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Survey of the Scientific Community: Key Findings and Insights

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EuPRAXIA-PP Survey for the potential user community

The aim of this survey is to establish a connection with the future EuPRAXIA users community and gain valuable insights into the potential requests and expectations of scientists who may be involved in forthcoming experiments with plasma acceleration sources. Your valuable input will help us shape the project to better serve the needs and aspirations of the scientific community. The questionnaire covers various aspects, including scientific cases, key parameters of the plasma source and emitted photon beam, and practical services such as local staff assistance, accommodation, and catering. Your responses will play a vital role in steering the project's direction and ensuring that it aligns with the requirements of researchers like you.

The survey will take approximately 5-10 minutes to complete and your responses will help inform future planning relating to experiments and user services in EuPRAXIA.

There are 59 questions in this survey.

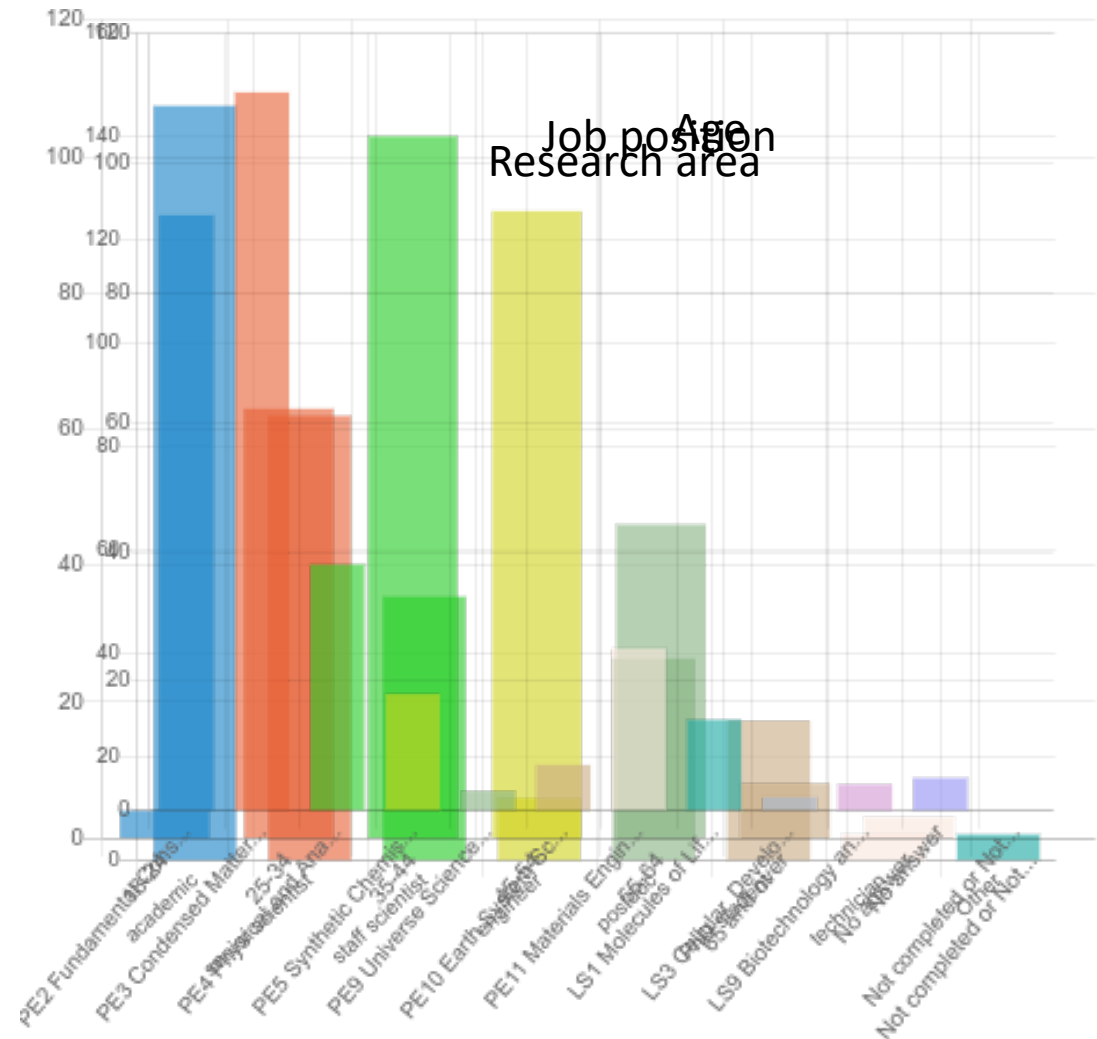
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- Over 500 people accessed the survey
- 319 participants submitted responses
 - 156 completed the survey in full
 - 163 submitted partial responses
- Job position:
 - majority of academics and scientists
- Age:
 - the majority are in the 35-54 range
- Research area (ERC field classification):
 - PE2 Fundamental Constituents of Matter. Particle, nuclear, plasma, atomic, molecular, gas, and optical physics
 - PE3 Condensed Matter Physics. Structure, electronic properties, fluids, nanosciences, biological physics

