

SACLA Users' Meeting 2018



Spring-8 Angstrom Compact free electron LAser

Overview &  
Introduction to the SACLA Basic  
Development Program

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# Objectives

- To facility deeper communications among users, and between user community and facility
  - SACLA's new capabilities
  - Recent user researches
  - International progress
  - Discussion of future research opportunities
  - Feedback of your voices to future direction of SACLA

# Program

## Thursday PM

- **Facility session:** Recent operation summary and new instruments
- **Invited session:** Three invited speakers will present their exciting researches with international views
- **Poster sessions:** Inputs from both users and facility

## Friday AM

- **Poster sessions (cont'd):**
- **Breakout sessions:** Biology; Chemistry/AMO; Materials science; XQO & HEDS  
(Emergency drill: 10AM~; you do not need to join ...)

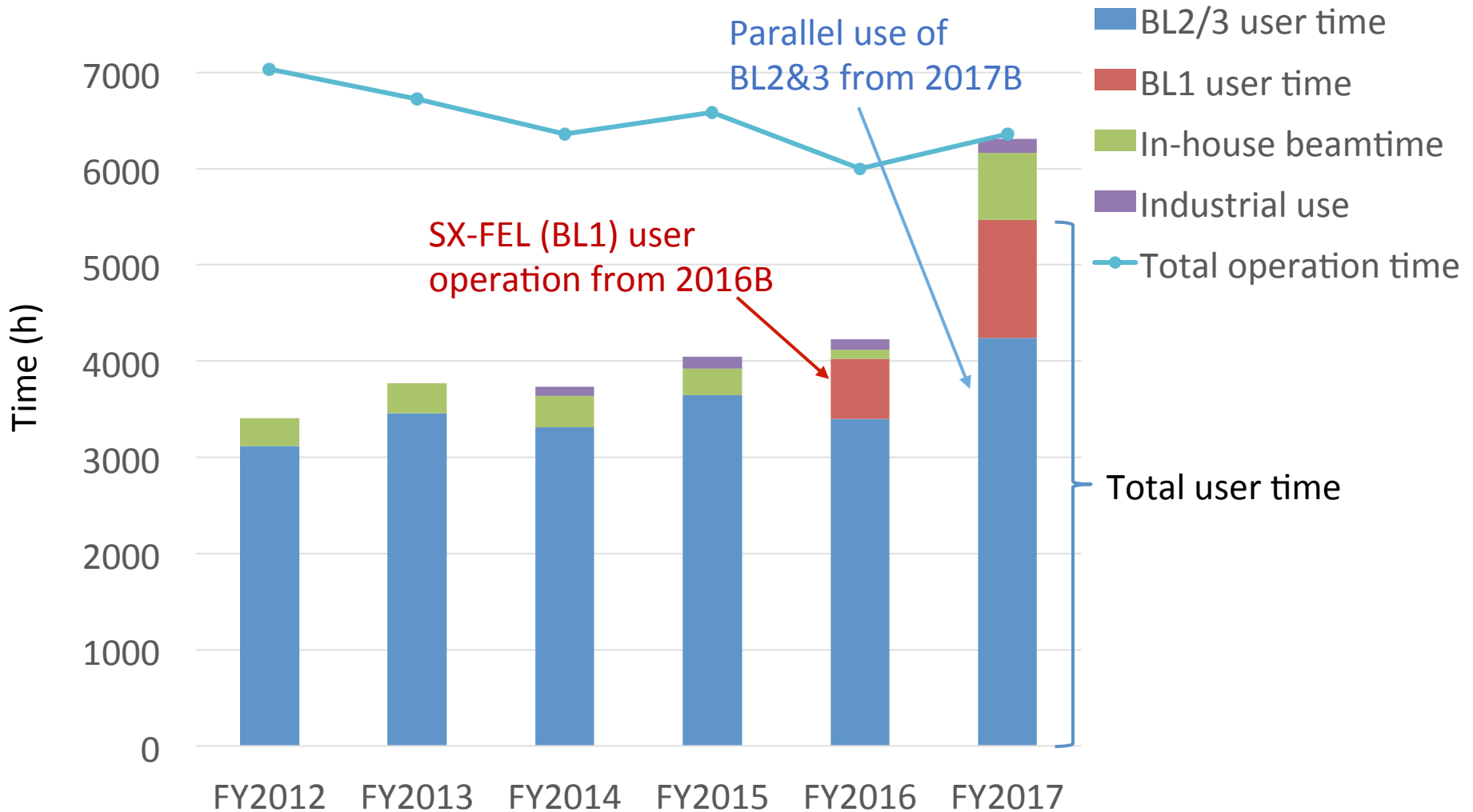
## Friday PM

- **Short presentations:** inputs from users on proposals for new concepts, requests to the facility, etc.
- **Wrap up**

# Status summary

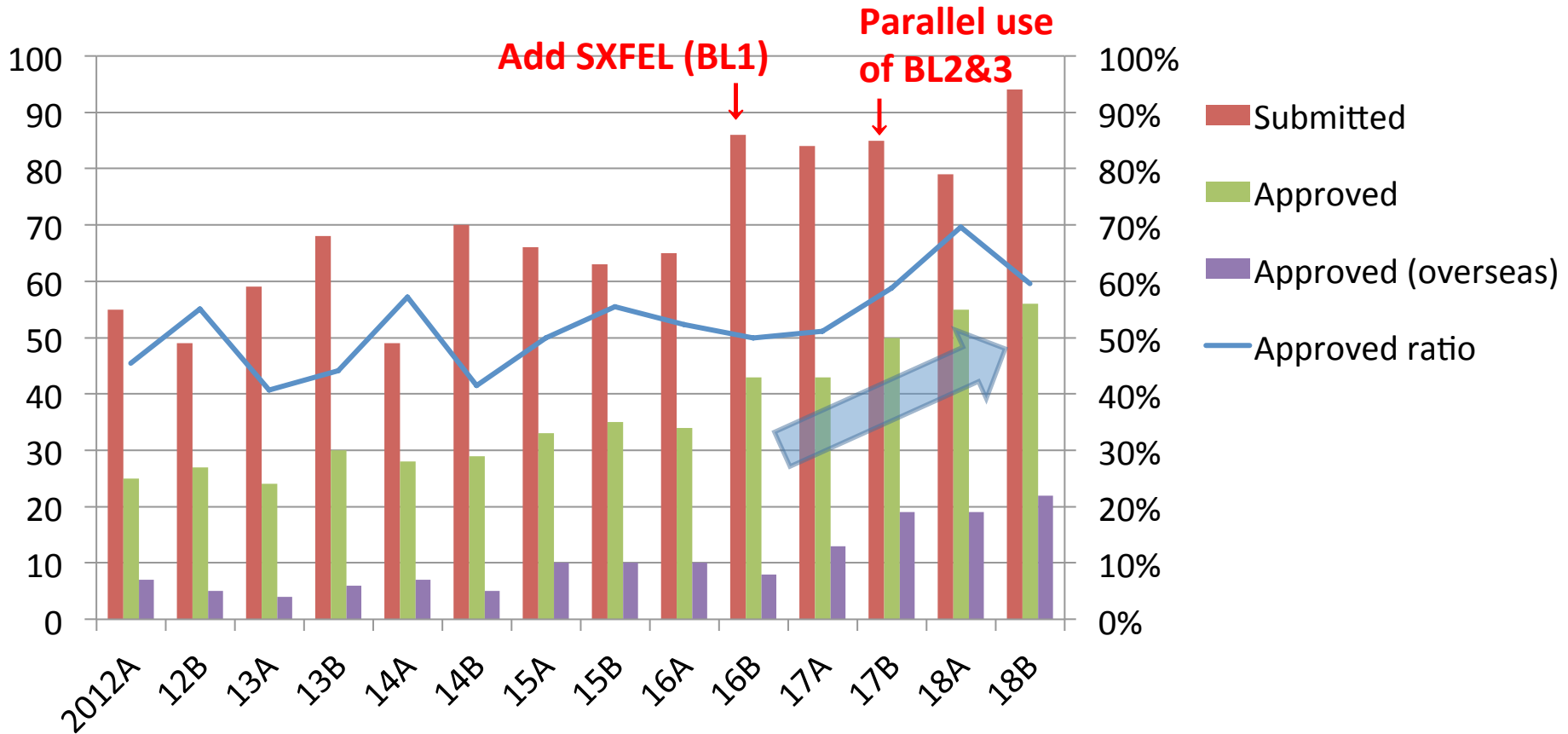
- In 2017B, SACLA operation entered into a new phase (“phase-2”) with start of simultaneous running of 3 beamlines
- Upgrade light-source capabilities
- Development of instruments

# Annual operation time



Total user time will reach 6000 h in FY2018.

