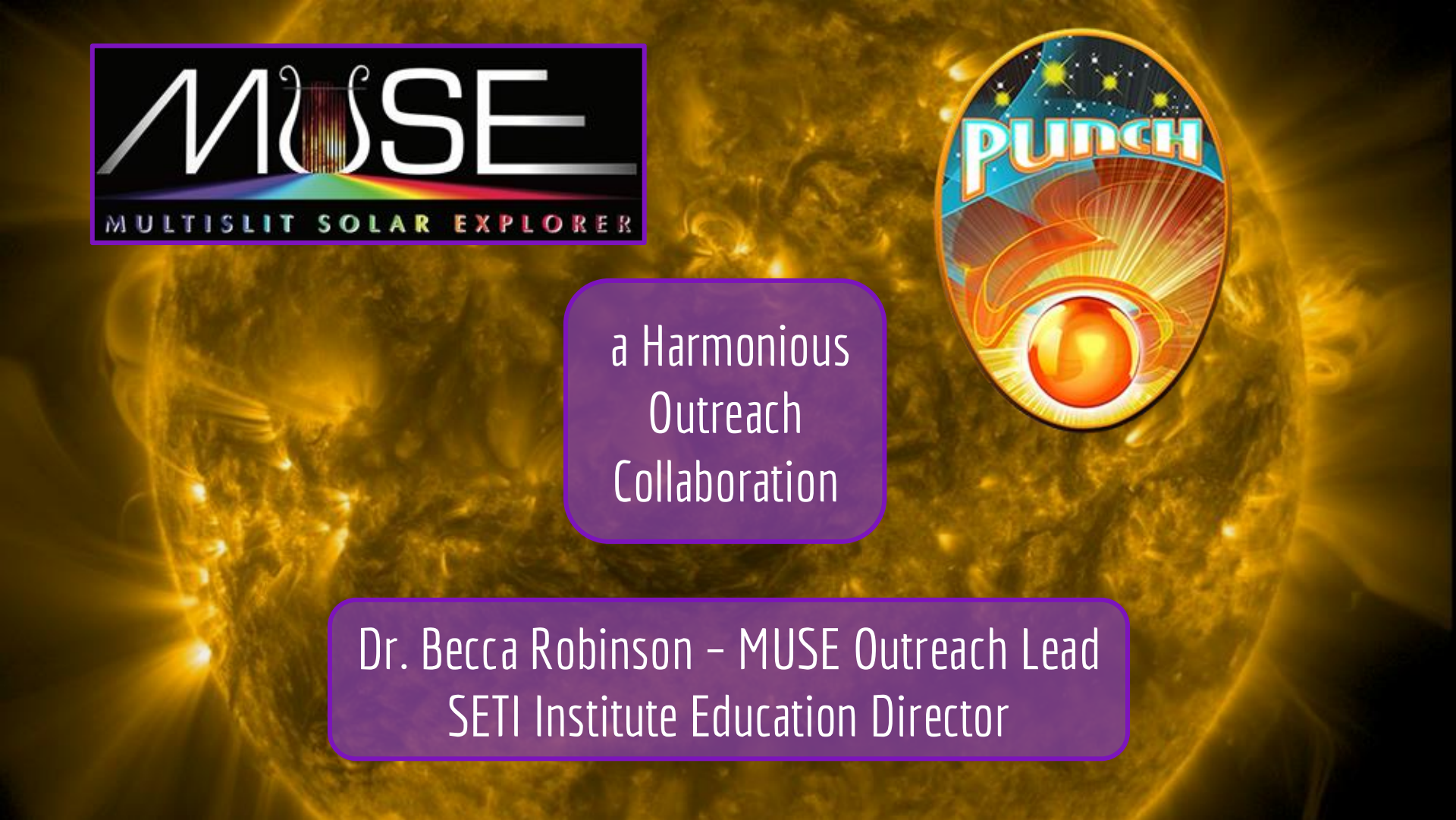

MUSE
MULTISLIT SOLAR EXPLORER
PUNCH
a Harmonious
Outreach
Collaboration
Dr. Becca Robinson – MUSE Outreach Lead
SETI Institute Education Director

