Welcome to the 2019 European XFEL Users Meeting
the 13th Users Meeting

Robert Feidenhans’l
Managing Director,
Schenefeld/Bahrenfeld, 23 January 2019
Nicole Elleuche new Managing and Administrative Director
Maria Faury new Council Chair

Nicole Elleuche comes from the Heinrich Pette Institute, Leibniz-Institute for Experimental Virology, Hamburg

Maria Faury has an engineering background and is Director of International Affairs and Large Research Infrastructures of the Fundamental Research Division at the CEA
2019 is a special Year: Signature of Convention 30 November 2009
2019 Users Meeting:
• 1090 Registered Participants
• 362 Posters
• 83 industrial vendors
• 5 Satellite meetings
<table>
<thead>
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<tbody>
<tr>
<td>Total online</td>
<td>769</td>
<td>916</td>
<td>891</td>
<td>937</td>
<td>1030</td>
<td>1090</td>
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**Time Evolution of Registrations (total)**
<table>
<thead>
<tr>
<th>Country</th>
<th>Number</th>
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<tbody>
<tr>
<td>Germany</td>
<td>794</td>
</tr>
<tr>
<td>Poland</td>
<td>59</td>
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<tr>
<td>Russian Federation</td>
<td>33</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>25</td>
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<tr>
<td>Sweden</td>
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<tr>
<td>United States</td>
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<tr>
<td>Slovakia</td>
<td>17</td>
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<tr>
<td>France</td>
<td>16</td>
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<tr>
<td>China</td>
<td>13</td>
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<td>Denmark</td>
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<td>Czech Republic</td>
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<td>Switzerland</td>
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<tr>
<td>Italy</td>
<td>9</td>
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<tr>
<td>Spain</td>
<td>4</td>
</tr>
<tr>
<td>Turkey</td>
<td>4</td>
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<tr>
<td>Other</td>
<td>23</td>
</tr>
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</table>
Two important Directors are leaving us /stepping down

26 October 2018:  
Andreas Schwarz  
Scientific Director European XFEL

31 December 2018:  
Reinhard Brinkmann  
Machine Director DESY

Thank you for all contributions and efforts
Content

- Users statistics and first publications

- Status SASE 1 (SPB/SFX, XBI and FXE, see talk by A. Orville, M. Chergui, S. Canton, F. Lehmkühler, K. Lorenzen)

- Status accelerator (Winni Decking)

- Progress SASE3 and SASE2 (see talks M. Meyer, A. Scherz, A. Madsen)

- Shaping the Future (Serguei Molodtsov)

- Organisation

- Canteen and Guesthouse

- Conclusion
Users and First Publications
First users – 14 September 2017

Four months from first lasing to user operation!
### Proposal for SPB/SFX and FXE in the first three rounds

<table>
<thead>
<tr>
<th></th>
<th>First Proposal Round</th>
<th>Second Proposal Round</th>
<th>Third Proposal Round</th>
<th>Fourth Proposal Round</th>
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<tbody>
<tr>
<td>Proposals submitted</td>
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<tr>
<td>SPB/SFX and FXE</td>
<td>63</td>
<td>61</td>
<td>75</td>
<td>61</td>
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<tr>
<td>Total proposers</td>
<td>505</td>
<td>440</td>
<td>576</td>
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<tr>
<td>User shifts requested (12 hours/shift)</td>
<td>275</td>
<td>341</td>
<td>341</td>
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<tr>
<td>Proposals submitted to FXE</td>
<td>37</td>
<td>42</td>
<td>44</td>
<td>33</td>
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<tr>
<td>Proposals submitted to SPB/SFX</td>
<td>26</td>
<td>19</td>
<td>31</td>
<td>28</td>
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<tr>
<td>Proposals allocated beamtime on FXE</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Proposals allocated beamtime on SPB/SFX</td>
<td>7</td>
<td>6</td>
<td>7</td>
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</table>

PRP Feb. 20/21
Megahertz data collection from protein microcrystals at an X-ray free-electron laser.

Marie Luise Grünbein, Johan Bielecki, Alexander Gorel, Miriam Stricker, Marco Cammarata, Katerina Dörner, Lars Fröhlich, Elisabeth Hartmann.
SPB/SFX experiment #2012: Many thousands of frames of diffraction data was collected and successfully analysed to give a structure!