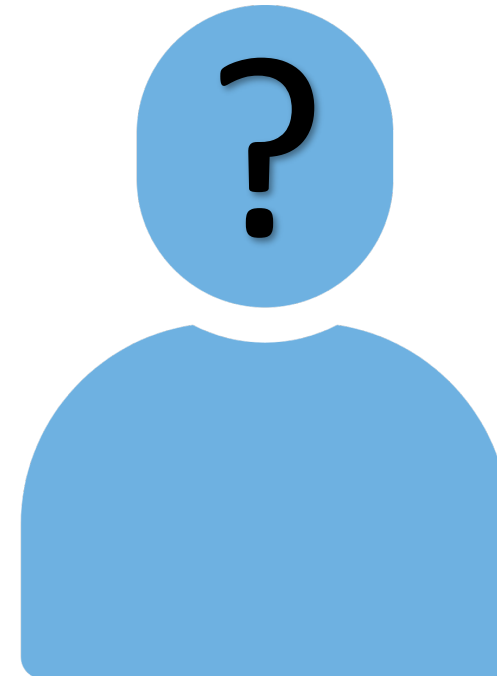


- EuPRAXIA project knowledge
 - 48% report partial knowledge
 - 36% have no knowledge
 - 15% report full knowledge

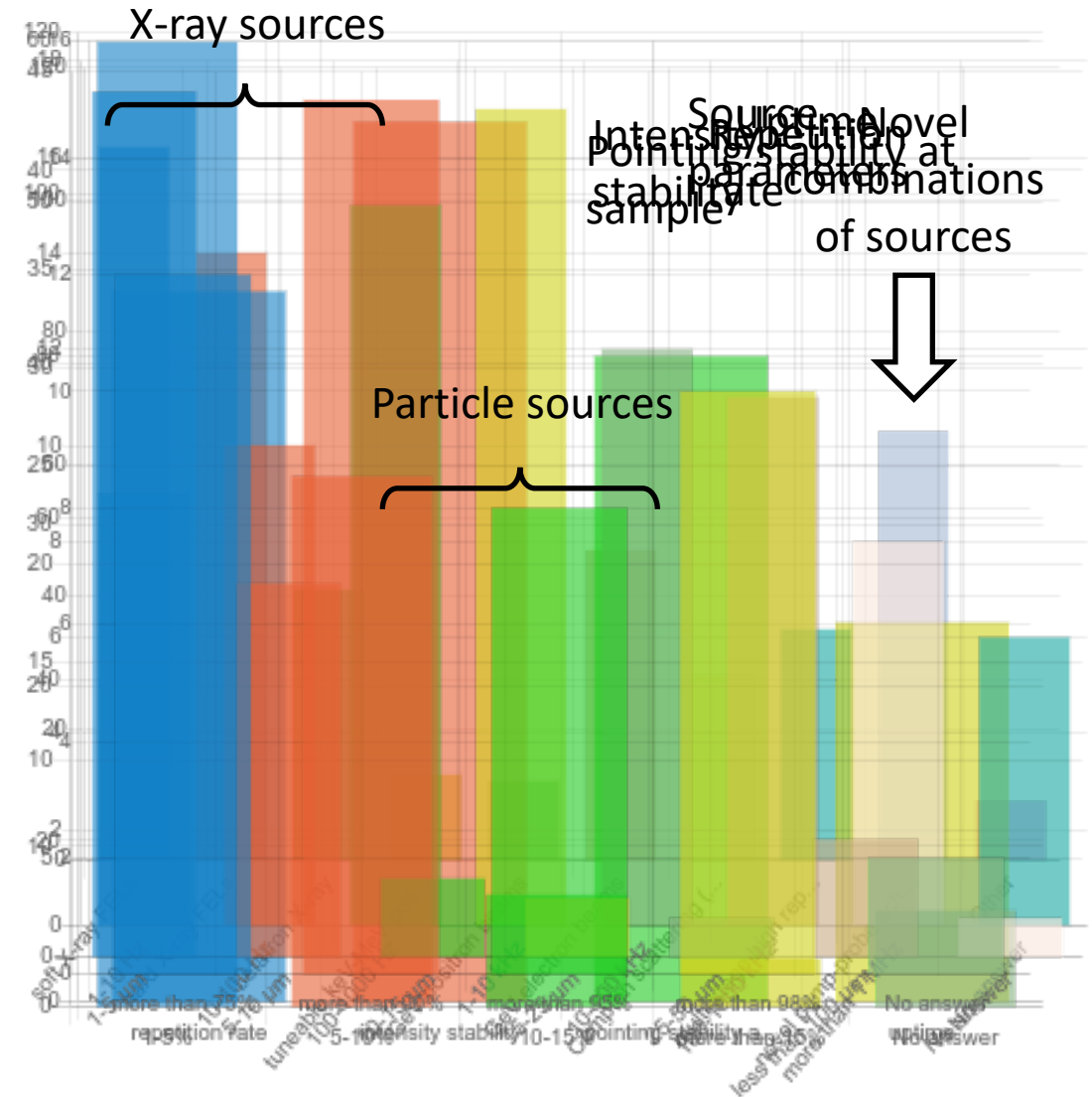
- Respondents would appreciate being informed and updated through these channels: mailing list, website
- Events and newsletters are also appreciated, though with less preference.



- Directly involved in scientific research
 - At an advanced stage of scientific career
 - Has a correct understanding of EuPRAXIA's aims
 - Holds a positive opinion of the EuPRAXIA project, though not fully informed about it
- Likely to become a user of EuPRAXIA facilities within the next 10 years
 - It is important to carefully consider the expectations of this statistical sample