# User proposal statistics



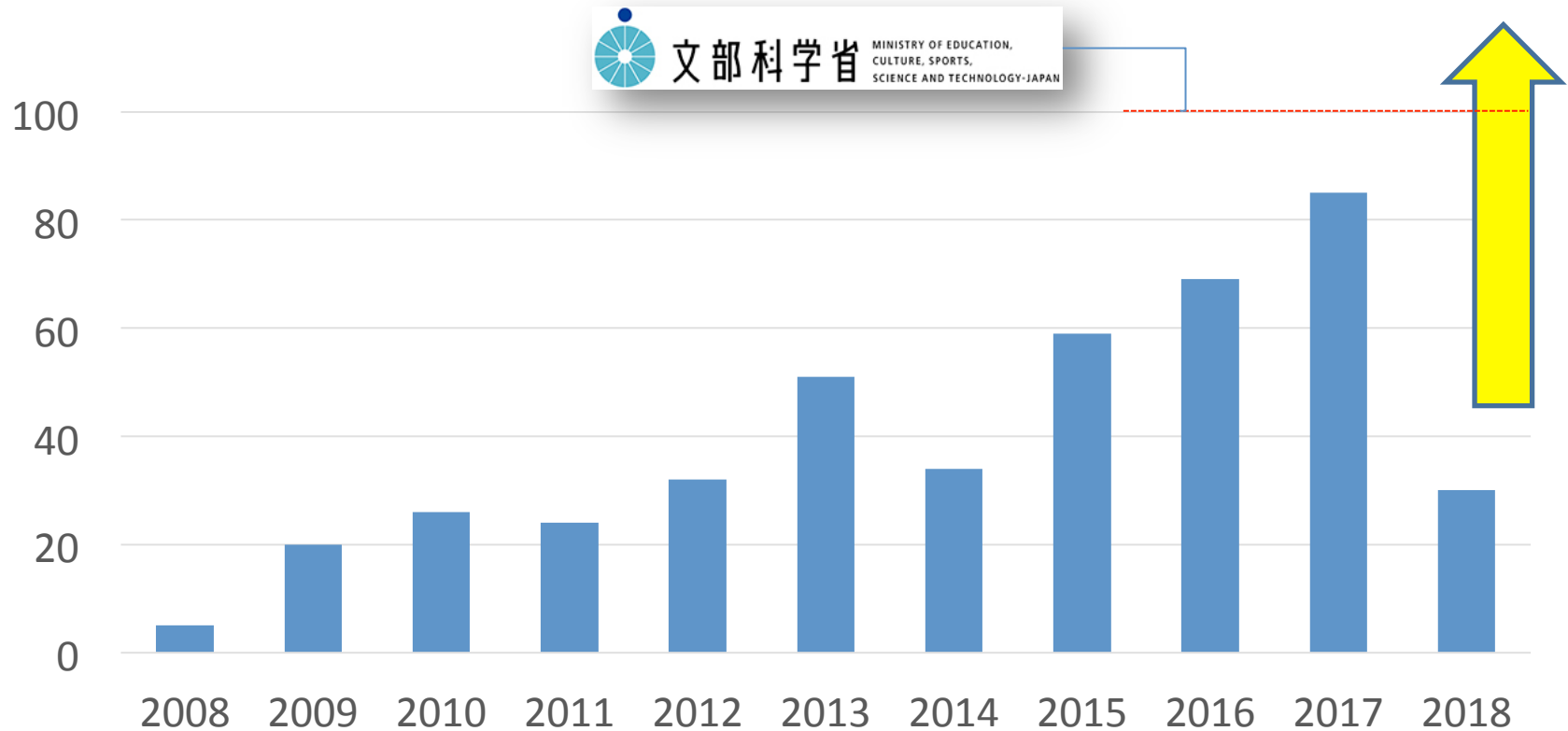
- Increasing availability due to the multi-beamline operation.
- >30% of approved proposals are from overseas users (17B-18B).