“A symphony of Solar Science”

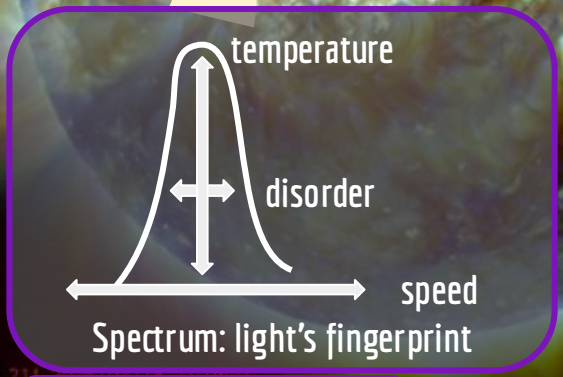
MUSE
MULTISLIT SOLAR EXPLORER

Bart De Pontieu

Extreme Ultraviolet Spectroscopy

(aka: seeing invisible sunlight)

EUV Spectroscopy: splitting extreme UV light into a *spectrum* to figure out temperature, speed, and disorder in the Sun's atmosphere



Spectrum: light's fingerprint

Solar Dynamics Observatory

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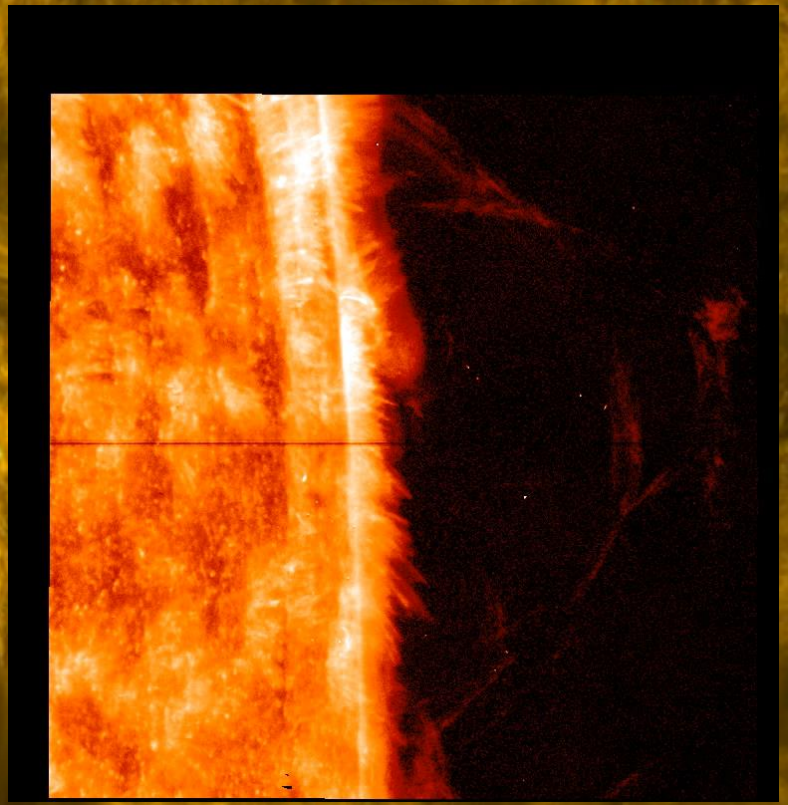
MULTISLIT SOLAR EXPLORER

How do spectrographs work?

