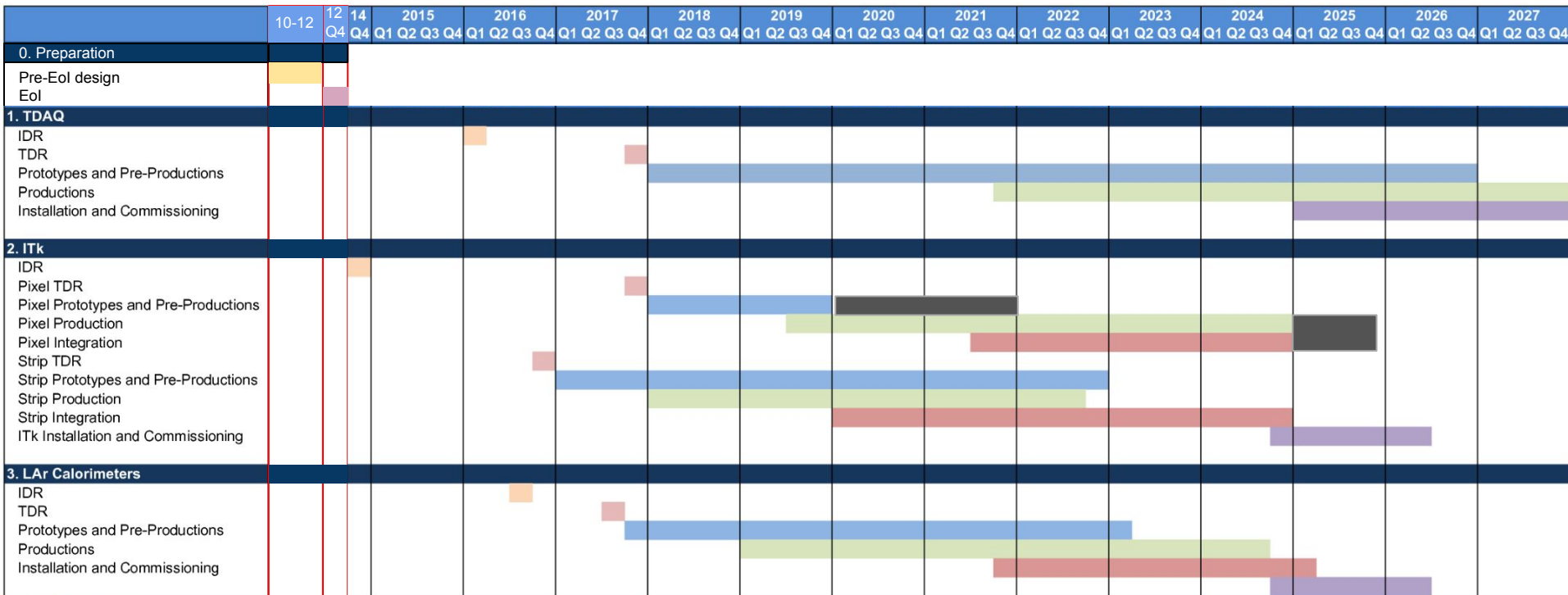


Detectors at Lepton Colliders

Michael Kagan, Caterina Vernieri,
Marty Breidenbach, Ariel Schwartzman, Su Dong, Charlie Young
May 7, 2021

Timelines ATLAS ITk (as projected in 2015)

Rough guess from ATLAS meetings



[ATLAS Upgrade Scoping Document, 2015](#)

Expected Timeline

triggered by sign for substantial funding for pre-lab in Japan

Timeline for the ILC experiments

- 2021 IDT calls for EoI
Necessary R&D for EoI
- 2022 ----- Assumed start of Pre-lab -----
EoI presentation
Necessary R&D for Lol
- 2023 Lol submission and presentation
Continuation of R&D
Selection process by the ILCC
- 2024 ILCC recommendation on the first set of the projects to proceed toward TP
Necessary R&D for TP
- 2025 TP submission and presentation of the first set of experiments
Continuation of R&D
Selection process by the ILCC
- 2026 ----- Assumed start of ILC-lab -----
- 2026-27 ILCC recommendation for the first set of experiments to proceed toward TDRs
- 2027 ILC-lab approval of the first set of experiments and request to proceed toward TDRs

