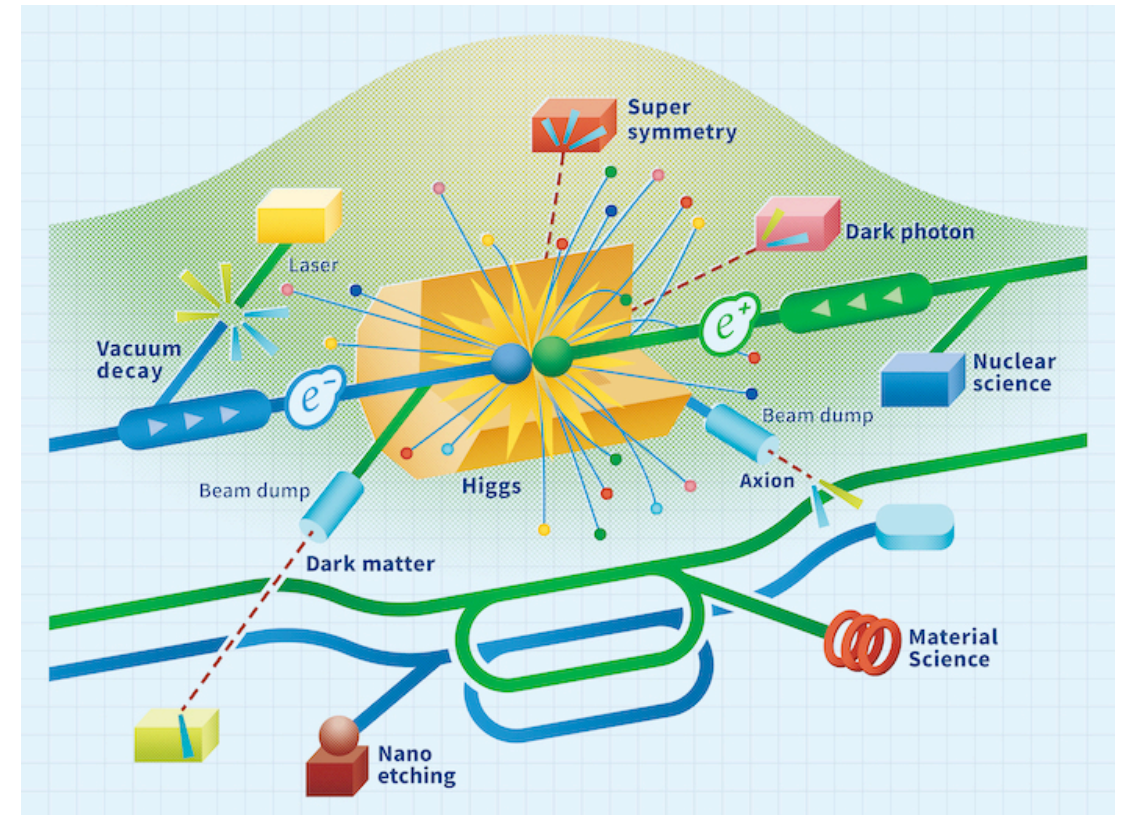


# LC Vision Update

ILC Europe Meeting

Oct 16, 2024

J.List



# What is this Global LC Vision?

## The common idea

- the exploration of the fundamental laws of our universe requires, in addition to the HL-LHC and Belle II, a long-term  $e^+e^-$  program over a wide range of energies - not just a “gap-filler”
- this program should start “now” by unveiling the mysteries of the Higgs boson, with an affordable project based on technology at-hand - and then evolve from there
- the long-term program should not be statically defined “today” for decades into the future, but instead the initial facility must be sufficiently versatile to allow choices to be taken as scientific knowledge and technologies advance - or even see revolutions
- this applies to the evolution of the  $e^+e^-$  facility itself as well as for the choice of the best avenue to eventually explore the 10-TeV parton-energy scale, for all of which sufficient resources for R&D and demonstrators must remain available

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**A few months ago, a spontaneous “think-tank” formed to reflect on these ideas**

**— and put them up for discussion at LCWS 2024!**

# What is this Global LC Vision?

## The common idea

- the exploration of the fundamental laws of our universe, including Belle II, a long-term e<sup>+</sup>e<sup>-</sup> program over a wide range of energies
- this program should start “now” by unveiling the mysteries of the Standard Model in an affordable project based on technology at-hand - and then evolve
- the long-term program should not be statically defined “too early”, but instead the initial facility must be sufficiently versatile to accommodate changes taken as scientific knowledge and technologies advance - or even “see revolutions”
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**Task ahead: Evolve this into a joint Linear Collider Vision input to the EPPSU**