Application procedures (JASRI): <http://sacra.xfel.jp/>

SACRA portal HP (technical information, publications, etc.): <http://>

[xfel.riken.jp/](http://xfel.riken.jp/)

# Trend of publication



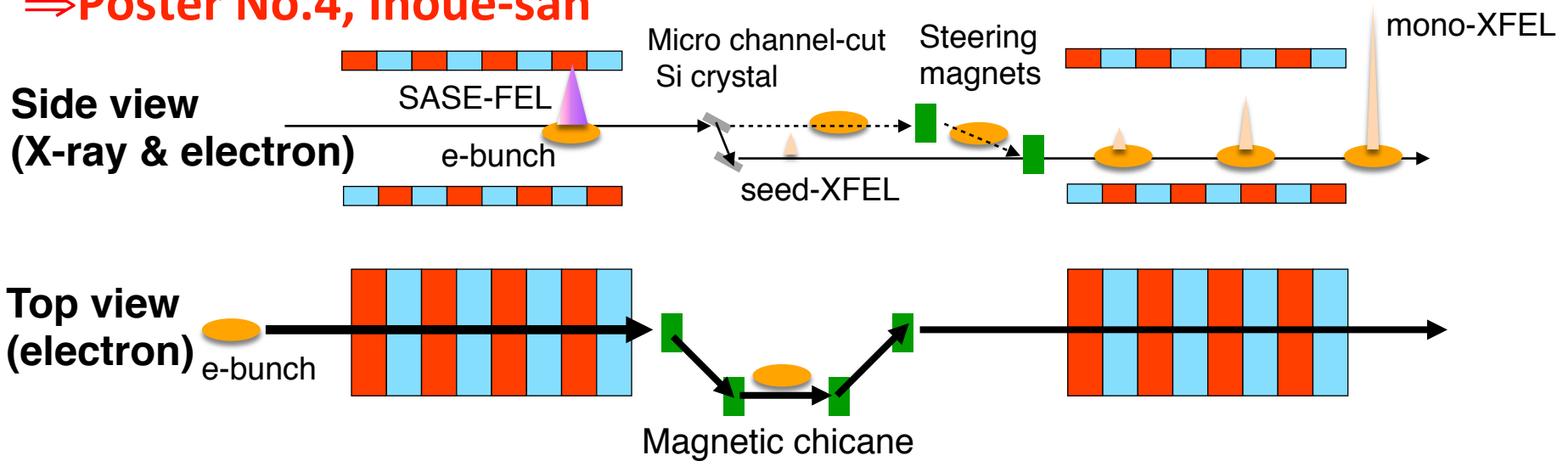
Timely submission !!

# Status Summary

- In 2017B, SACLA operation entered into a new phase (“phase-2”) with start of simultaneous running of 3 beamlines
- Upgrade light-source capabilities
- Development of instruments → Tono-san’s talk

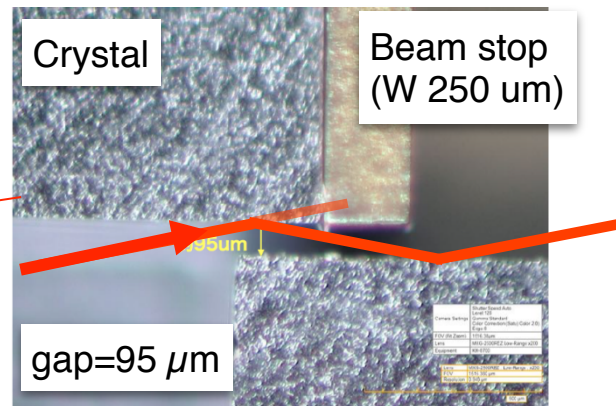
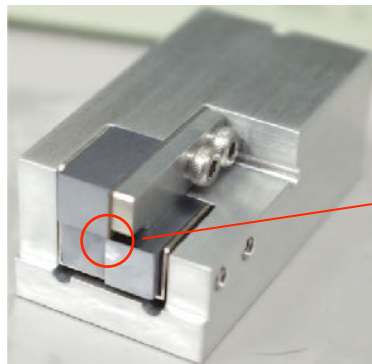