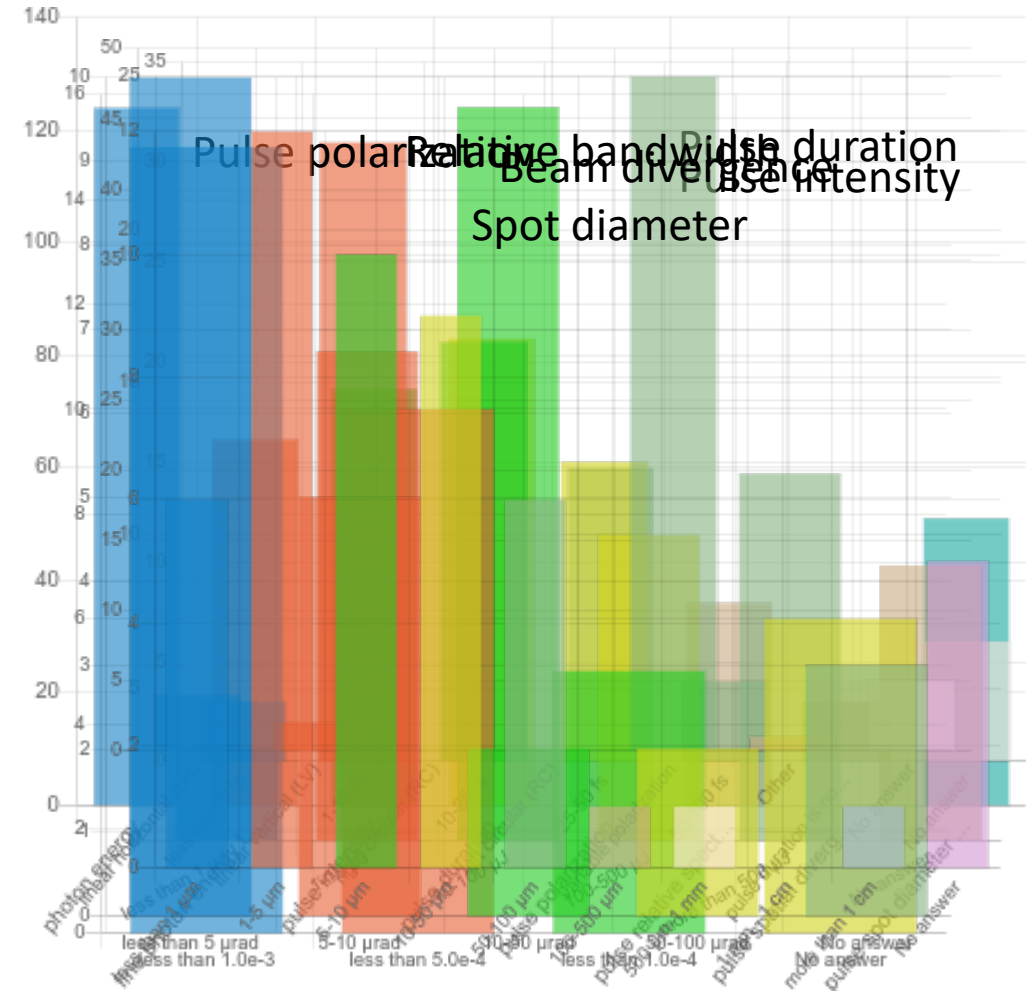
- X-rays sources attract greater interest
- Notably, there is interest in exploring combinations of different sources for novel pump-probe schemes
- Required sources parameters:
 - Rep rate: 100-10000 Hz (36%)
 - Intensity fluctuations: 1-5% (55%)
 - Pointing stability at sample: 1-5 μm (55%)
 - Uptime: it seems to be not critical



- Photon energy is the most important parameter:
 - 33% prefer EUV (< 300 eV)
 - 47% prefer soft x-ray
 - 20% prefer hard x-ray (> 7 keV)

