Max-Planck-Institut für Kernphysik

User Experience:

CFEL SCIENCE

LINAC Coherent Light Source

Large collaborations / consortia emerge

User Experience:

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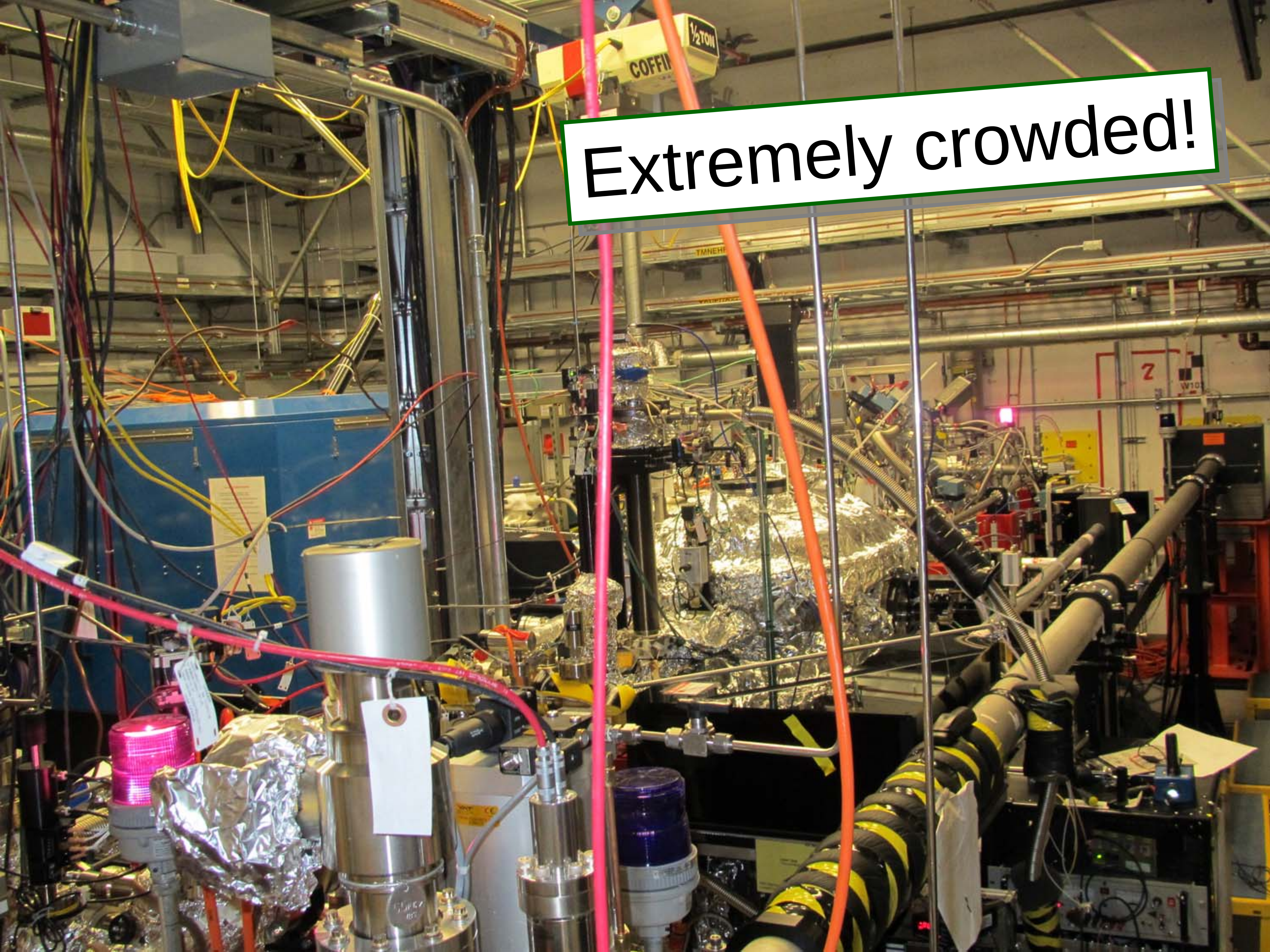
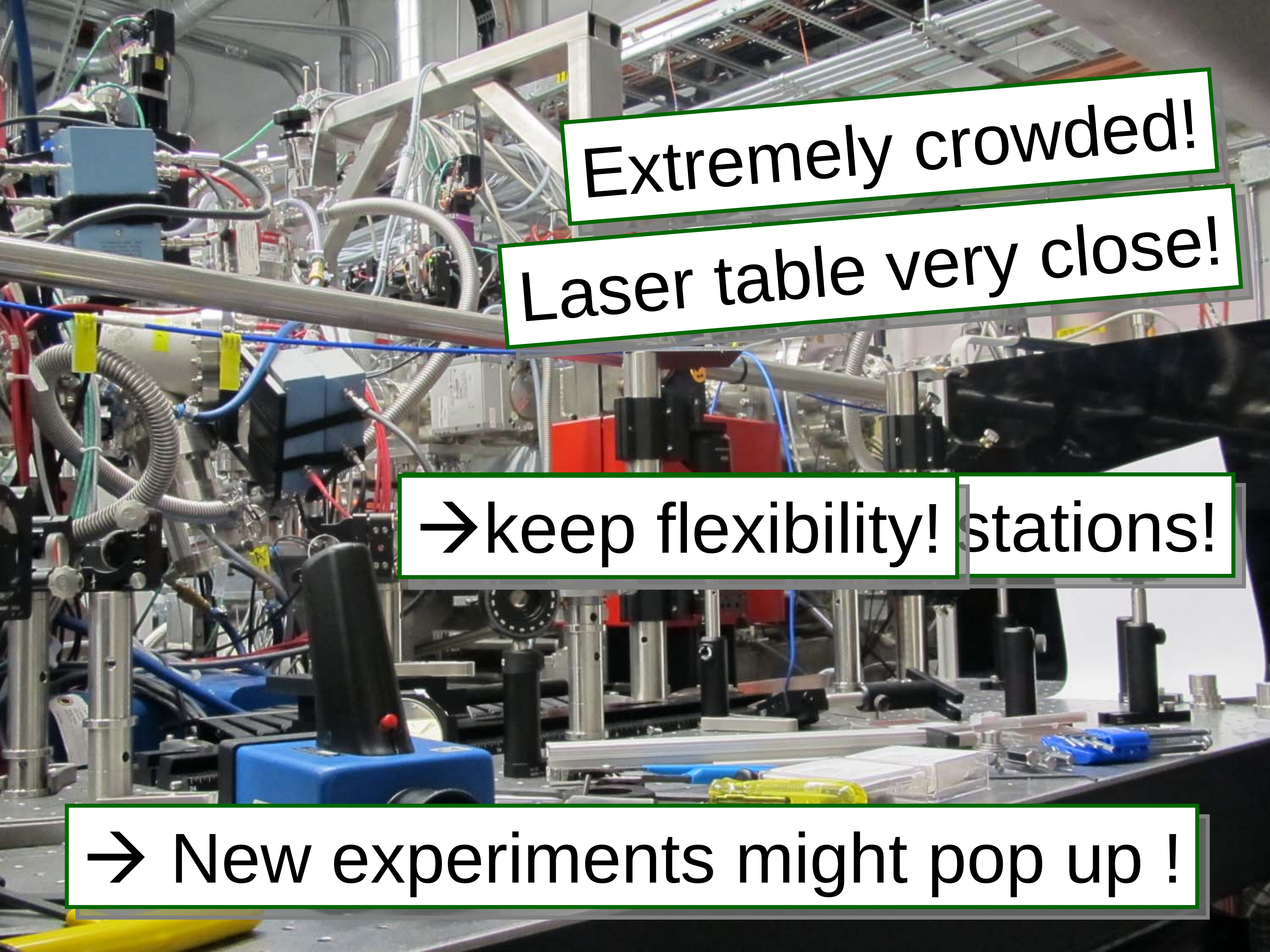
LINAC Coherent Light Source