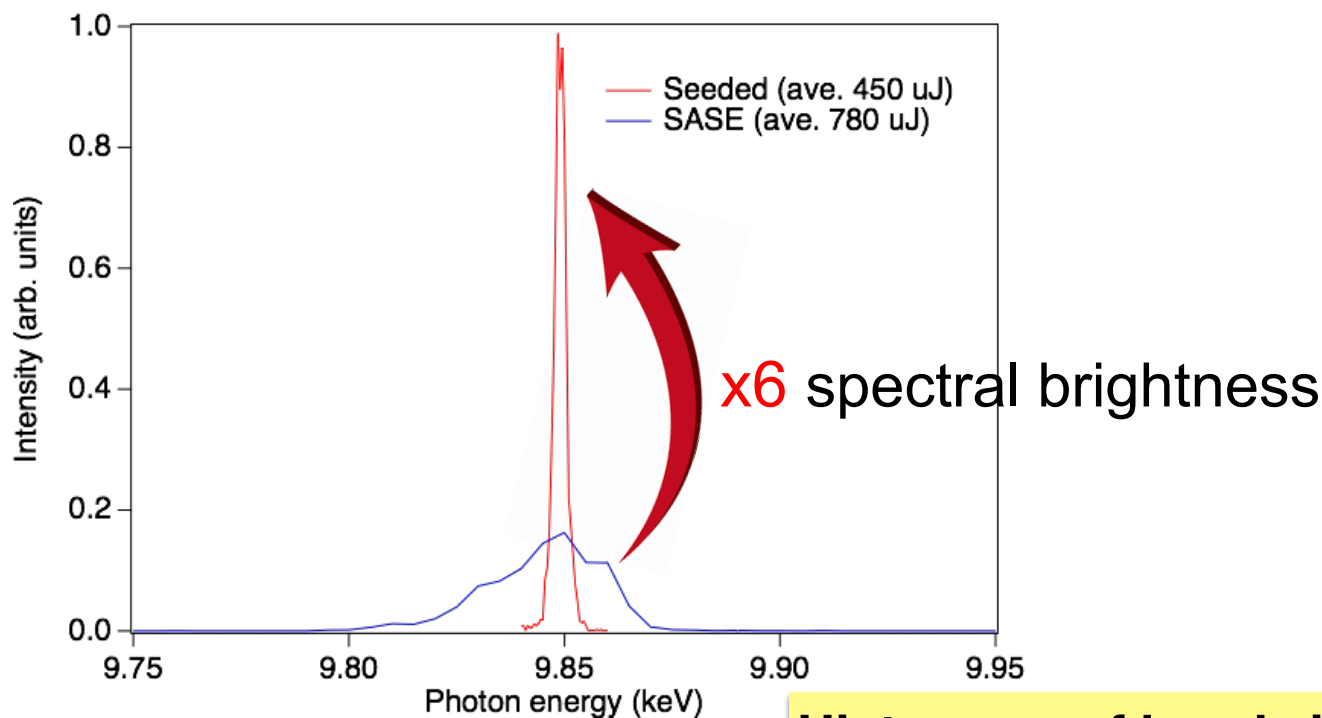
⇒Poster No.4, Inoue-san



- ☑ Mono-XFEL beam is generated.
- ☑ High extraction efficiency of mono-beam for seeding.