- Funding agencies will not provide dedicated ILC detector R&D funds before the Pre-lab being established.
- For some EoIs, R&D would be needed to make Lols.
→ driving the timing for the Lol submission
- Selection process starts with the Lols.
→ driving the timing for the Lol decision
- Experiments are formally approved based on TPs.
- The ILC-lab is needed for approvals.
- Availability of resources is part of the approval criteria.
→ driving the timing for the TP decision
- These considerations are for the initial set of experiments. There could be more experiments proposed at later time.

IDT: International Development Team

EoI: Expression of Interest

Lol: Letter of Interest

TP: Technical Proposal

TDR: Technical Design Report

ILCC: ILC Committee

IDT-EB 21/12/2020

I was informed by several people that there has been a confusion about the EoI process. While the spring **LCWS** is for **the discussion on physics that can be addressed in various ways at ILC**, the **fall workshop** is about **more concrete ideas of experiments, rather than a physics idea and sketchy detector concept, and some people behind to work on them**. For the **real EoI presentation anticipated in 2022**, one has to show **expected performance of the experiments resulted from some simulation studies and technical description of the detector**. The actual call for EoIs will be “due” by then, and currently written proposals are not envisioned. The call for EoIs will be triggered by a concrete sign of funding for pre-lab, and EoIs are presented after the pre-lab is launched.

yours Tatsuya

Physics & Detector

- Case for ILC broader and stronger than ever
 - a lot more than Higgs factory
- urgent: determine needed infrastructure and technology
 - finalize the design of civil construction, machine parameters, and experiments in ~3 years
- new opportunities
 - beam dump, off IP, extracted beams
- new organization of working groups launched
 - please join!

ILC timeline



	IDT	ILC Pre-Lab				ILC Lab.										Phys. Exp.
	PP	P1	P2	P3	P4	1	2	3	4	5	6	7	8	9	10	Phys. Exp.
Preparation CE/Utility, Survey, Design Acc. Industrialization prep.																
Construction																
Civil Eng.																
Building, Utilities																
Acc. Systems																
Installation																
Commissioning																
Physics Exp.																

Based on Hitoshi timeline, what is SLAC timeline?



2023 +2	call for Lols	SiD collaboration building [expect 3-5 M\$ /yr ?? pre-lab fundings] Additional R&D funding managed through SLAC likely needed Simulations, develop ideas on mechanical design, etc.
2025 +3	Lol submission ILCC recommendation for funding of Technical Proposal	set up a mechanical engineering at SLAC mechanical design / initial prototyping for the tracker / calorimeter
2026 +5	ILC lab	
2028 +7	ILC approval of experiment	Consolidation of collaborations and funding for TDR O(100M\$) Design and prototyping SLAC choice as US lead lab
2031 +10	start of detector construction	
2037 +16	commissioning and first data	

ILC as an example : C3 would be +4 years more to demonstrate first the accelerator cost/scalability, and potentially some time in developing international organization

SLAC milestones for e+e-

- Towards EoI presentation (2022): R&D possibilities
 - MAPS - Ongoing effort from Marty with US-Japan & Japan-US funds
 - Relevant for MAPS tracker and Calorimeter
 - Mechanical design considerations?
 - Interface with DAQ developments
 - Engage in ALICE Bent MAPS project for vertex detector
 - Must determine where SLAC can contribute
- Towards LoI (2023) and Technical Proposal (2025)
 - Collaboration building needed
 - Is the target a technology proposal and initial mechanical design?
 - Funding is a necessity: continuing engineering support is needed

