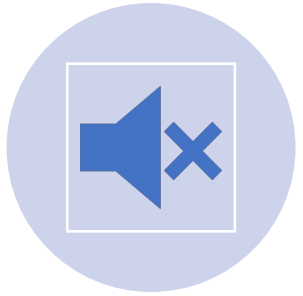
Welcome to the Photon Phun Coaches' Workshop!

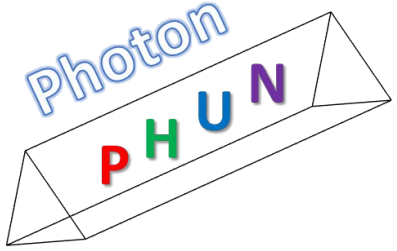
We want to know who is here!
Please introduce yourself in the chat: Name, School.



Please mute your microphone to reduce background noise.

We will leave time for a Q & A.
Please submit your questions via the Google form that will be shared in the chat.

This presentation, along with the questions and answers, will be posted on the WESO website.



Photon Phun

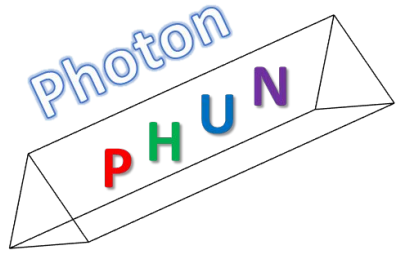
Coachs' Meeting 2025

K. Thornton, A. Shahani, E. Bernhardt, M. Thornton

wesoscience.org

Thank you for serving as an event coach and helping us bring back WESO to our community!

Agenda

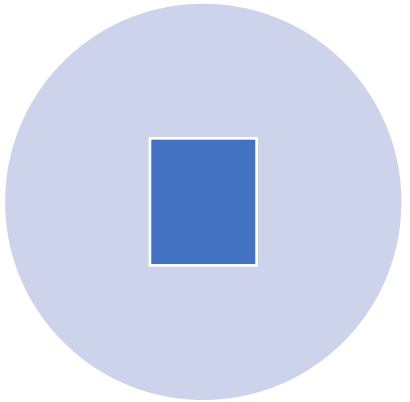


- Introductions
- Goal of the Event
- Event Details & Format
  - Overview
  - Event Concepts
  - Reflection Diagram & Reflection Relay
  - Written Quiz & Hands-On Experiments
- Scoring
- Resources
- Questions & Answers

Introductions

- Four co-supervisors: K. Thornton, A. Shahani, E. Bernhardt, M. Thornton.
- Photon Phun was a long-running event, but it was discontinued after the COVID interruption.
- This is the second year since the break.
- All of the supervisors ran this event last year.
- A few of the supervisors have experience coaching or participating in the event (many years ago).

Goals of the Event

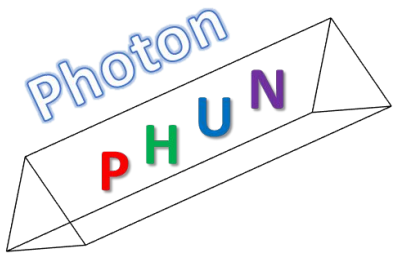


Learn about light

Teamwork

Have PHUN!

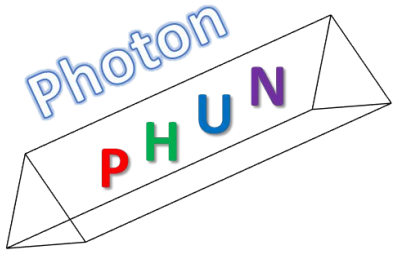
Event Details and Format



- Grades: Grades 4-5
- Team Size: 2-3 competitors
  - **<u>3 is highly recommended</u>**
  - No adjustment is made for 2 student teams
- Duration: 35 minutes
- Components of the event
  - Reflection diagram
  - Light relay
  - Written quiz
  - Hands-on experiment and questions