1. Overview: machine & end-stations
2. LCLS: performance & support
3. Proposal process
4. User supplied instrumentation

The LCLS at Stanford


Extremely crowded!
½TON


Extremely crowded!
Laser table very close!
→keep flexibility!
stations!
→ New experiments might pop up !

→ Need preparation space !

LCLS: End-Stations

1. AMO (2009): atomic, molecular, optical, clusters, imaging, chemistry
2. SXR (2010): solid state, liquid phase, spectroscopy, AMO: e.g. EBIT!
3. XPP (2010): time-resol…: solid state, …istry, imaging

questionable!

4. XCS (2011): corre… spectroscopy …asing
5. CXI (2011): coherent imaging, clusters
6. MEC (2012): matter in extreme states

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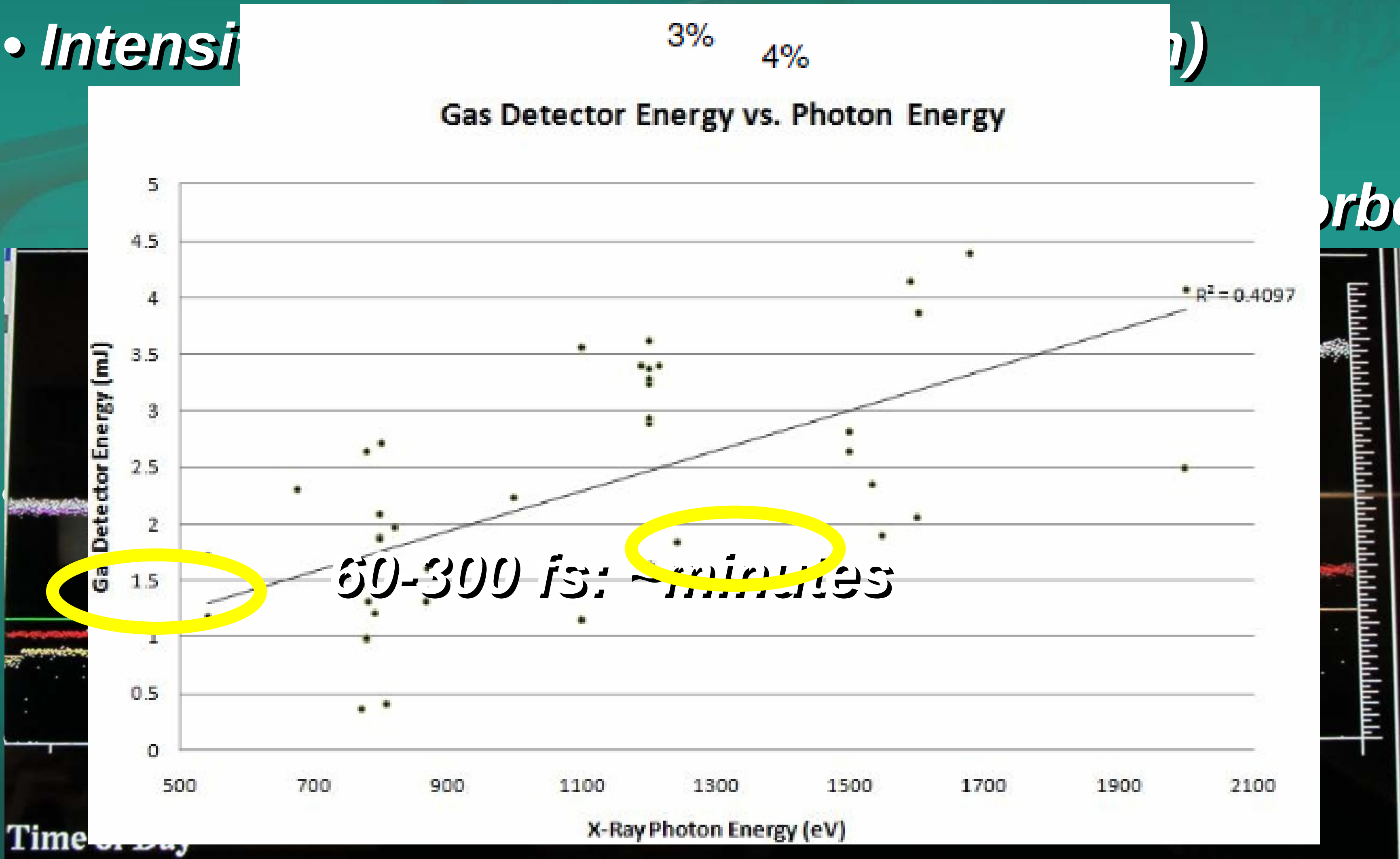
LCLS Performance

- Operation: ~97 % up-time in round II
- Intensi… …n)

…orber

60-300 fs: ~minutes



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LCLS Support

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- 2 beamline scientists
  1 flour coordinator + 1 area manager
  ….1 technician, 1 controls engineer, 1 postdoc
- Technical support: reasonable … expensive!
- Safety instructions: web, courses..time consuming
- Safety checks: efficient and …) reasonable
- Lasers: reasonable
  time jitter 60-1000 fs: too large!
- Imaging detectors: …to be improved
- Data taking, processing, storage: good
- Housing: excellent Guest house: small, expensive

excellent!

improved!