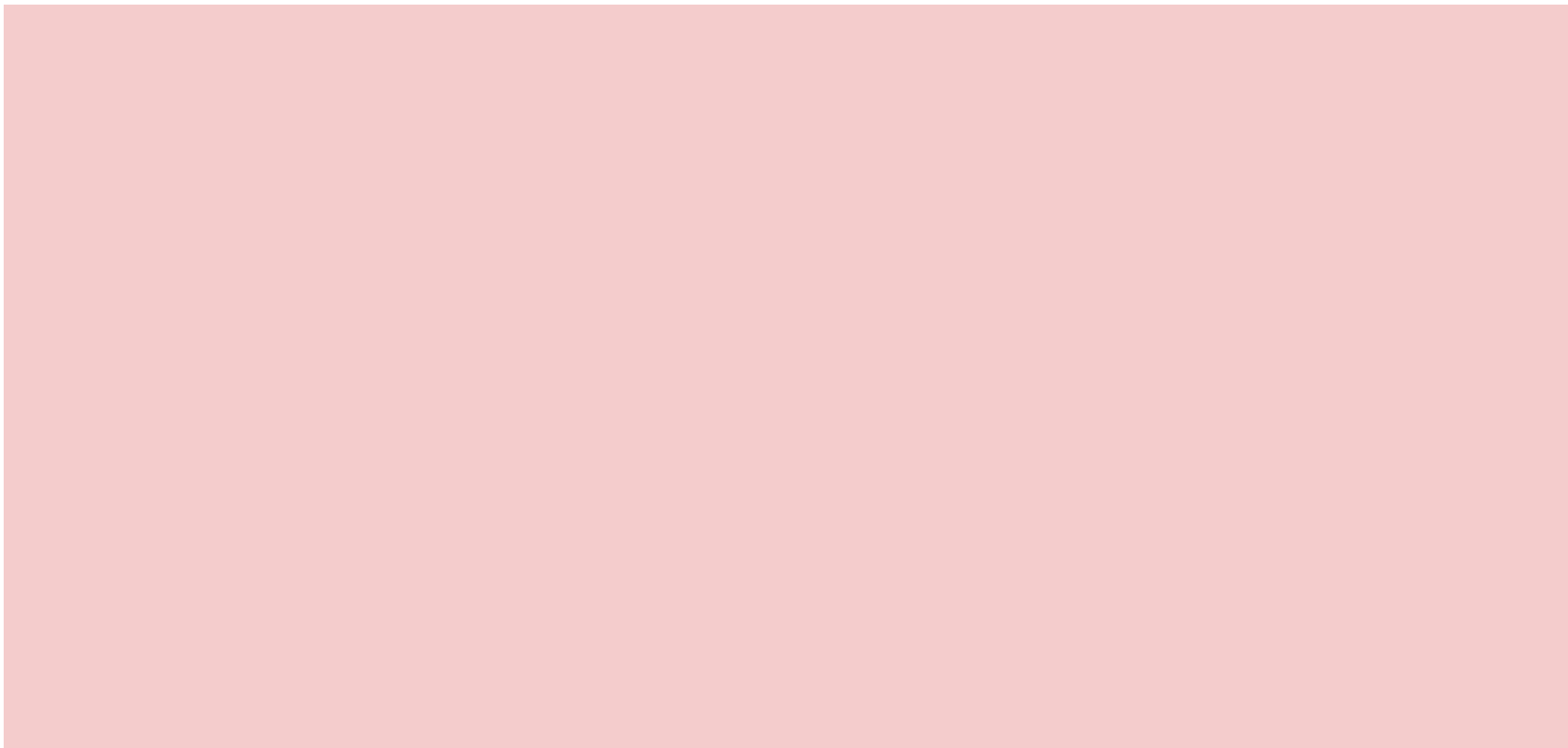
- Start of TDR (2027 / 2028) *100-150M\$ if ILC is approved*
 - Based on ATLAS experience, we should expect this to take 4-5 years
 - Design and prototyping
 - Engineering and technician team for prototype design and construction