The detailed event description can be found at: https://wesoscience.org/events/

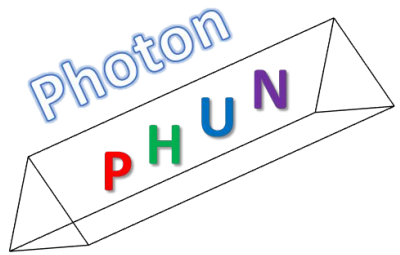
Event Concepts

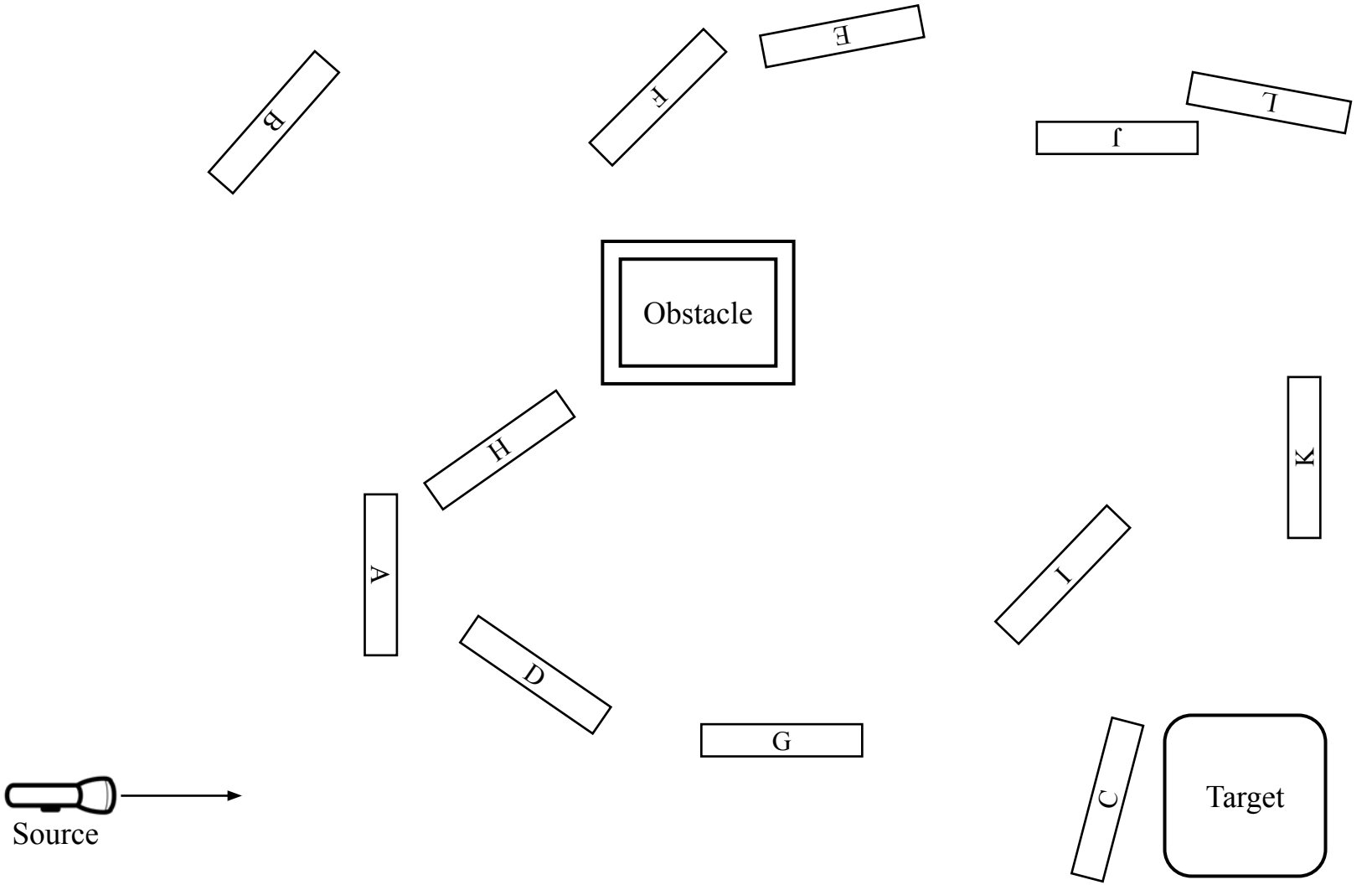


- **Colors of the rainbow** and **how a rainbow is produced.**
- The RGB and CMYK **color models**.
- Concept of items (materials) being **transparent, translucent, or opaque**.
- **Reflection** of light – angle of incidence and angle of reflection
- **Colors of light** – how white light is made, how colored light is made, **why** objects appear to be certain colors, **how** objects may look to be different colors in different lights.
- **Wave nature of light**, including their **energy**. Be able to identify a **wavelength** or **period** on a wave drawing.