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Proposal Process

- ***6 pages + 2 pages supplementary material: good!***

1. **Abstract:** Provide a concise summary of the proposed experiment giving a clear picture of the quantities to be meas the samples to be studied, and the expected scientific results.
2. Table Summarizing Experimental Team: In a table, list the names and roles of each person who would participate in proposed experiment (e.g., sample prep, theory, data collection, data analysis). This section could also briefly mentic directly-relevant previous work done by the team members.
3. **Scientific Case:** Briefly explain the background and significance of why your experiment is interesting and worth doi In particular, why is LCLS required for this experiment? Itemize the specific aims and particular questions you want t answer. Focus on the specific experiment and avoid broad discussions in general terms.
4. **Experimental Procedure:** Provide specific information so that the technical feasibility of this experiment at the reque LCLS instrument can be evaluated. Tell us if you plan or have carried out supporting experiments at other facilities. H simulations of the experiment been performed? What are the anticipated data rates? Provide a beam time plan, indicating what could be accomplished in less than 1 week (approximately 60 hours of beam time). Describe any additional equipment you plan to bring to LCLS for the experiment. We strongly recommend that you contact the LCl instrument scientist before proposal submission to discuss capabilities, to identify possible problems in integrating external equipment with the LCLS facility and to determine possible solutions.
5. **Additional Supporting Information:** Although not encouraged, you may provide up to 2 pages of additional informat to show important graphs, images, key data, technical drawings, descriptions of instrumentation to be brought to LC or a few references to related work by the team members to show how well a system has been characterized by mo conventional methods.
6. Safety related information must be thoroughly provided for all proposed experiments. List and describe any safety concerns that may arise with samples you will examine, equipment you will use, or techniques you will perform (inclu any physical, chemical or biological hazards) and how these issues will be addressed in the experiment design. Discu potential safety issues with the LCLS Safety Officer.

→ being improved!

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delicate !

4. User supplied instrumentation

User Instrumentation

- ***Not at all foreseen at the beginning!***
- ***→ SXR → external ES → CAMP squeezed in AMO***
- ***LAMP as a test case: painful!***

quite some irritations

tough … problematic conditions: see SXR

Following the spirit and philosophy of the original agreement between the SRX consortium and LCLS management, it has been anticipated that after commissioning all facilities, including end stations, should be made available to general users with approved beam time. The following discussion is provided for particular scenarios that may arise:

2. **General user end stations** may also be proposed for installation on LCLS. Such plans need to be discussed with the SXR instrument staff prior to submission of a beam time proposal and must also be part of the submitted proposal. Due to the costly overhead of integration of a new end station to the LCLS system, the user must be willing to share the end station with other users with approved proposals. LCLS will develop a suitable schedule that fits both the needs of the end station builders and general users. Support and co-authorship in this case will follow the rules regarding

The intellectual property of a proposal (i.e. the exact experiment, or idea or samples used) does not need to be shared with any end station builder/owner in order to have access to that end station. A certain understanding on technical

but requires their active contributions to the research, in accord with established authorship criteria. LCLS staff will be acknowledged according to LCLS policy.

User Experience:

LINAC Coherent Light Source

1. Excellent performance !
   … end-stations

2. Highly motivated staff !
   … support

3. Proposal process
   … procedures evolve !

4. User supplied instrumentation
   … instrumentation !

Some remarks

personal !

- *Classical end-station concept*
  only partly successful
  often not to extrapolate from synchrotrons

→ Flexibility needed….up to new beam lines !

- *User supplied instrumentation is important*

→ Define clear and reasonable procedures !

- *Large collaborations evolve and are often needed*
  not always coherent
  not always systematically attacking problems

→ Learn from high-energy physics !

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Some remarks

personal !

- ***Short-time proposals: not always appropriate***

  There are projects facing huge challenges

  …with huge impact if successful

  …clear that final success will take years

→ Define long /medium term high trust projects !

→ Long-time commitment to user consortia

Who want to solve these questions

Who have well-defined plans / work packages

Who works coherently and efficiently

→Learn from HEP but no "closed shops" !

Some remarks

personal !

- ***Short-time proposals: not always inappropriate !***

→ Have short time projects !

→ Be open to new ideas and keep flexible !