IRIS - Interface Region Imaging Spectrograph



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Single-slit spectrograph

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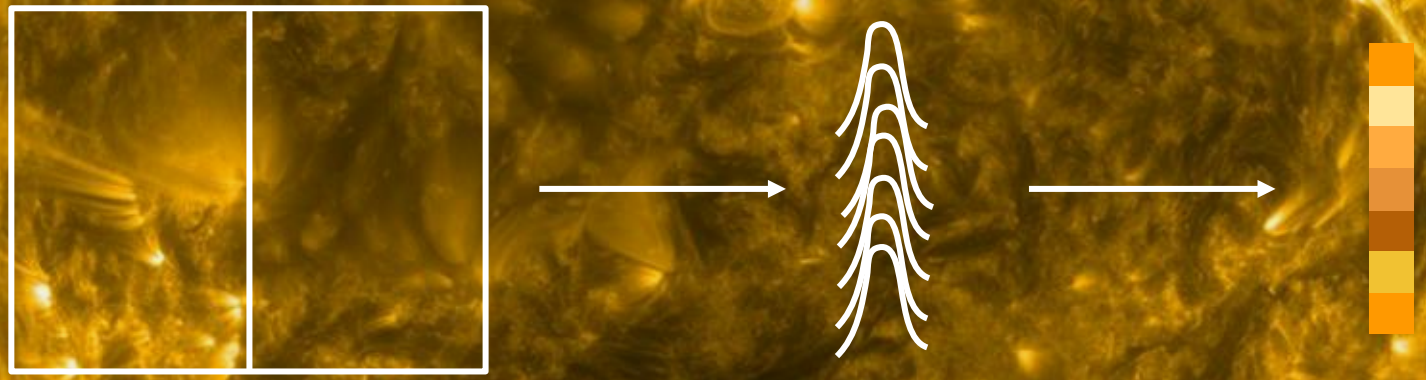

Multi-slit spectrograph

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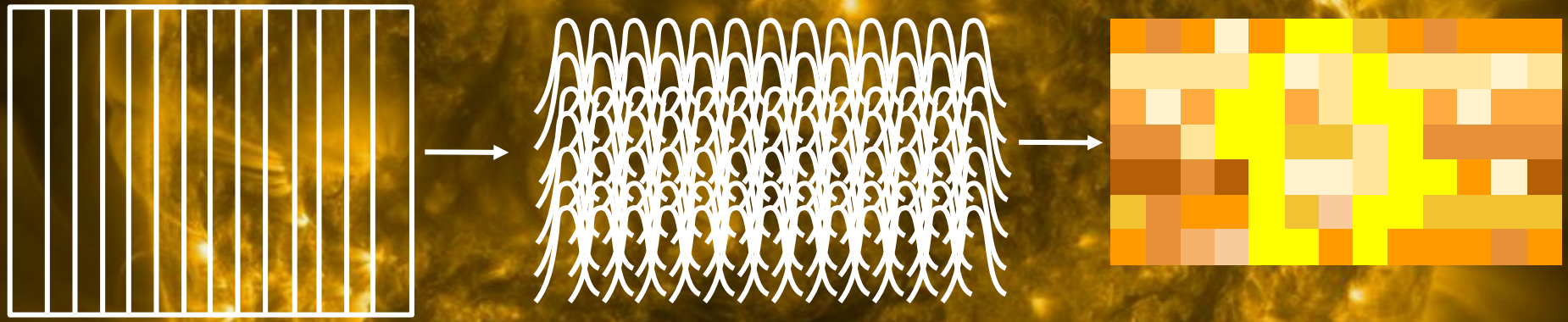


What can MUSE see?

MULTISLIT SOLAR EXPLORER

SIMULATION

MUSE SYNTH

BEST SINGLE-SLIT

DECENT SINGLE-SLIT

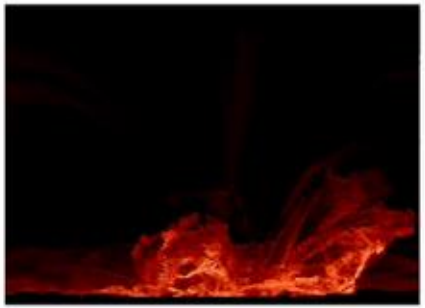
Bart De Pontieu

What can MUSE see?