Micro channel-cut Si crystal





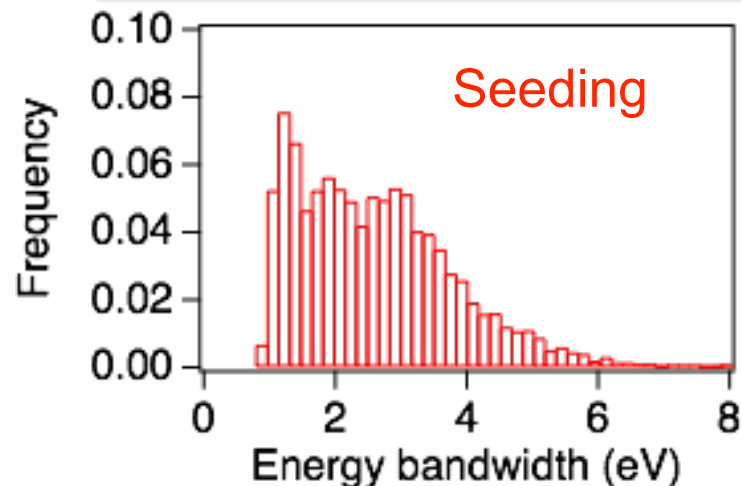
## Seeding mode:

- Ave. pulse energy: 450 uJ
- Bandwidth: 3 eV in FWHM

## SASE mode:

- Ave. pulse energy: 780 uJ
- Bandwidth : 30 eV in FWHM

## Histogram of bandwidth



# Preparation for SPring-8-II



- Ultrasmall emittance  $\sim 100$  pm with 5BA lattice in 202 $\delta$
- Injection from the low-emittance SACLA linac: test start in FY2018
- Compatible to small dynamic aperture of new lattice & suppression of electricity by skipping operation of existing injector (linac & booster)
- Try to minimize impacts to SACLA users

# Programs

Three special programs operated by RIKEN SPring-8 Center

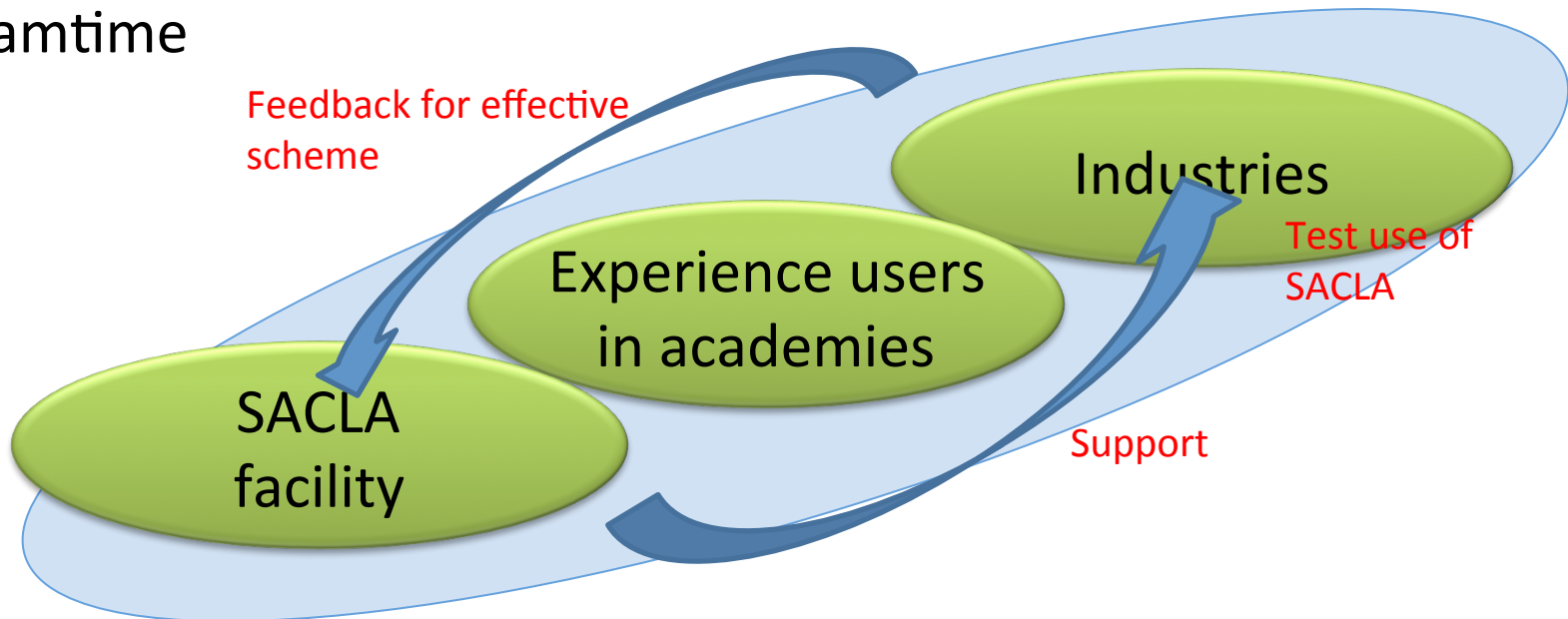
1. Industrial
2. Education
3. Development