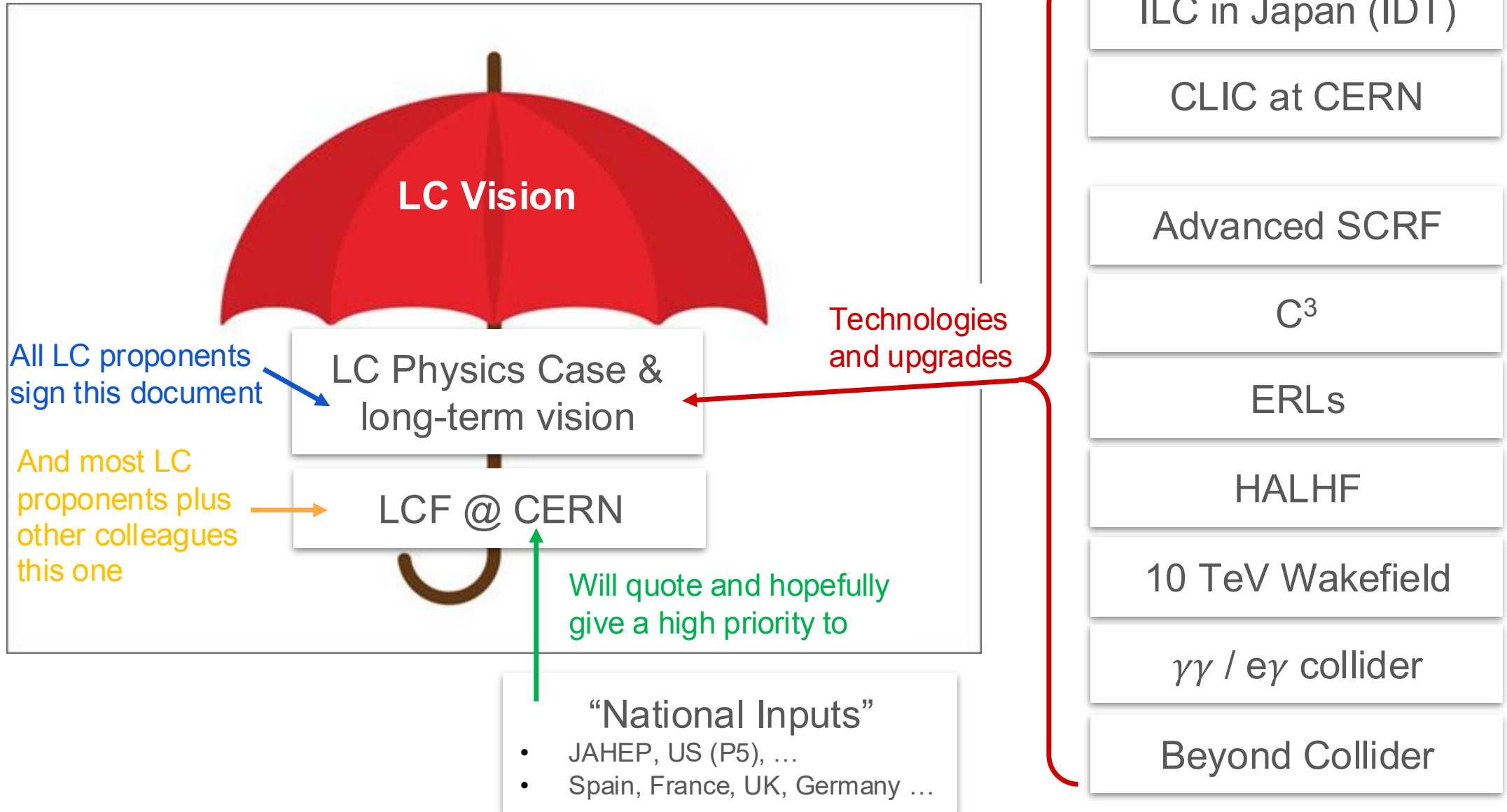
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**— and put them up for discussion at LCWS 2024!**