- Know **values of wavelengths** of colored (visible) lights, infrared (IR), ultraviolet (UV), and the order of magnitude of wavelengths across the spectrum from radio waves to gamma rays, including X-rays.
- Know the **relationship between wavelength and frequency**.
- Understand **primary and complementary colors** of light and how they differ from pigments (i.e., **additive versus subtractive color mixing**).
- Understand **how a lens works**.
- Understand why **a prism** splits white light into different colors.

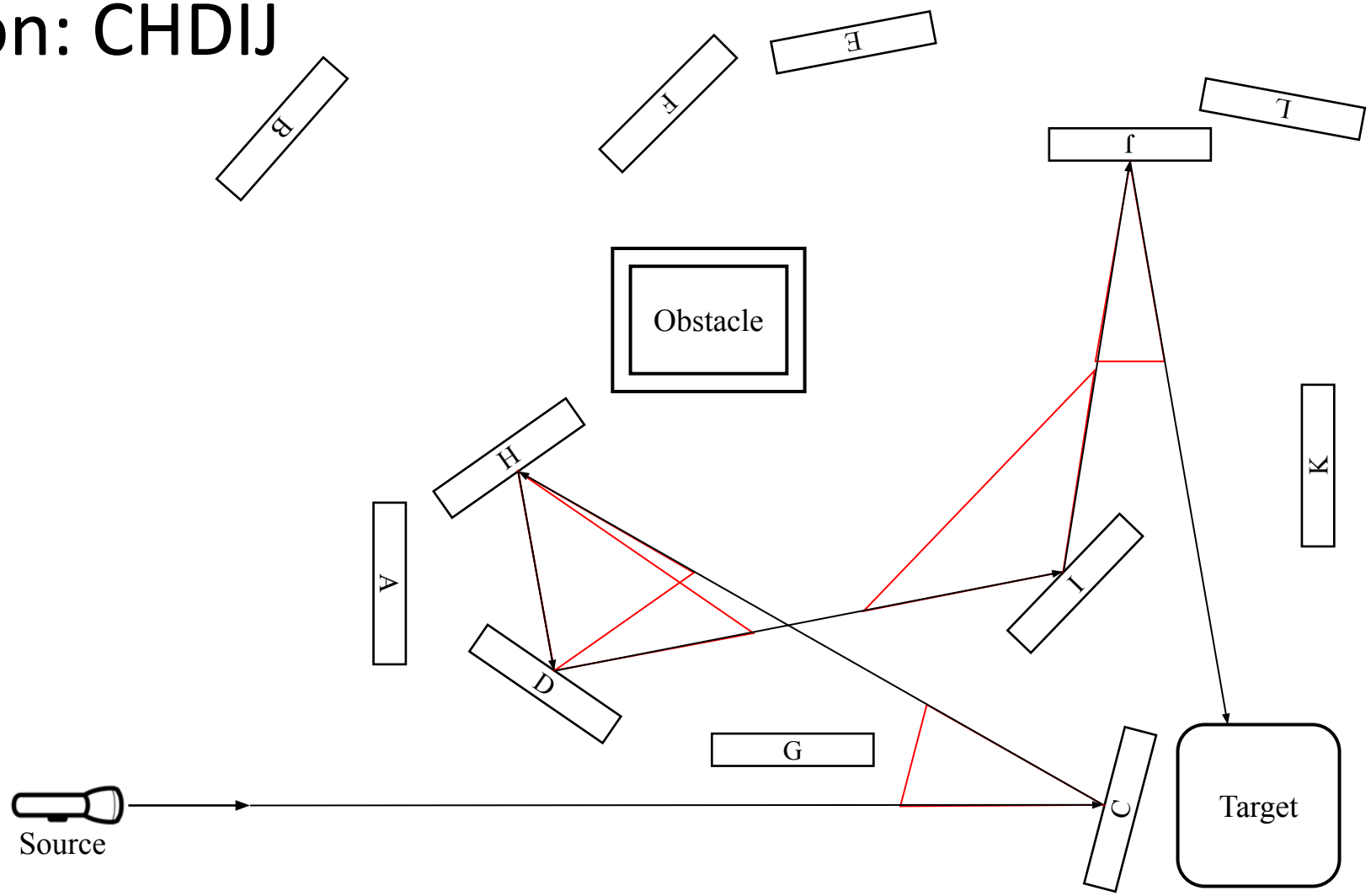
Example Reflection Diagram

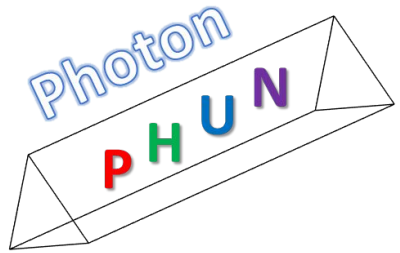




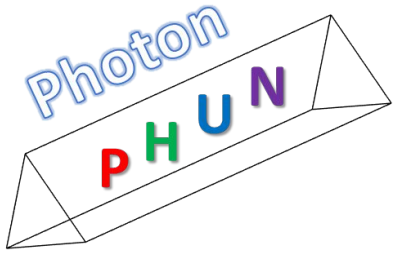
Example Reflection Diagram

Solution: CHDIJ



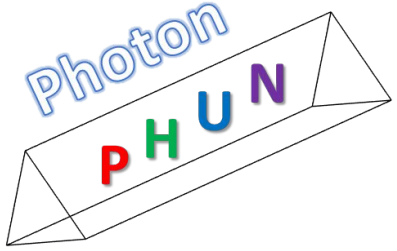


Reflection Relay



- Teams will be called into the reflection room.
- 1 min to survey the room and strategize.
- 2 min for the light relay.
- 6 targets, 10 points each target.
- Students must reflect the light three times before hitting the target (and dwell on the target for 3 seconds).
- Mirrors must be at least 2 feet away from the source and at least 1 foot away from other mirrors.
- The script will be available on the WESO site.
- After the relay is concluded, they return to their station.

Reflection Relay



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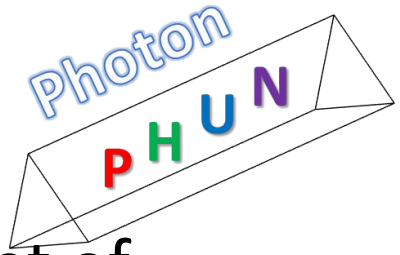
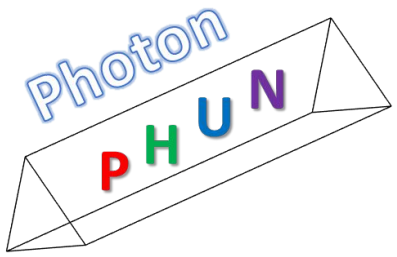
Practice is a must!
WESO will also set up one practice session

Exam Room



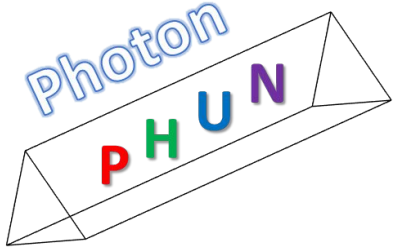