# 1. SACLA Industry-Academy Partnership Program (domestic) SACLA産業利用プログラム

- To promote industrial use with a help of experienced academic users
- Operated since FY2014
- 4 programs are running in FY2018 (metals, vehicles, soft matters, ceramics ...)



- ~8 proposals/year from industrial party are conducted in public beamtime



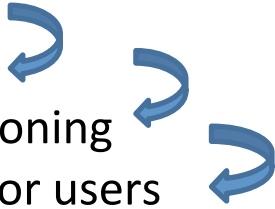
## 2. SACLA Research Support Program for Graduate Students

### SACLA大学院生研究支援プログラム

- To provide opportunities to stay and learn at SACLA for motivated graduate students
- Program students can access to facility time of SPring-8 & SACLA
- To enhance cooperation between universities & SACLA
- Since FY2014
- Open for international students in FY2018
- Satoru Egawa (U Tokyo), Gota Yamaguchi (U Tokyo), Junpei Yamada (Osaka U), Yudai Seino (U Tokyo), Tae Kyu Choi (Eu.XFEL)
  - Development of ultimate focusing optics for soft and hard x-ray FEL
  - Preparatory study for observation of vacuum birefringence effect

# 3. SACLA Basic Development Program (new)

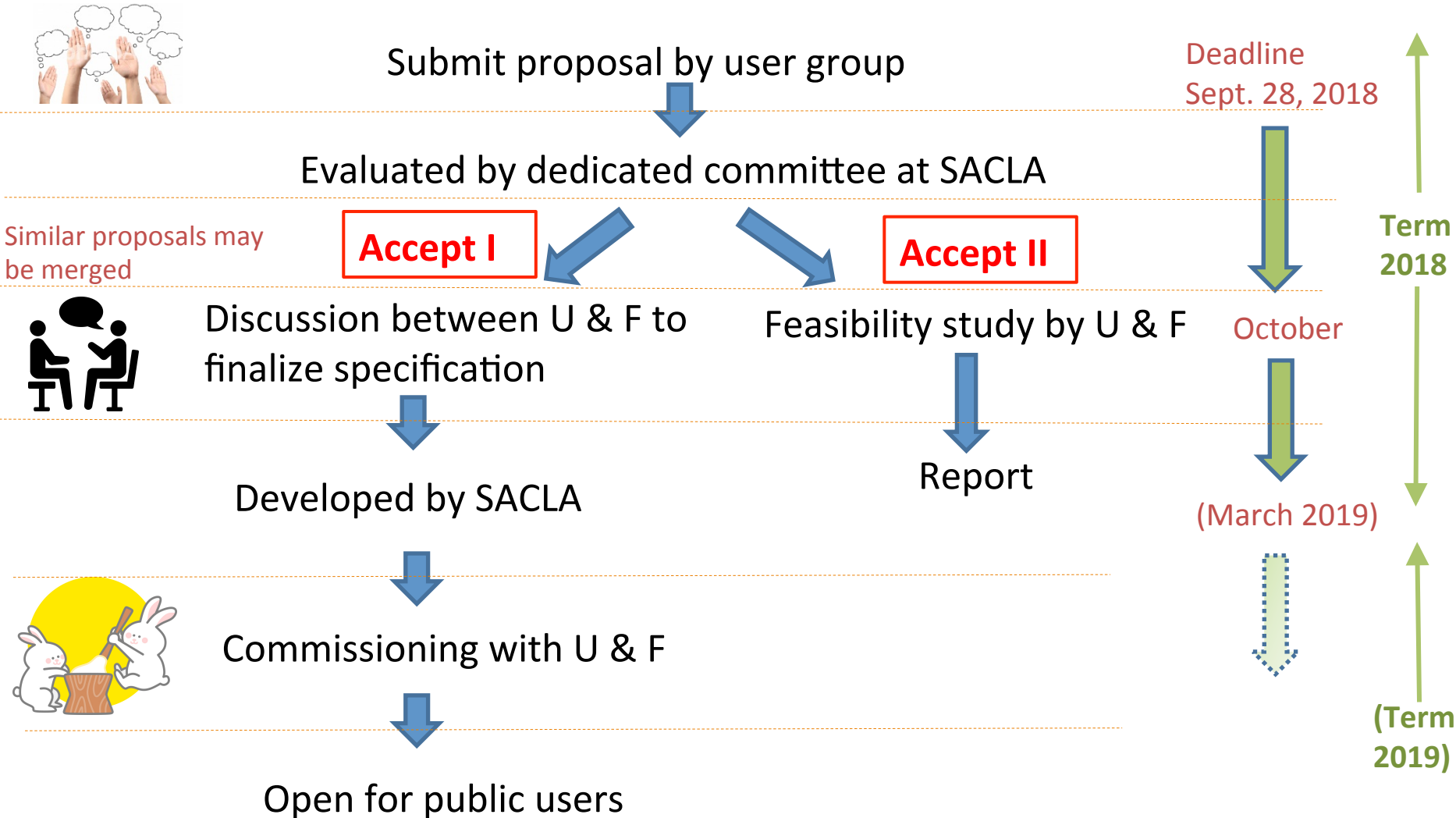
## SACLA基盤開発プログラム

- Typical cycle for instrumental development
  - (1) Propose
  - (2) Develop
  - (3) Commissioning
  - (4) Operate for users
- So far, all processes have been conducted by the SACLA facility internally
- Contributions from external users will boost development of new & unique capabilities to promote innovative science
- We invite you to engage this cycle, especially for process (1) and (3)
  - Note that we could not allocate budget to users' institutions
- [Category A] New experimental instruments
- [Category B] Enhanced capabilities for the XFEL and optical lasers (including development of new X-ray optical devices)