# LC Vision Documents

idea: S. Gessner

and their relations to other EPPSU inputs



# LC Vision Overview

**Chairs: J. List, S. Stapnes**

## Coordination Group

Halina Abrahmovic, Erik Adli, Ties Behnke, Ivanka Bosovic, Phil Burrows, Marcel Demarteau, Yuanning Gao, Carsten Hensel, Mark Hogan, Masaya Ishino, Daniel Jeans, Imad Laktineh, Andy Lankford, Benno List, Kajari Mazumar, Shin Michizono, Emmanuela Musumeci, Tatsuya Nakada, Mihoko Nojiri, Dimitris Ntounis, Jens Osterhoff, Ritchie Patterson, Aidan Robson, Daniel Schulte, Taikan Suehara, Geoffrey Taylor, Caterina Vernieri, Marcel Vos, Georg Weiglein, Filip Zarnecki, Jinlong Zhang, Laura Monaco, Patrick Koppenburg, Hitoshi Murayama, NN Canada

### Expert Team 1

“Physics-driven run plan  
and EPPSU documents”  
Roman Poeschl, Michael  
Peskin

### Expert Team 3

“SCRF upgrades”  
Sergey Belomestnykh,  
Hiroshi Sakai,  
Marc Wenskat

### Expert Team 5

“ERL upgrades”  
Walid Kaabi,  
Vladimir Litvinenko,  
Kaoru Yokoya

### Expert Team 7

“Beyond Collider”  
Yasuhito Sakaki,  
Ivo Schulthess

### Expert Team 2

“LCF@CERN”  
Steinar Stapnes, Thomas  
Schörner

### Expert Team 4

“C3/CLIC upgrades”  
Angeles Faus-Golfe,  
Enrico Nanni

### Expert Team 6

“Plasma upgrades”  
Brian Foster,  
Spencer Gessner

### Expert Team 8

“Alternative Collider Modes”  
Tim Barklow, Gudi  
Moortgat-Pick

# Scenarios for Expert Teams

to get started

- let's assume we start with a Linear Facility, **with 2 Beam Delivery Systems (2 IRs)**, length
  - a) ~20 km (e.g. 250 GeV SCRF)
  - b) ~30 km (e.g. 550 GeV SCRF — CEPC complementarity from day-one)
- what could “your” technology offer as
  - i. decision-ready in < 5 years (e.g. 2-3 year targeted engineering effort after EPPSU adoption in early 2026)?
    - **ILC-like SCRF**
    - alternative collider modes, beyond-collider facilities?
    - anything else?
  - ii. as upgrade, decision-ready after the first years of data-taking of initial facility (e.g. 2045-2050)?

# News

## what's going on

- Expert teams are working....
- First outlines of documents exist, regular meetings of editor team to start soon
- **Informal discussions re-emphasize for LCF4CERN:**
  - 2 beam delivery systems (“sociology”, but also complementary opportunities => ET8)
  - initial machine in SCRF “ILC-like”
- **mixed messages wrt**
  - relative importance of “cheapest possible Higgs Factory” vs “a really attractive LC project, complementary to CEPC from day-1”
  - **the physics need for e<sup>+</sup>e<sup>-</sup> collisions above the ttbar threshold**



# A key question on people's mind

in the HEP community

- After the CERN70 celebration (UvdL speech etc) many more people seem to assume that FCC will be “financially feasible”
- **If CEPC goes ahead**, taking Higgs data ~10 years earlier than any machine in Europe,
  - what would a 550 GeV LC add?
  - will a LC then give the leading results in the particle data book?
  - or should Europe then directly push for a hadron collider, despite the immense technological, environmental and financial hurdles?  
(problem: many people don't seem to take them as seriously

# Staying Up-to-date

what's coming up

- **Public e-group LCVision-General**

**<http://simba3.web.cern.ch/simba3/SelfSubscription.aspx?groupName=LCVision-General>**

- **Updates at ECFA WS (Thursday), ILC-Europe, IDT-WG3, ILD, several national meetings...**

**=> get in touch if you'd like an LC Vision talk for “your” event!**

- **LC Vision Community Event**
  - **Jan 8-10 at CERN (main amphi...)**
  - **open, hybrid, ...**
  - **indico coming soon, prepare your travel ! :)**

# Coming next

## ... and on going

- announcement of email list & LC Vision event at CERN on all the “usual mailing lists”
- Angeles will call meeting with all expert team leaders on BDS requirements:
  - realistic design & costing only for previously studied configurations for ILC & CLIC
  - can we stay with these (best for realism?) - or do some upgrade / add-ons require substantial changes?
  - cannot re-design BDS now, but should list requirements
- weekly meetings of editorial board to start soon
- detail program for January

**Any Questions?**