→ Balance length of beam times:

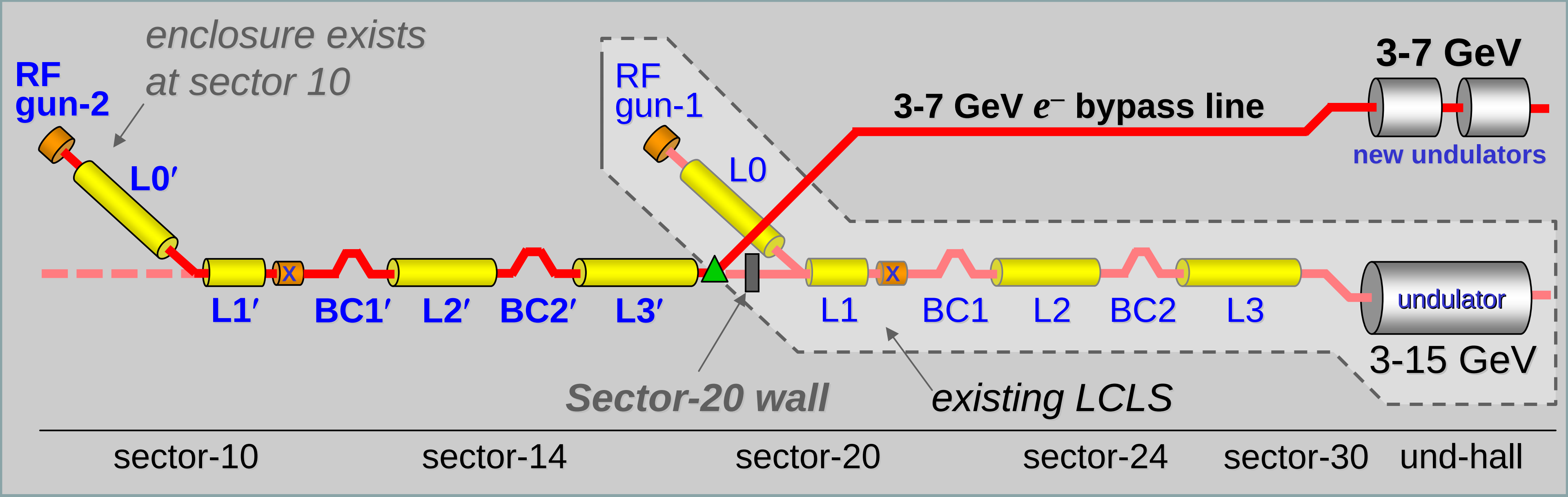
Experimental needs ←→ expected impact

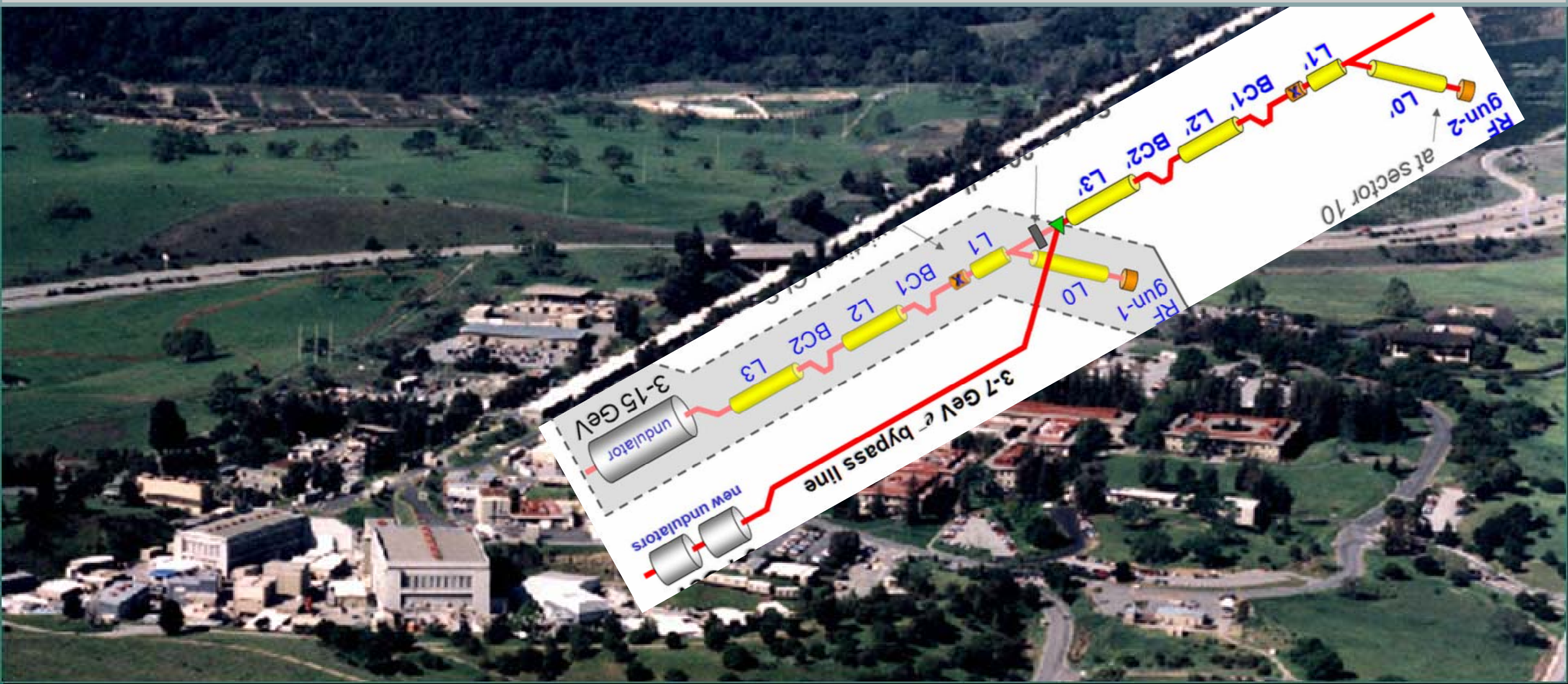
