



# The X-lites Network

X-lites: Extreme Light in Intensity, Time, and Space

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# X-lites: Extreme Light in Intensity, Time, and Space

- Extreme light enables scientific research at the frontiers of high intensity fields, short time pulses, and high coherence
- A new generation of extreme light experiments are now, or will be soon, enabled by new “mid-scale” user facilities around the world
- These changes introduce opportunities for new scientific advances and research collaborations





# NSF Extreme light user facilities



**THE OHIO STATE UNIVERSITY**

**INSTITUTE FOR OPTICAL SCIENCE**

## NSF NeXUS

1 kW laser: 10 mJ at 100 kHz, pulse duration down to 10 fs.

Drive attosecond and femtosecond XUV and soft x-ray generation.



**Arizona State University**

**CXFEL: Compact X-ray Free**

**Electron Laser**

For medical imaging, making biomolecular movies, unraveling photosynthesis, chemical catalysis and attosecond physics



**THE GÉRARD MOUROU  
CENTER FOR ULTRAFAST  
OPTICAL SCIENCE  
UNIVERSITY OF MICHIGAN**



**3 PW laser: 75 J, 25 fs**  
For high-field science, particle and light sources and applications

Aspirations for:



**EP OPAL:  
Dual 25 PW**



# X-lites Network Goals



- Promote collaboration across the global community of extreme light facility **users** and **staff**
- Work together to identify knowledge and technical gaps that can be addressed through collaborative research
  - Put forward joint proposals to international sponsors
- Broaden engagement across scientific fields, geographic regions, and generations of researchers



# X-lites Stage 1: Design Project



18 months of AccelNet\* Design funding supports planning and network building

4 U.S. facilities leading this planning stage

- Ohio State University, NeXUS
- Arizona State University, CXFEL
- University of Michigan, ZEUS
- Colorado State University, IRISS

\*AccelNet is the National Science Foundation funding opportunity

Targeted Outcomes:

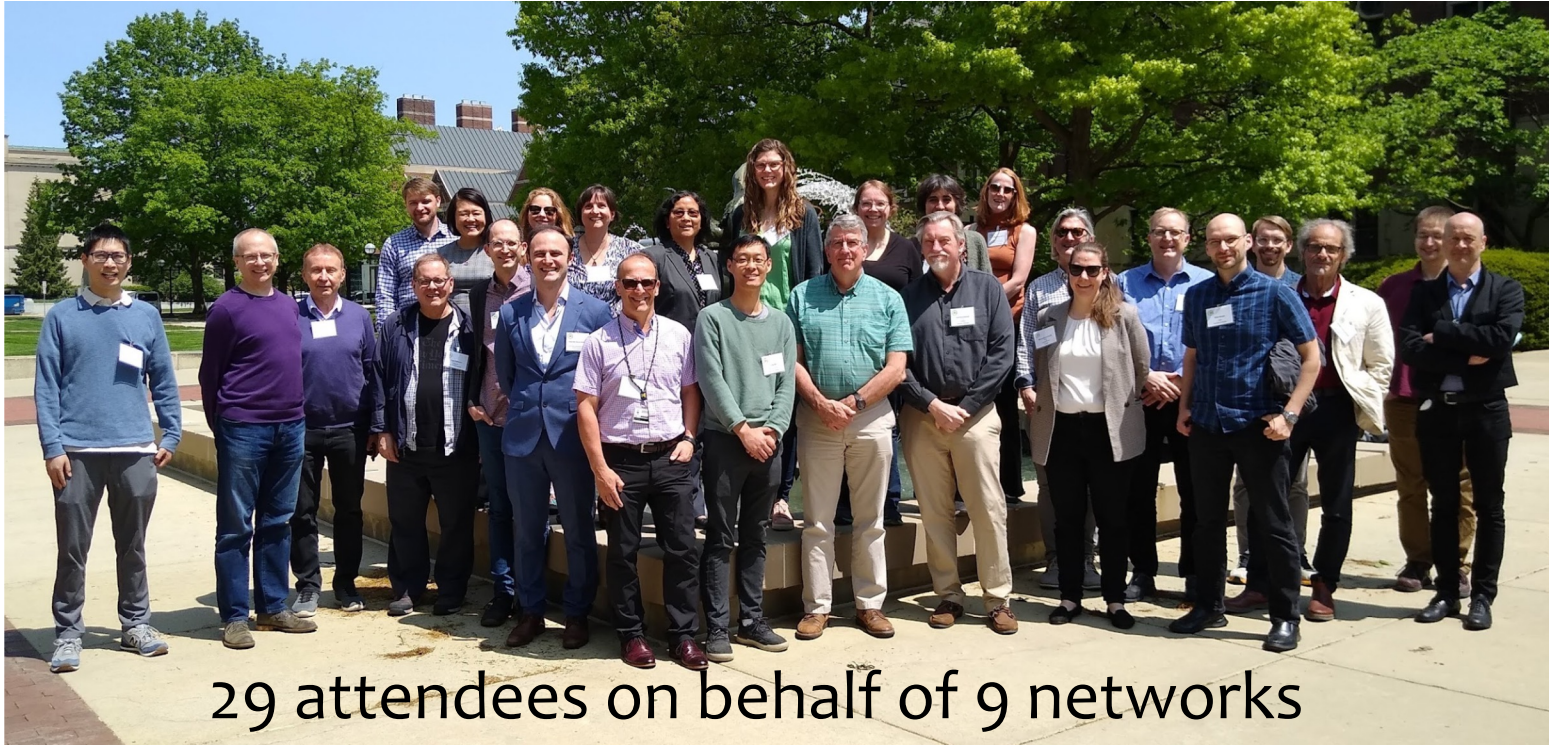
- A growing network of extreme light researchers ready to collaborate
- A network of facility staff sharing knowledge and best practices
- A report identifying science and technology gaps in extreme light that will be addressed collaboratively
- Engage with sponsors for support of collaborative research in extreme light