- Construction (starting 2031 / 2032?)
 - 6-10 year timeline

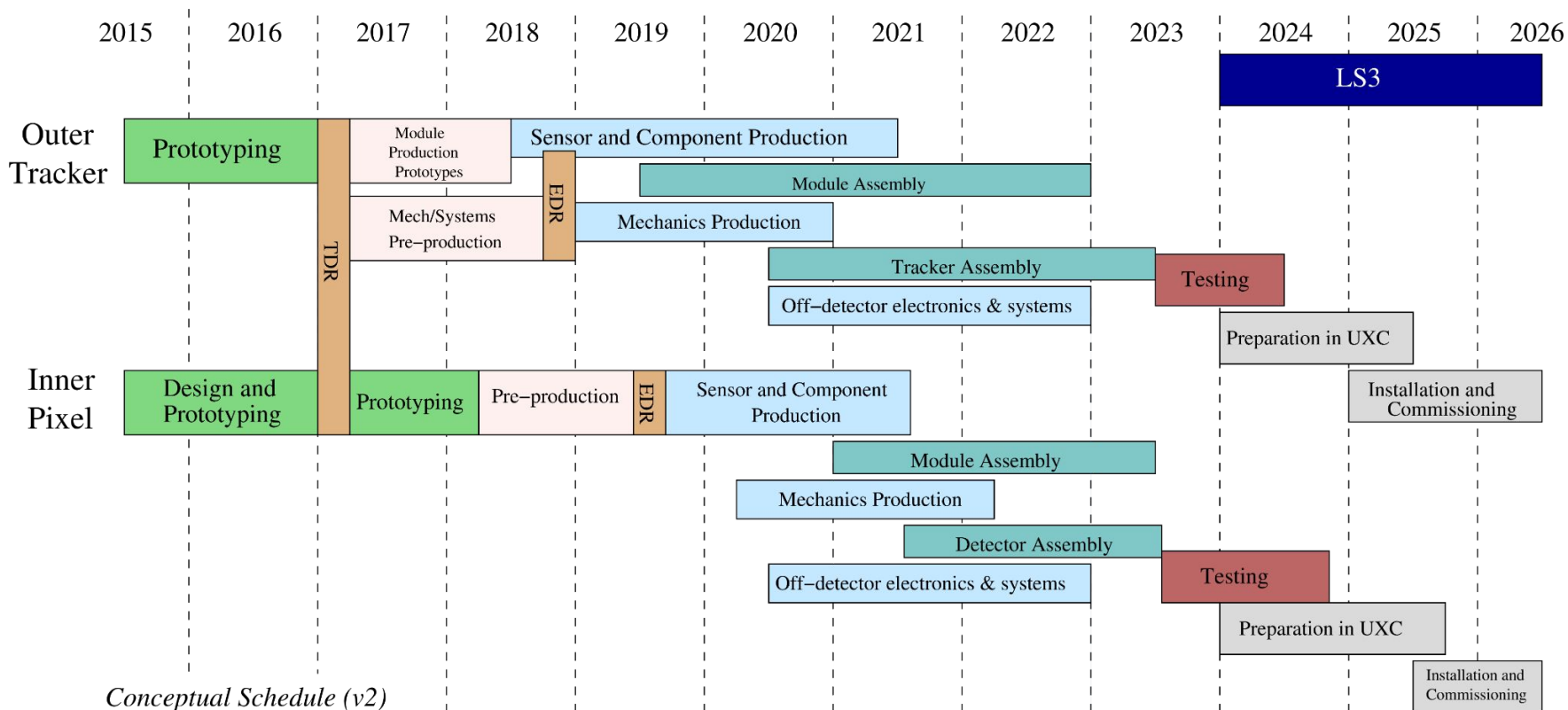
Priorities towards the next P5 decision

- Try to enlarge efforts into R&D → target EoI
 - Only have small funding, and small amounts of people's time
 - Key avenues: Tracker(& Vertex), and Silicon Calorimeter
 - Simulation studies of detector performance to evaluate design choices.
- Keep on eye on the physics case for the Higgs factory
 - Important to actively engage with the discussions broadly within Snowmass
 - The broader community is polarizing towards a discovery lepton machine
 - The Higgs-factory-only physics case is losing traction / interest
 - Need to understand what energy is important to target
- C3
 - Want to build a 2 raft prototype with Program Development support, followed by a 4-6 Cryomodule string test. Hope to be there for Snowmass.