[http://xfel.riken.jp/eng/topics/sacla\\_basic\\_development\\_2018.html](http://xfel.riken.jp/eng/topics/sacla_basic_development_2018.html)

**Please contact to [saclainst@spring8.or.jp](mailto:saclainst@spring8.or.jp)**

# Flow



[http://xfel.riken.jp/eng/topics/sacla\\_basic\\_development\\_2018.html](http://xfel.riken.jp/eng/topics/sacla_basic_development_2018.html)

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# Discussion summary of last meeting (Dec, 2017)

## Brief summary of discussion

- ✓ 1. BL1: timing tool will be operated in May 2018;
2. BL1: insertion device for generating circular polarized soft x-rays (~100 eV) ? Higher photon energy up to Boron K-edge (188 eV) ? (for future consideration) → **under discussion**
3. 500 TW: Possibility of off-line use ?
  1. Full dedication of off-line use may not be straightforward
  2. We could consider to invite (potential) users to commissioning/tuning of laser or to early experiments in 2018A
  3. Collaboration among laser facilities, e.g., Osaka Univ., QST Kansai Institute, would be encouraged → **discussion in progress**
4. Extended capabilities of XFEL performance → **Self seeding**
  1. Higher pulse energy: increase of pulse energy in higher photon energy may be achieved with harmonic lasing (consensus to Tanaka-san)
  2. Not only for maximizing pulse energy, but for improving spatial profile and/or spectral brightness
  3. BL1 sub-10-fs pulse duration
  4. Better time resolution. attosecond ? sub-10 fs ? Need pulse compression of XFEL and/or optical laser pulses
5. SPring-8 & SACLA combinative use
- ✓ 6. SACLA Basic Development Program

Questions ?

and

Let's enjoy this meeting

END