# X-lites Stage 1: In person workshop



May 14-16 2023, University of Michigan campus



29 attendees on behalf of 9 networks



# X-lites Stage 1: workshop objectives



- Learn from the experiences and insights of Member Networks
- Network and develop working relationships
- Develop ideas and priorities for X-lites activities
- Agree to an X-lites organizational structure
- Establish a plan to grow X-lites



- Communication: website, information/resource sharing, internal channels
- Workshops and symposia at X-lites annual conference or other professional conferences
- Short courses/summer schools on topics ranging from science to technology development to technical training for facility staff
- Personnel exchanges (researchers and facility staff)







# Prioritize activities (part 2)



- Drive discussion/coordination of a compelling, grand scientific challenge
- Share and/or develop tools, techniques, softwares, lessons learned, best practices
- Working groups on data standardization, interoperability, repository, and sharing
- Education and mentoring for students and early career: facility proposal development, career paths, job search
- Outreach to new potential users in diverse scientific fields
- Dedicate funding and effort to include underrepresented countries

# Networks eligible for X-lites membership

- Support the X-lites mission and vision
- Have at least 15 members/users from at least 5 distinct institutions
- Be organized as a not-for-profit or government entity
- Approved by Executive Committee



# X-lites Network Member



## Rights

1. Eligible for leadership of executive committee or standing committees
2. Network's members are eligible for all X-lites benefits
3. Can share relevant communications through X-lites communication channels

## Responsibilities

- A. Agree to the X-lites teaming plan
- B. Participate in at least one committee
- C. Contribute resources to support X-lites activities
- D. Share relevant X-lites communications to their members