Request rigorously tests at synchrotons

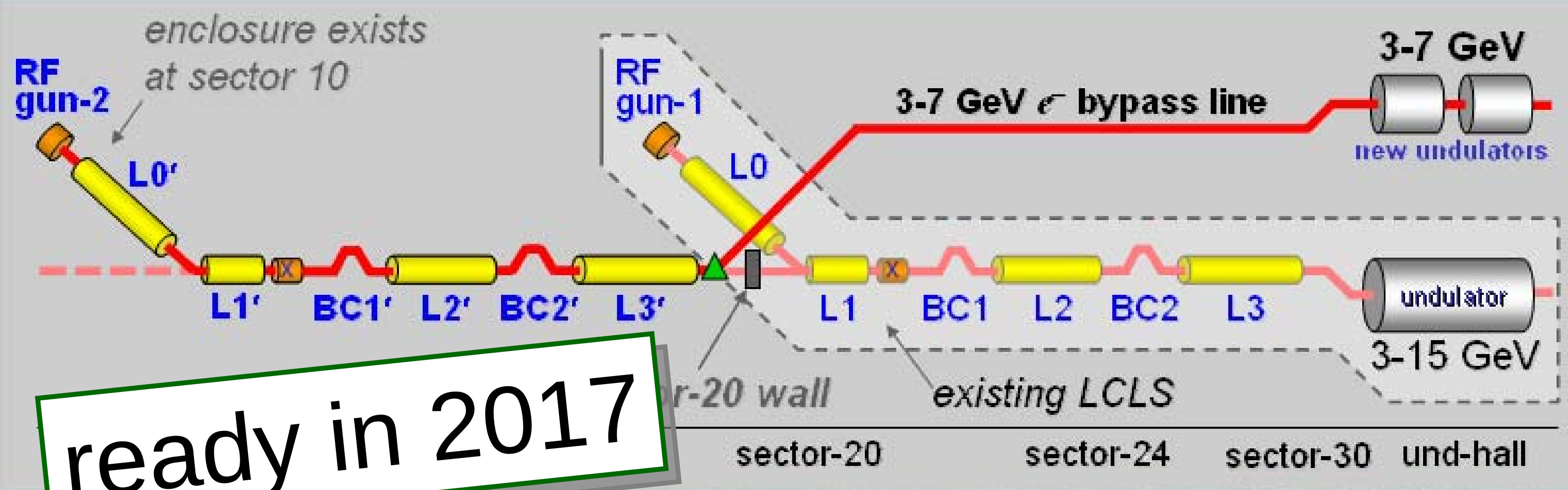
Request optimized use of beam time: rep-rate

have fun...

