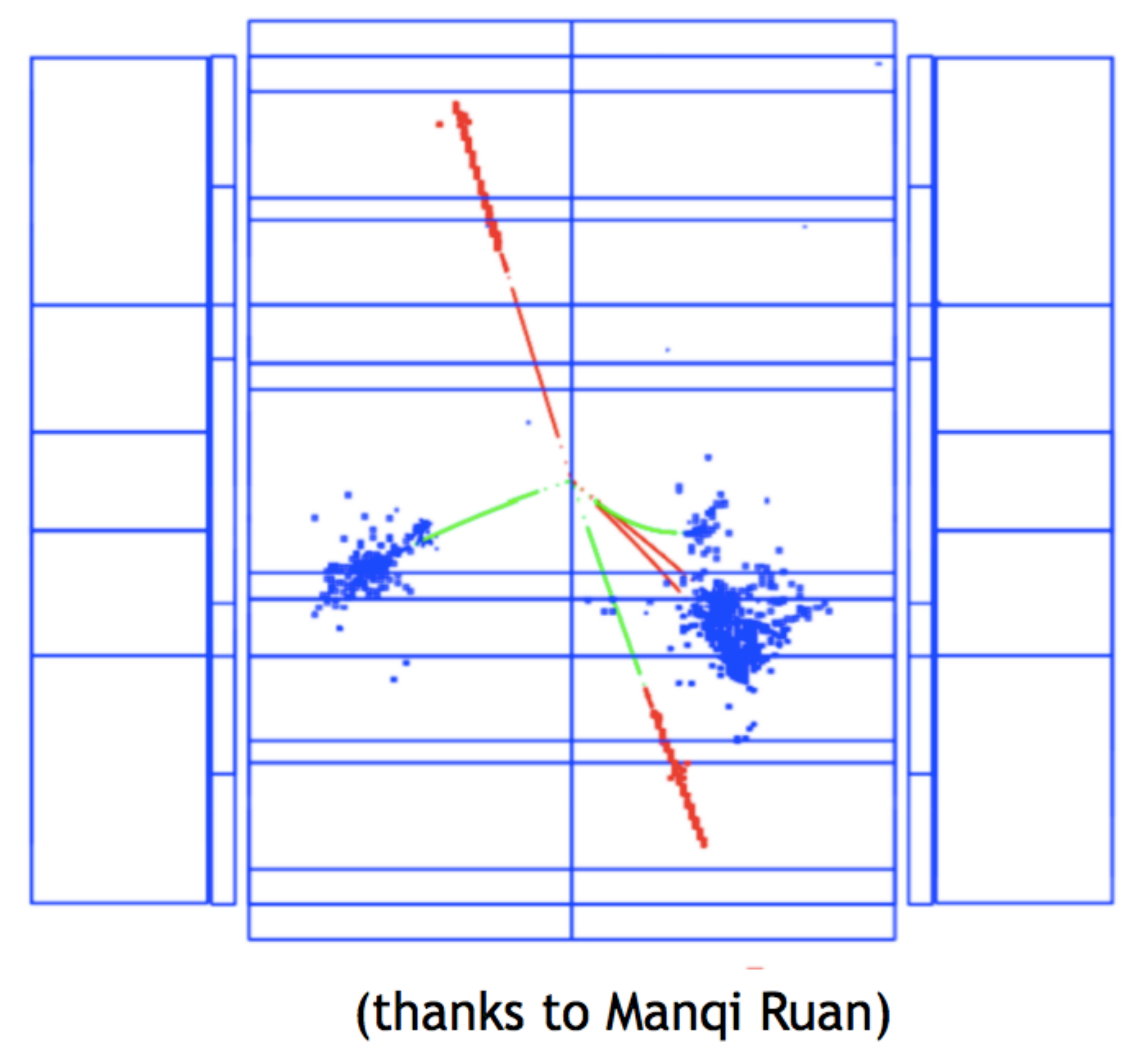
Measurement accuracies are such that 1% coupling measurements are feasible.

The absolute cross section for $e^+e^- \to Zh$ can be measured.

At 250 GeV, to first approximation, any Z boson with $E_{lab} = 110$ GeV is recoiling against a Higgs boson.

Physics Case for the 250 GeV Stage of the ILC arXiv:1710.07621

See presentation by
M. Peshkin



ILC

Conclusions of "Committee on the Scientific Case of ILC250 Higgs Factory (Chair: Shoji Asai)"

Commissioned by the Japan Association of High Energy Physicists

- In order to make the most out of the HL-LHC physics results, concurrent running of the ILC250 is desired.
- Because the energy scale of new physics is currently not known, the reach of precision Higgs and other SM probes of ILC250 are comparable to those of ILC500.
- Combining with HL-LHC, SuperKEKB, and other experiments, ILC250 "Higgs Factory" will play an indispensable role: fully cover new phenomena up to Λ~2-3 TeV & uncover the origin of matter-antimatter asymmetry
- The inherent advantage of a linear collider is its energy upgradability. Thus the ILC250 can not only uncover the energy scale of new physics, but has the potential to fulfill this requirement by an energy upgrade.