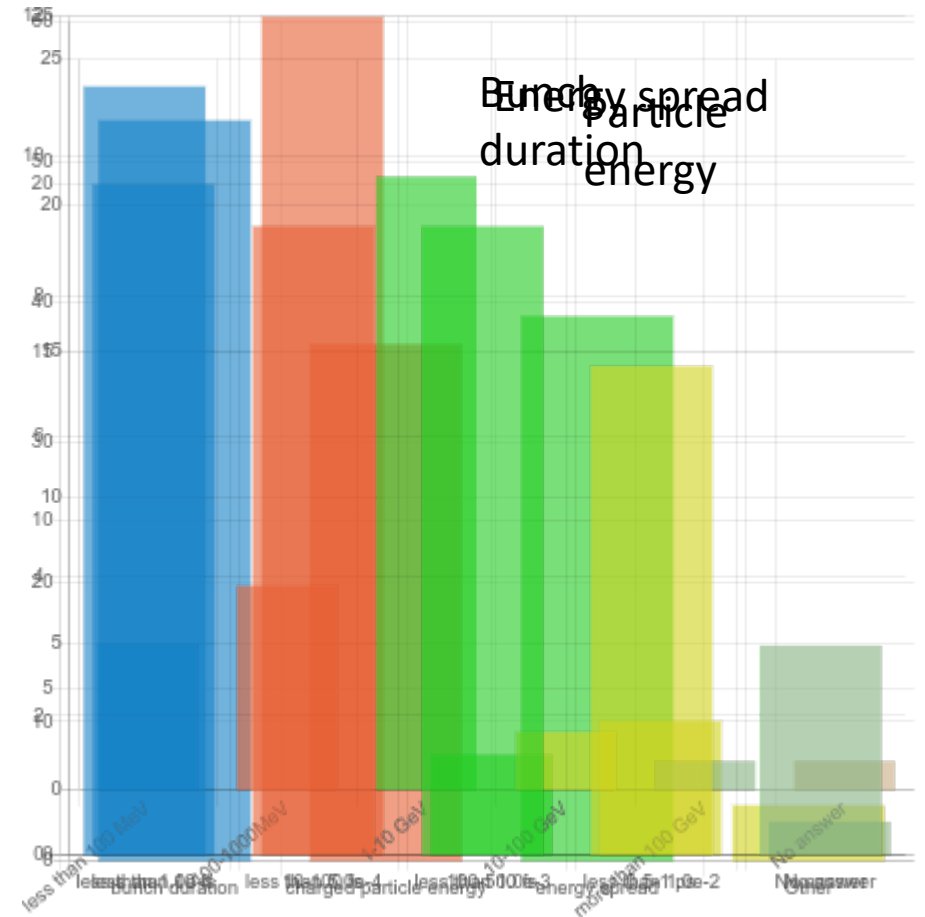
- Fine photon energy tunability:
 - 40% request fast photon energy changes (< 1 minute); 30% can wait up to 10 minutes
 - 60% require energy mesh smaller than 0.5 eV; 27% between 0.5 and 1 eV
 - 35% ask for more than 50 photon energies values; 35% ask for 10-50 photon energies values

- Pulse intensity: 10-100 μJ is preferred by 32%
- Pulse duration: 1-10 fs
- Pulse polarization: variable
- Relative bandwidth: < 1e-3
- Beam divergence: < 5 μrad
- Spot diameter: 1-5 μm