Results from XFEL2012, initial refinement:

- $R_{\text{work}}/R_{\text{free}}$: 0.168 / 0.193
- Average $B_{\text{ISO}}$: 34.9
- RMSD bonds (Å): 0.003
- RMSD angles (°): 0.592

This is the first realisation of the European XFEL’s purpose—a complete experiment from start-to-end demonstrated in the very first user experiment at the facility at the SPB/SFX instrument (Data September 2017, Analysis November 2017). That is, structural biology works at XFEL!

Courtesy Adrian Mancuso
AGIPD at SPB/SFX: Adaptive gain detector

European XFEL pulse structure

European XFEL

352 frames

Courtesy Adrian Mancuso
Progress as a function of time on instruments

- Instruments have a high degree of complexity
- High work load on staff
- Significant set up time for experiments
- Key instrumentation still needs to be commissioned
- Mitigating support for instruments by careful planning

Courtesy Adrian Mancuso
2 November 2018 – SPB experiment

Downstream (SFX) interaction region being filled with components, related electronics and cabling production is ongoing
FXE: X-ray – Optical Laser sync performance

single shot @ 564 kHz detector frame rate

RF synchronized,
Inter train run 447

σ = 132 fs FWHM= 320 fs

Optically synchronized,
Inter train run 447

σ = 31 fs FWHM= 73 fs

Credits: Scientific Instrument FXE
Single Shot spectrum Analyzer at FXE

single shot @564 kHz detector frame rate on a 1.1 MHz x-ray pulse repetition rate

10 trains, 30 pulses each
Proposals statistics all 6 instruments

Number of proposals 3rd and 4th proposal round

<table>
<thead>
<tr>
<th></th>
<th>FXE</th>
<th>SPB/SFX</th>
<th>SQS</th>
<th>SCS</th>
<th>MID</th>
<th>HED</th>
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<tr>
<td>Run III</td>
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<td>Run IV</td>
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<td>10</td>
<td>8</td>
<td>17</td>
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### Third Proposal Round, Nov 2018 – June 2019

**Distribution of shifts**

<table>
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<tr>
<th></th>
<th>#Use Exp</th>
<th>User</th>
<th>Com/IU/Setup</th>
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<tr>
<td>FXE</td>
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<tr>
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<tr>
<td>HED</td>
<td>4</td>
<td>20</td>
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**Management Contingency**: 2 shifts on FXE/SPB for Hercules winterschool
The X-ray program includes external (user) and internal commissioning and other internal use.

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>2019</th>
<th>2020</th>
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<td>Mar</td>
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<td>Nov</td>
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<td>Dec</td>
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First User Experiments on MID
First User Experiments on HED
Parallel Operation of 6 User Experiments (two weeks in Spring)
High Rep rate delivered to Instruments (6000 bunch/s)

RP Radiation protection
ST Setup, access, tuning
FD Facility development
XP X-ray program
Status: Parallel Operation of all three Undulators!

- In operation:
  - 3 SASE FELs
  - 3 photon beamlines
  - 2 experiments

- In commissioning:
  - 4 experiments

See Talk by Wilfred Decking
Accelerator runs really well
All goals for 2018 achieved!

operation:
3 SASE FELs
3 photon beamlines
2 experiments

commissioning:
4 experiments
5 December 2018: First user experiment at SCS

November / December 2018: First user groups SQS
First beam in Hutch at MID: December 7

First Image on AGIPD Detector Dec 8

See talk by Anders Madsen

First Users in March
02.11.2018 – HED experiment

First Users in 1 May

See talk by A. Madsen
Workshop

“Shaping the Future of the European XFEL: Options for the SASE4/5 Tunnels”

06 December – 07 December 2018
Venue: Room E1.173 - European XFEL/S

Scope of the Workshop: Analysis and discussion of mid-term upgrades of the two empty tunnels of the European XFEL (SASE4/5).

Talk by Serguei Molodtsov
Organisational Matter
New Orga-Chart
Line Management
Italy and UK are now full shareholders

21 November 2018: UK new shareholder

05 October 2018: Italy new shareholder
Civil construction projects Canteen

- **XHC** opens in April
- Operator starts test run in February 2019
- 30 x 20 m in the base area, 150 seats
Civil construction projects:

- XHG (Construction start Summer)
It has (again) been a fantastic Year
Acknowledgement to the fantastic staff at European XFEL

Thanks to all the XFEL staff for their hard work and for their commitment.
And to the fantastic Accelerator Staff

Thanks to all the DESY accelerator staff for their hard work and for their commitment