- Each team will be given a station (desk) furnished with the packet of questions (including the reflection diagram) and all materials. The materials for hands-on activities will be similar to the ones distributed by WESO. Please ensure that you receive all materials.
- Three components are
  - Reflection diagram
  - Quiz questions on the concepts
  - Questions based on hands-on experiments as well as concepts
  - In addition, we may collect the result of hands-on experiments.
- Total points for this portion is 60 points.

Scoring



- 60 points for the light relay.
- 60 points from the questions/results from the exam room.
- 120 points total.
- Tie breaker: The light relay completion time.

Resources (see the event description for details, including links)

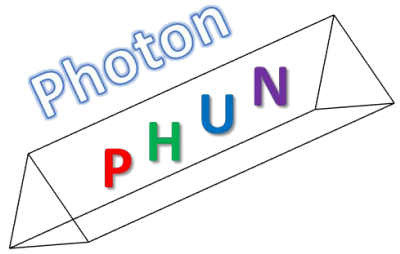


- The Usborne Internet - Linked Library of Science Light, Sound & Electricity
- Easy Genius Science Projects with Light
- Bill Nye the Science Guy: Light optics, Light and Color (DVD)
- The Ann Arbor Hands-On Museum has Light and Optics exhibits- including color, mirrors, lenses, optical illusions, just to name a few.
- Slides and worksheets from previous training sessions (next page)
- Hewitt, Paul G., Conceptual Physics – more advanced, more for coaches

If we create/find new resources, we will share on wesoscience.org

MICHIGAN ENGINEERING
THORNTON GROUP

https://thorntongroup.engin.umich.edu/outreach/



Welcome! | Group Members | Research | Publications | Outreach

Materials from 2016, 2017, and 2018

Outreach

Photon Phun Workshop at Washtenaw Elementary Science Olympi

Materials from the 2016 workshop:

Workshops

Photon Phun Slides from Workshop #1 (Introduction to Light)

Photon Phun Slides from Workshop #2 (Wave & Light Properties)