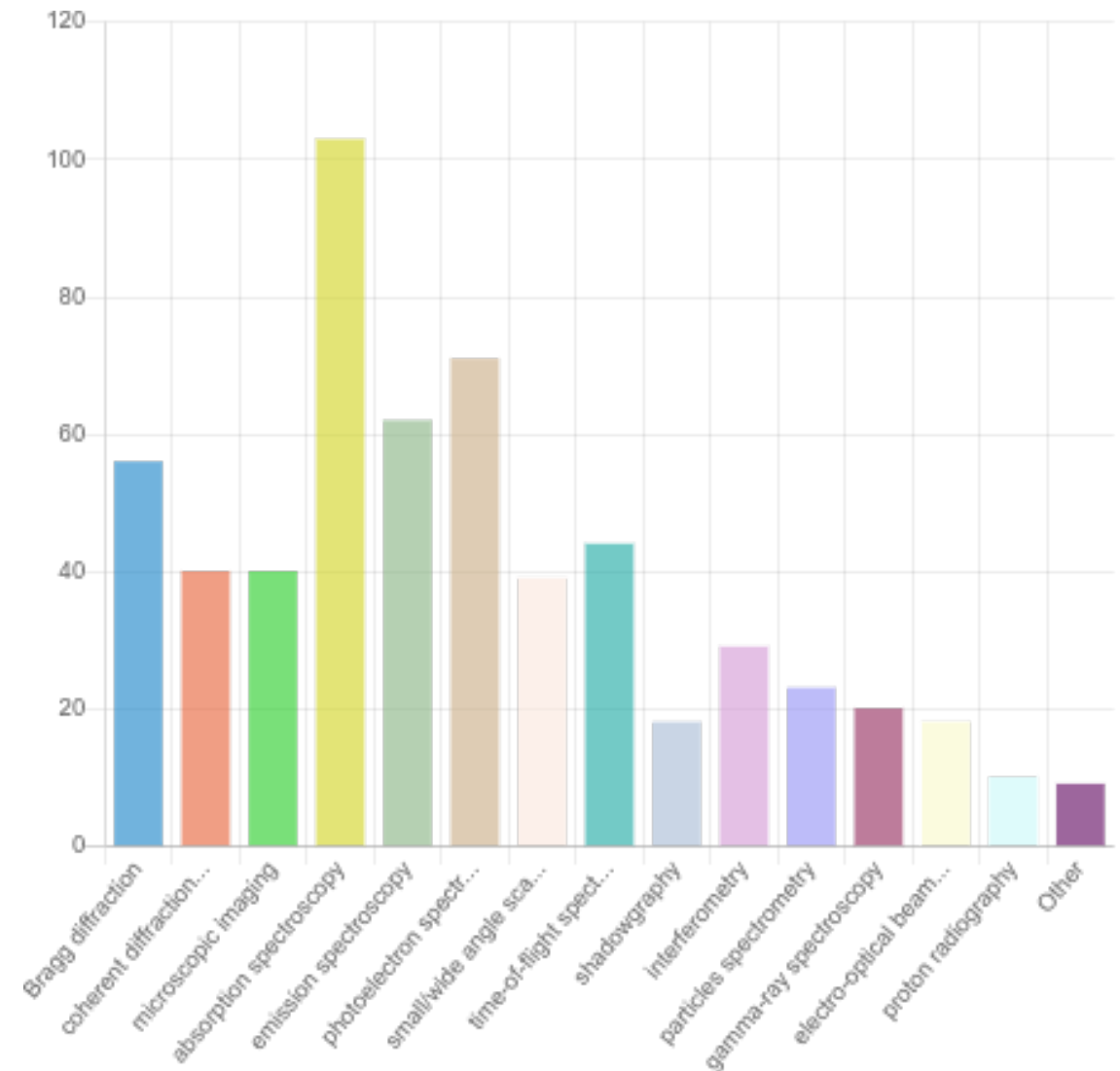
Parameters of particle sources:

- Bunch durations longer than 100 fs are not of interest to users
- Particles energy should be in the range 1-10 GeV
- A small energy spread is preferable, however it is not a critical parameter