Backup



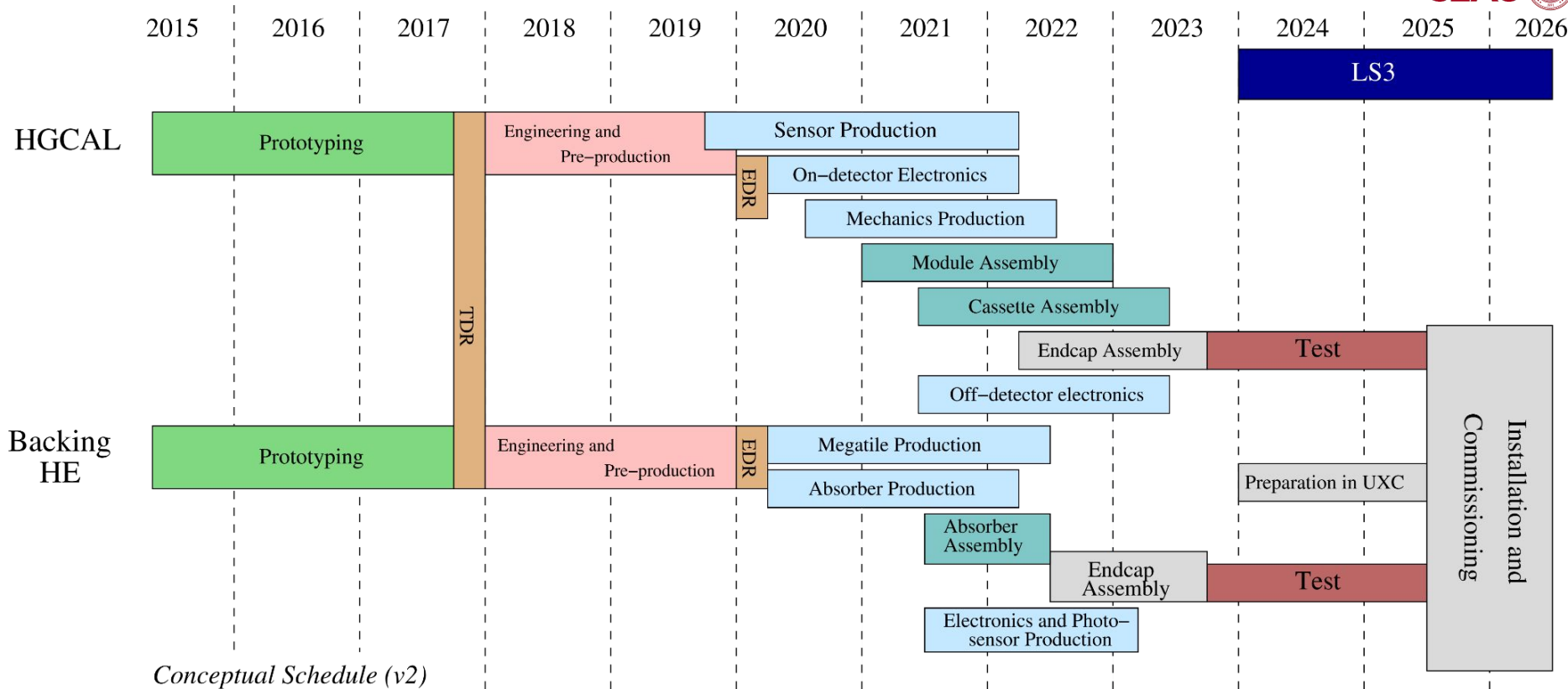
Timeline CMS Tracker (as projected in 2015)



Conceptual Schedule (v2)

[CMS Phase II Upgrade Scope Document, 2015](#)

Timeline CMS HGCAL (as projected in 2015)



[CMS Phase II Upgrade Scope Document, 2015](#)