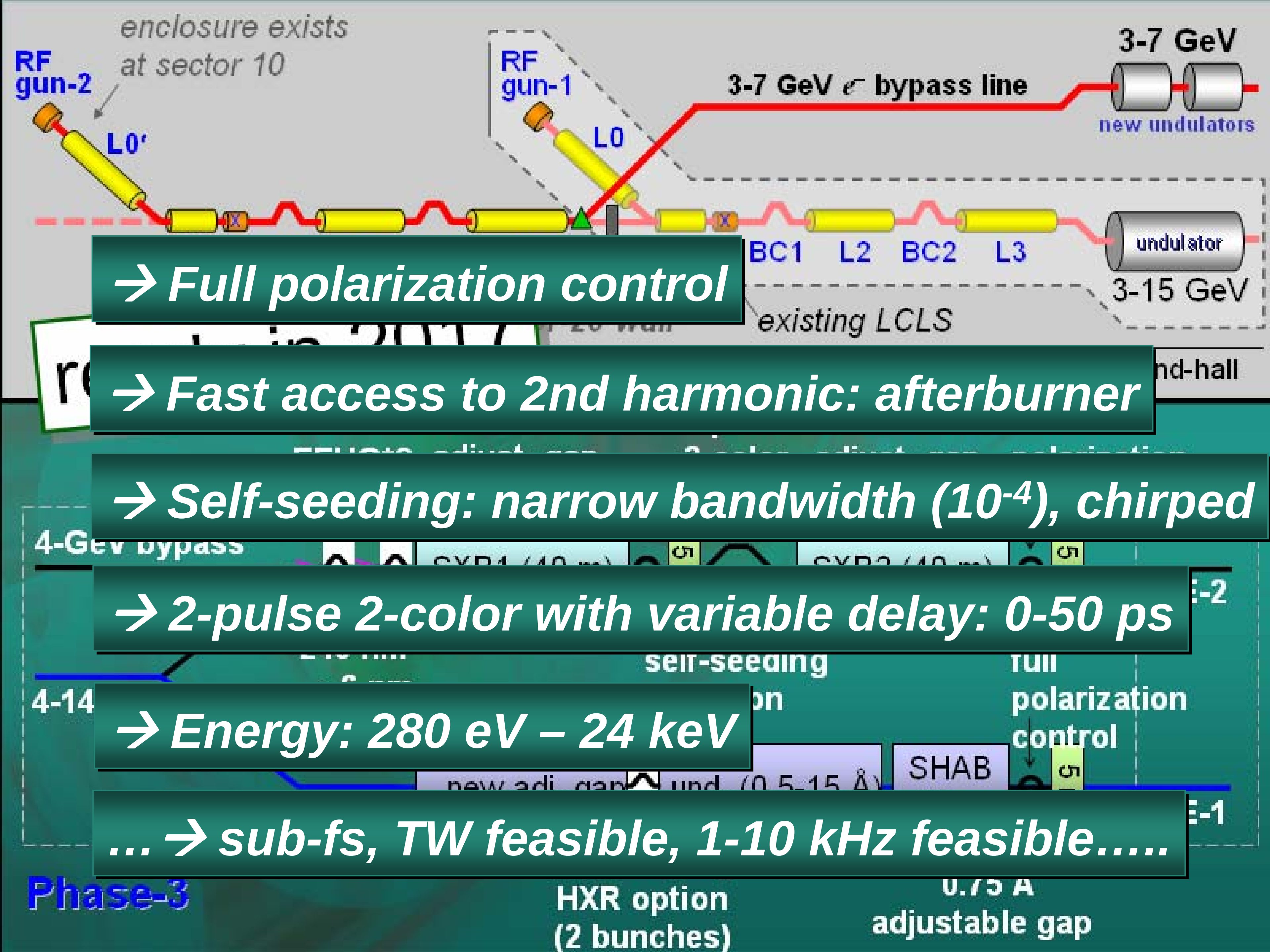
some competition...


enclosure exists
at sector 10
RF
gun-2
L0′
RF
gun-1
L0
3-7 GeV e^- bypass line
3-7 GeV
new undulators
L1′
BC1′
L2′
BC2′
L3′
L1
BC1
L2
BC2
L3
undulator
3-15 GeV
Sector-20 wall
existing LCLS
sector-10
sector-14
sector-20
sector-24
sector-30
und-hall