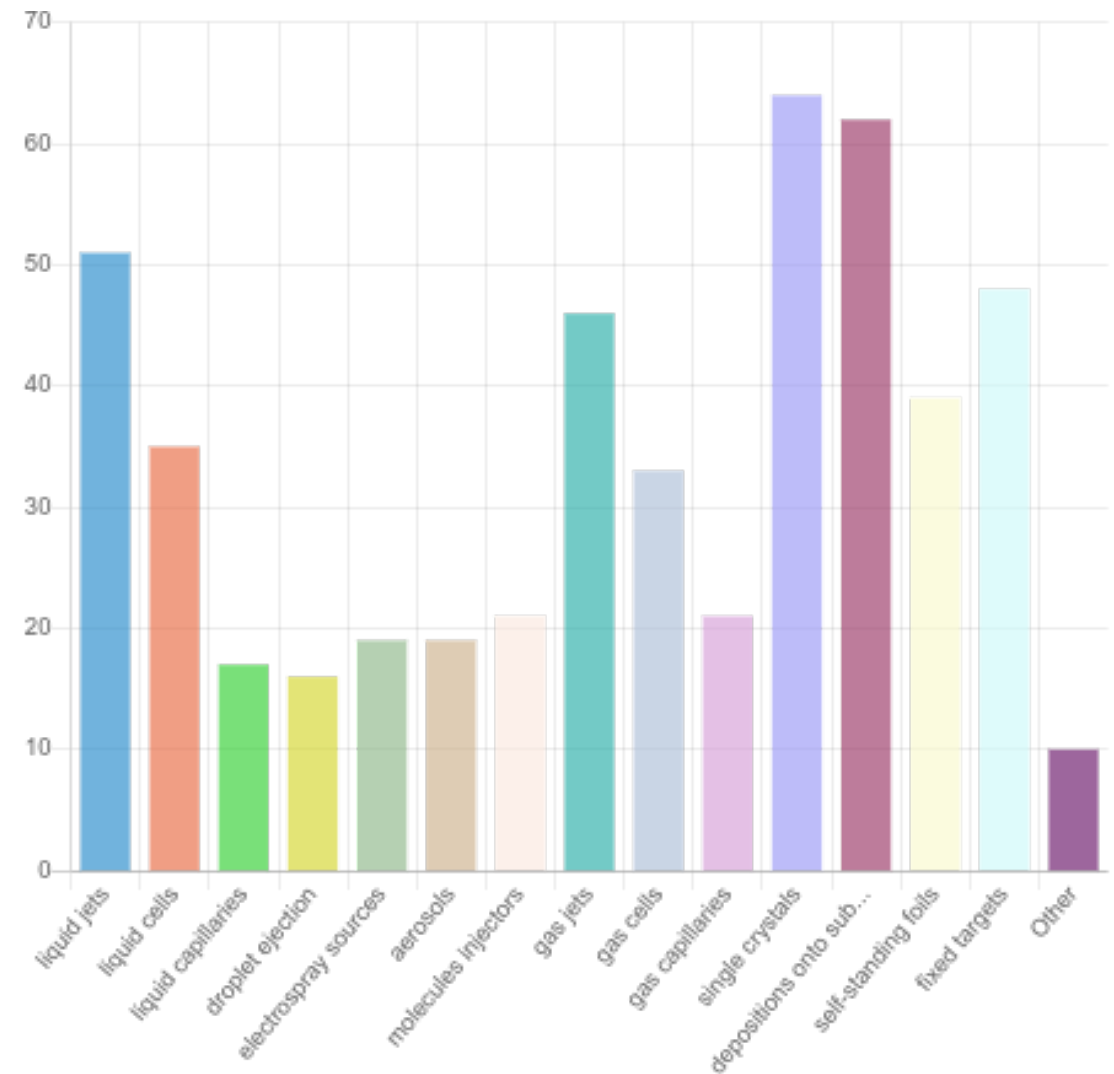
Most preferred techniques:

1. Absorption spectroscopy (66%)
2. Photoelectron spectroscopy (45%)
3. Emission spectroscopy (40%)
4. Bragg diffraction (36%)