Yasuhiro Okada

US P5 RECOMMENDATIONS INCLUDE:

- Motivated by:

  the strong scientific importance of the ILC and

  the recent initiative in Japan to host it,

- The U.S. should engage in:

  modest and appropriate levels of ILC accelerator and detector design in areas where the U.S. can contribute critical expertise.

- Consider higher levels of collaboration if ILC proceeds.

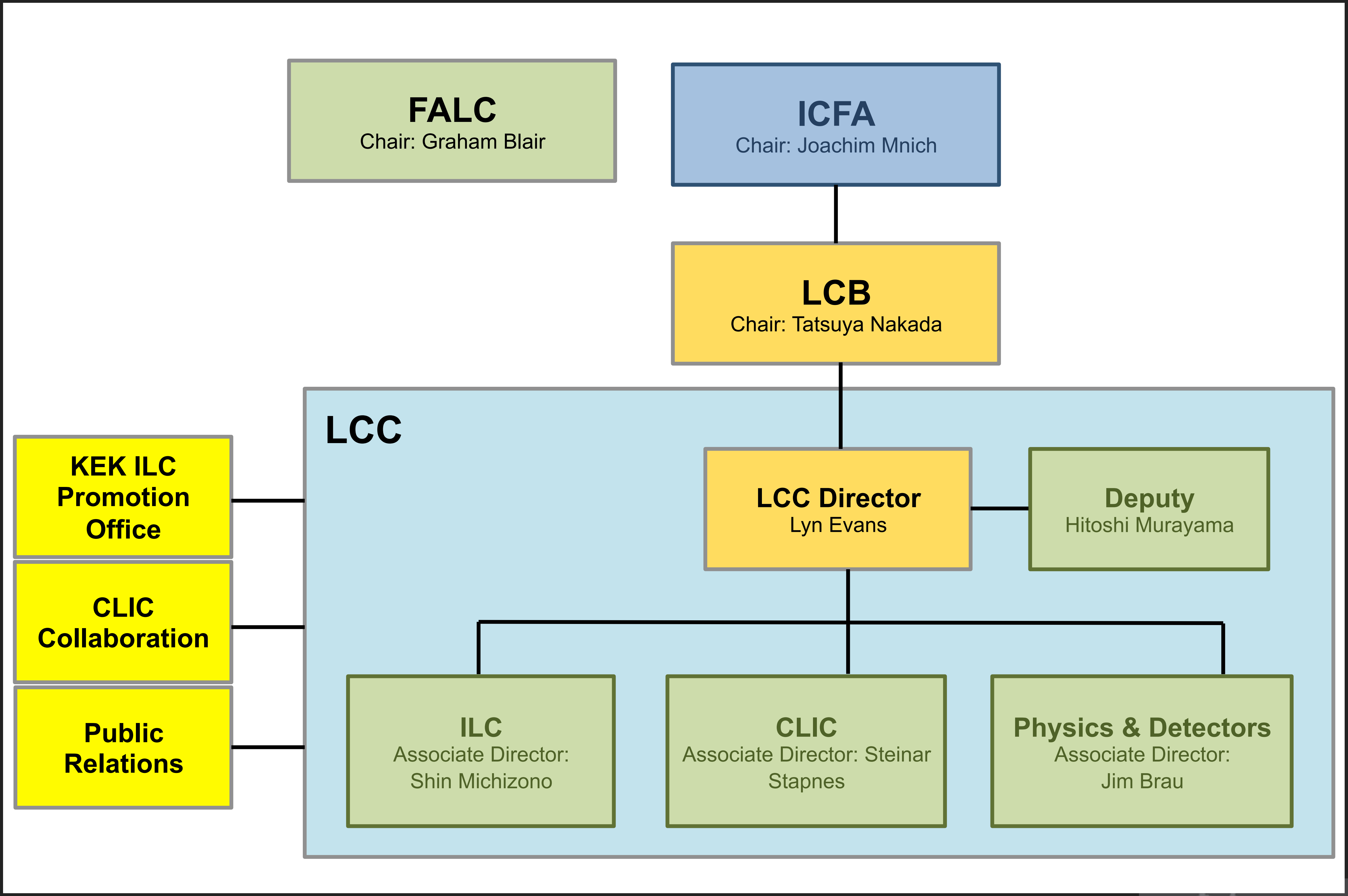
- *Europe's top priority should be the exploitation of the full potential of the LHC, including the high-luminosity upgrade* of the machine and detectors … collecting ten times more data than in the initial design … opportunities for the study of flavour physics and the quark-gluon plasma.
- *CERN should undertake design studies for accelerator projects* … including high-field magnets and high-gradient accelerating structures, in collaboration with national institutes, laboratories and universities worldwide.
- The initiative from the Japanese particle physics community to host the ILC in Japan is most welcome, and European groups are eager to participate. *Europe looks forward to a proposal from Japan to discuss a possible participation.*

???