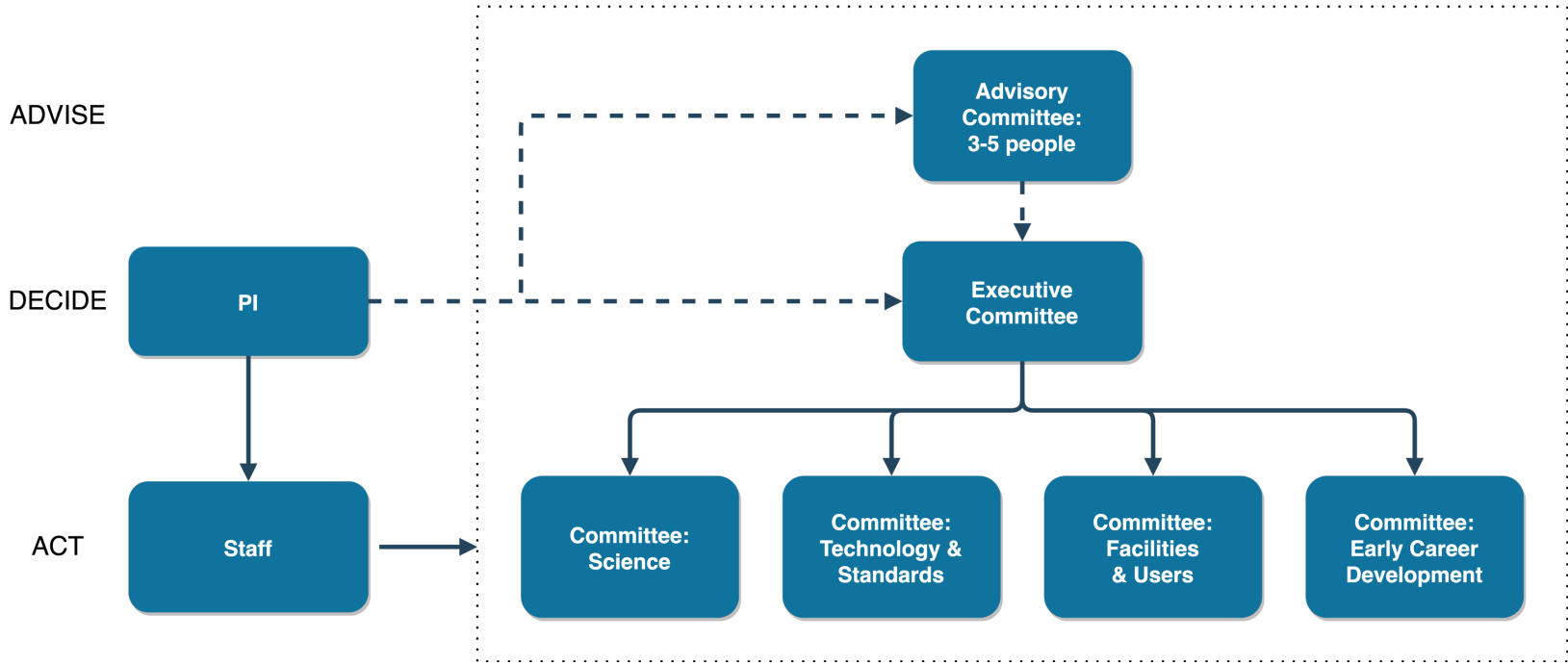
# X-lites Member Contribution Examples



- Host an event at member facility
- Host personnel exchange
- Cover staff/faculty time to support committee participation
- Share and/or create X-lites communications
- Instruct a summer school
- Share existing policies, open designs, and open software
- Support connections to sponsors, professional societies, and related networks
- Cover staff/faculty travel costs to X-lites events



# X-lites Organizational Structure





# X-lites stage 2 proposal



- Our proposal is due on December 11<sup>th</sup> 2023
- Budget up to \$1.5M to support 4 years
  - Sponsor funding will primarily support students and early career researchers and international exchanges
  - Opportunity in year 2 and 3 to acquire \$350k and support collaborative research
- Need support from international partner networks to be X-lites founding members
- If successful, the X-lites Network would begin mid-2024



# THE X-LITES NETWORK

Extreme Light in Intensity, Time, and Space



## BENEFITS

### 1. Resource Sharing

**Shared communication, software, designs, and best practices**

### 2. Working together to solve challenges

### 3. Training, workshops, and symposia

### 4. Personnel exchanges to facilities

**Support researchers and facility staff to develop skills and share knowledge**

### 5. Mentoring and training for students and early career researchers

### 6. Outreach to interested researchers in diverse fields and around the world

## GOALS

- Promote collaboration across the global community of extreme light networks
- Identify knowledge and technical gaps to be addressed through collaborative research
- Broaden engagement across scientific fields, geographic regions, and generations of researchers

**Let's Connect!**

[GO.OSU.EDU/X-LITES](http://GO.OSU.EDU/X-LITES)

Subscribe for events and updates

Join our Slack line  
<http://x-lites.slack.com>





# THE X-LITES NETWORK

Extreme Light in Intensity, Time, and Space



## ABOUT THE NETWORK

- An emerging generation of extreme light facilities enables opportunities for new scientific research and collaborations
- *X-lites* is a new network that aims to connect facilities, researchers, and research networks to accelerate scientific advances

### Our Partners:

- ZEUS at University of Michigan
- NeXUS at Ohio State University
- CXFEL at Arizona State University
- LLE at University of Rochester
- AttoChem (EU Cost Action)
- And eager to keep growing!

## FOCUS AREAS

- Scientific research opportunities enabled by extreme light
- Development of new technology and standards
- Effective facility operations & management
- Recruiting and supporting facility users
- Support of students and early career professionals

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