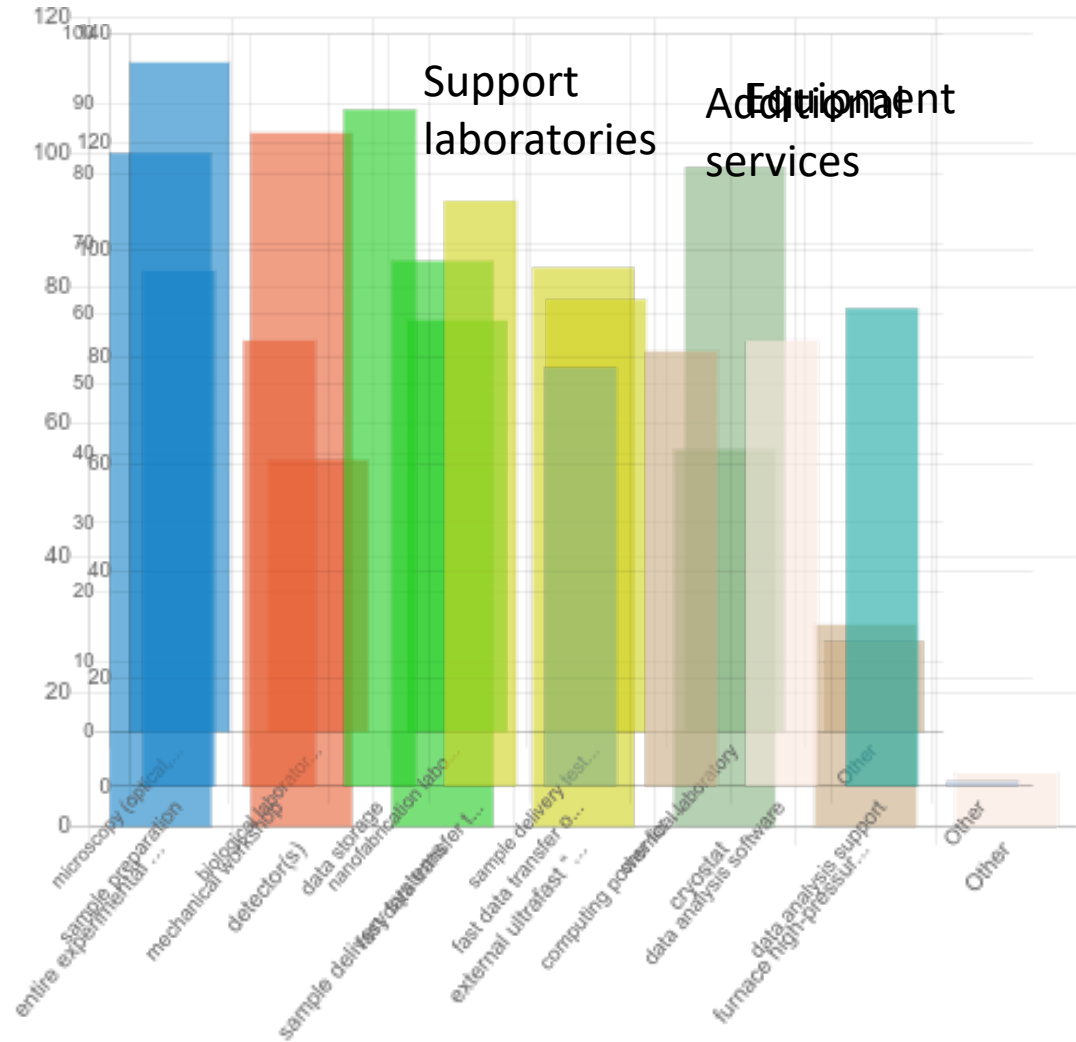
Most preferred sample delivery approach:

1. Single crystal (41%)
2. Depositions onto substrates (40%)
3. Liquid jets (33%)
4. Fixed targets (31%)
5. Gas jets (30%)
6. Self-standing foils (25%)



- Equipment to be provided by the beamline:
 - Detectors (66%)
 - Entire experimental setup (64%)

- Services
 - Support laboratories: microscopy (optical, SEM, AFM) and chemical lab are demanded
 - Additional infrastructural services: data storage and fast data transfer are particularly requested



- The results of this survey can serve as guidance for the steering committee and WP leaders. Future strategic choices might take into account the key findings from this survey. For more detailed insights, please contact the WP5 coordinators
- Expectations of the respondents:
 - Photon science in the soft x-ray range is more appealing, followed by the EUV range
 - A repetition rate of 100 Hz is considered adequate (realistically achievable)
 - Excellent beam pointing and intensity stability are highly demanded (more challenging)
 - Significant experimental support is expected
 - Data storage, analysis, and fast transfer capabilities are seen as essential services
- Although knowledge of EuPRAXIA remains limited, the scientific community seems to understand and agree with the project's aims. This represents a positive starting point for building a user community around the EuPRAXIA facilities
- EuPRAXIA should actively reach out to young scientists. The EuPRAXIA Doctoral Network is an excellent initiative to support this goal.

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