Photon Phun Reflection Worksheets

Photon Phun Slides from Workshop #3 (Refraction)

Photon Phun Slides from Workshop #4 (Color Mixing)

Materials from the 2017 workshop:

Event Description

Workshop #1 Slides (Introduction to Light)

Workshop #2 Slides (Wave & Light Properties)

Worksheets

Reflection Activity

Materials from the 2018 workshop:

Photon Phun pptx for Lecture/Demo #1

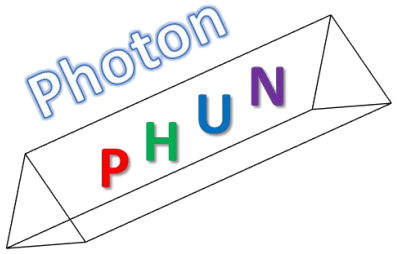
Photon Phun worksheets #1

Photon Phun pptx for Lecture/Demo #2

Photon Phun worksheet #2

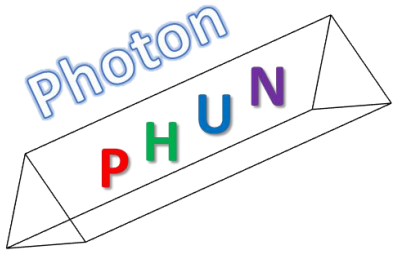
Photon Phun Lecture #4

Light Relay Tips



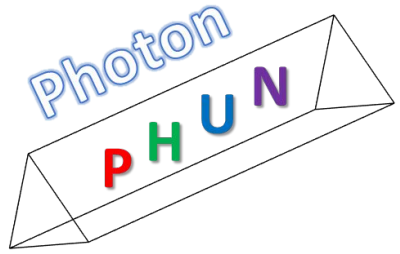
- Be careful with the flashlight/laser! They should be handled by coaches only.
- Use the lowest brightness of the flashlight that will still let them see the reflected light (given the lighting conditions).
- Being able to hold the mirror steady is very important. One option is to hold it against their torso.
- They can practice reflection initially independently, and once they get comfortable, they can start the relay.

Coaching Advice



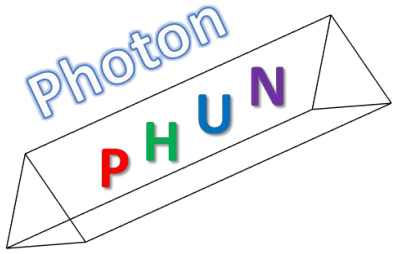
- Practice a variety of target setups.
- Experiment with the materials provided by WESO (e.g., color mixing) -- doing is more memorable than listening.
- Try the activities and worksheets from the past workshop.
- Make sure they support each other.
- Don’t over-coach your team!
- Most importantly, make it fun!

Common Questions/Answers



- Each school can only send one team of 2-3 students per grade.
- Teams can be made up of any combination of genders.
- This is not a spectator event; coaches and parents will not be able to watch their teams compete.

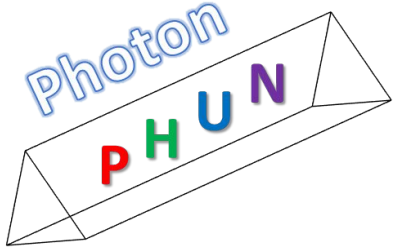
Other Coaching Questions



- When do I start having practices?
- Where do I practice?
- How often do I practice?
- What do I do if I have more kids than can compete at the event?

The answer to all of the above questions depends on you, your head coach and your individual school. WESO does not control how individual schools form their teams or conduct practices.

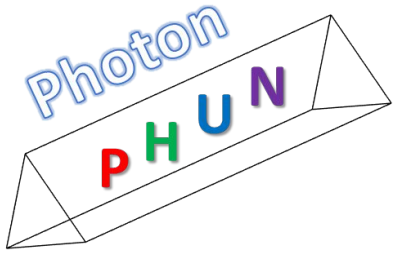
Questions After Tonight?



WESO Discord Server

- Every WESO event will have its own channel
- Join the WESO server to submit your questions in the event chat
- Event supervisors or WESO board members will monitor the discussion and answer questions
- Event coaches can use the chat to exchange coaching ideas
- Go to wesoscience.org/events/ for details on how to join the WESO server and guidelines for its use

Questions Now?



- Please submit your questions now using the Google form that was shared with you in the chat.
- We will answer live and post all questions and written answers to the website following the meeting.

Thank you again!