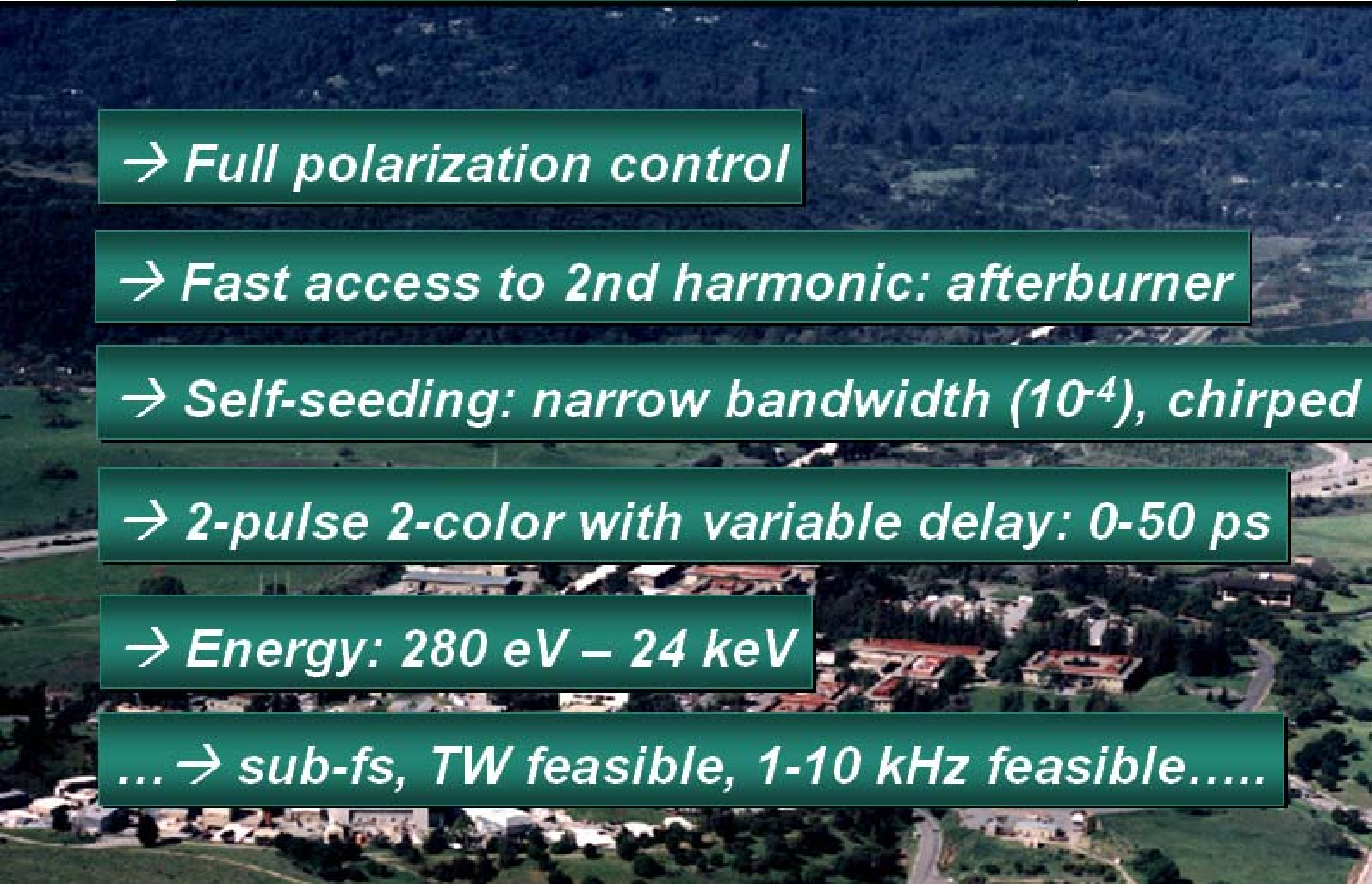
ready in 2017



- → *Full polarization control*
- → *Fast access to 2nd harmonic: afterburner*
- → *Self-seeding: narrow bandwidth (10^{-4}), chirped*
- → *2-pulse 2-color with variable delay: 0-50 ps*
- → *Energy: 280 eV – 24 keV*
- *… → sub-fs, TW feasible, 1-10 kHz feasible…..*

LCLS II at Stanford !

- → Full polarization control
- → Fast access to 2nd harmonic: afterburner
- → Self-seeding: narrow bandwidth (10^{-4}), chirped
- → 2-pulse 2-color with variable delay: 0-50 ps
- → Energy: 280 eV – 24 keV
- … → sub-fs, TW feasible, 1-10 kHz feasible…..



END