THE EUROPEAN STRATEGY 2013, CTD.

- *CERN should develop a neutrino programme* … substantial European role in future long-baseline experiments. … explore the possibility of major participation in leading long-baseline neutrino projects in the US and Japan.
- Europe should support a diverse, vibrant theoretical physics programme … should extend also to high-performance computing and software development.
- … quark flavour physics, …dipole moments, … charged-lepton flavour violation and … other precision measurements at lower energies, … may give access to higher energy scales … in national laboratories, with a moderate cost and smaller collaborations. *Experiments in Europe with unique reach should be supported, as well as participation in experiments in other regions of the world.*
- *Detector R&D programmes should be supported strongly* … Infrastructure and engineering capabilities for … large detectors, as well as … for *data analysis, data preservation and distributed data-intensive computing* should be maintained and further developed.

See presentation by J. D'Hondt


FALC
Chair: Graham Blair
ICFA
Chair: Joachim Mnich
LCB
Chair: Tatsuya Nakada
LCC
KEK ILC Promotion Office
CLIC Collaboration
Public Relations
LCC Director
Lyn Evans
Deputy
Hitoshi Murayama
ILC
Associate Director: Shin Michizono
CLIC
Associate Director: Steinar Stapnes
Physics & Detectors
Associate Director: Jim Brau

ICFA/LCB CHAIR – TATSUYA NAKADA PRESENTATION

Reporting on LCB meeting on 9 August 2017 in Guangzhou

"… PHYSICS STUDIES BY THE LCC PHYSICS AND DETECTOR GROUP AND THE JAHEP MAKE IT CLEAR THAT THERE IS A COMPELLING PHYSICS CASE FOR THE ILC BUILT AT 250 GEV.

AND THE COST OF SUCH MACHINE IS AT A LEVEL OF SOME OF THE EXISTING LARGE INTERNATIONAL SCIENTIFIC FACILITIES.

FOR THESE REASONS, THE LCB STRONGLY SUPPORTS THE JAHEP CONCLUSION TO PROMPTLY CONSTRUCT THE ILC AT 250 GEV IN JAPAN AND ENCOURAGES THE JAPANESE GOVERNMENT TO GIVE THEIR PROPOSAL VERY SERIOUS CONSIDERATION WITH A FAVOURABLE CONCLUSION…"

THE ILC IS WELL ESTABLISHED

- NLC, JLC, …from before 1990!
- OECD - GSF conclusion 2002!
- ILC-GDE Director (2005-2013), Barry Barish, in the meantime has built LIGO and Advanced LIGO, found gravity waves and been awarded the Nobel prize !
- The Cost Reduction strategy has been successful.
  - Maintain capacity to upgrade to 350-380 GeV
  - But seek approval now, for commencement of ILC250
  - Clear guidance needed for upcoming European Strategy and P5 deliberations

Time to move!

ICFA STATEMENT ON THE ILC OPERATING AT 250 GEV AS A HIGGS BOSON FACTORY

The discovery of a Higgs boson in 2012 at the Large Hadron Collider (LHC) at CERN is one of the most significant recent breakthroughs in science and marks a major step forward in fundamental physics. Precision studies of the Higgs boson will further deepen our understanding of the most fundamental laws of matter and its interactions.

The International Linear Collider (ILC) operating at 250 GeV center-of-mass energy will provide excellent science from precision studies of the Higgs boson. Therefore, ICFA considers the ILC a key science project complementary to the LHC and its upgrade.

ICFA welcomes the efforts by the Linear Collider Collaboration on cost reductions for the ILC, which indicate that up to 40% cost reduction relative to the 2013 Technical Design Report (500 GeV ILC) is possible for a 250 GeV collider.

ICFA emphasises the extendibility of the ILC to higher energies and notes that there is large discovery potential with important additional measurements accessible at energies beyond 250 GeV.

ICFA thus supports the conclusions of the Linear Collider Board (LCB) in their report presented at this meeting and very strongly encourages Japan to realize the ILC in a timely fashion as a Higgs boson factory with a center-of-mass energy of 250 GeV as an international project[1] , led by Japanese initiative.

1 In the LCB report the European XFEL and FAIR are mentioned as recent examples for international projects.

Ottawa, November 2017