MULTISLIT SOLAR EXPLORER

SIMULATION

MUSE SYNTH



BEST SINGLE-SLIT

DECENT SINGLE-SLIT

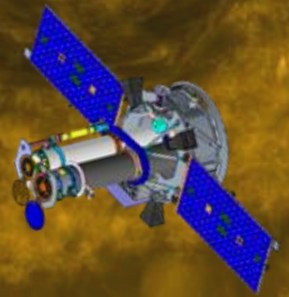
Bart De Pontieu

Outreach: Multi-slit Solar Explorer (MUSE)

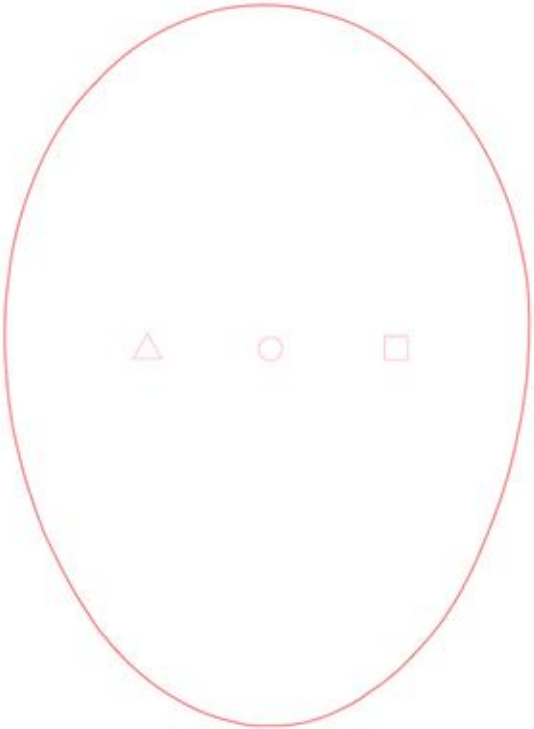
A new mission to study the Sun! Partnering with:

- ★ Chabot Space & Science Center
- ★ California Academy of Sciences
- ★ Boys & Girls Club of the Peninsula - San Leandro coming soon!

Frontiers EPO pre-report out now!



Heritage Products from PUNCH: Pinhole Projectors ready to go!



Coming Soon: Solar Eclipse 2026

ASTRO TRAILS

SWAN HELLENIC

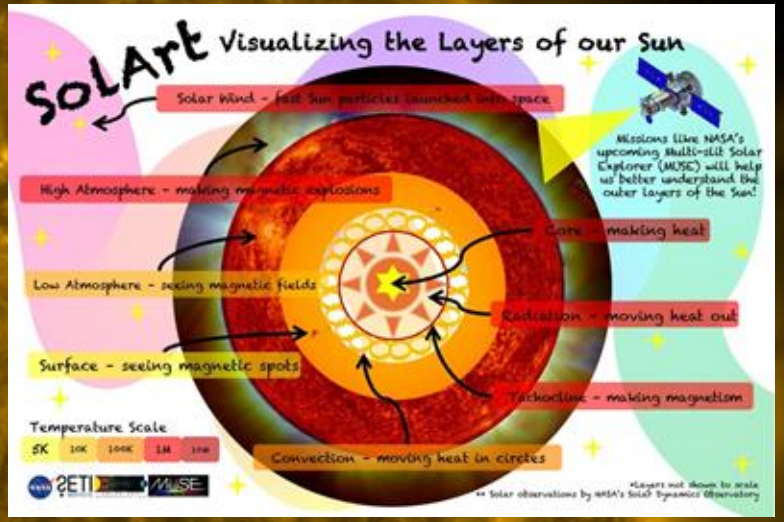
HX EXPEDITIONS

SETI INSTITUTE

Heritage Products from PUNCH: Team Cards (under construction)

First Original Product: SolArt

SaM Fontejon/Fontejon Photography, Inc.



First Original Product: SolArt

First Original Product: SolArt

SolArt - A Guide for Parents and Educators

Materials

- **Paints**: DecoArt Water Marbling Paint (DecoArt)
- **Thickener**: DecoArt Water Marbling Magic Medium Water prep (DecoArt)
- **Trays**: DecoArt Water Marbling Tray 12"x15" (Blick)
- **Mulberry Paper:** FIVEIZERO A4 Mulberry Paper Sheets (Amazon)
- **Drying Paper:** Recollections Cardstock Paper 12"x12" (Michaels)
- **Skewers:** Any ~6" skewer will do, but I have DecoArt Water Marbling Sticks (Blick)
- **SolArt Cards:** original MUSE Outreach design – contact rrobinson@seti.org for files

East Bay Montessori students enjoying SolArt

Procedure

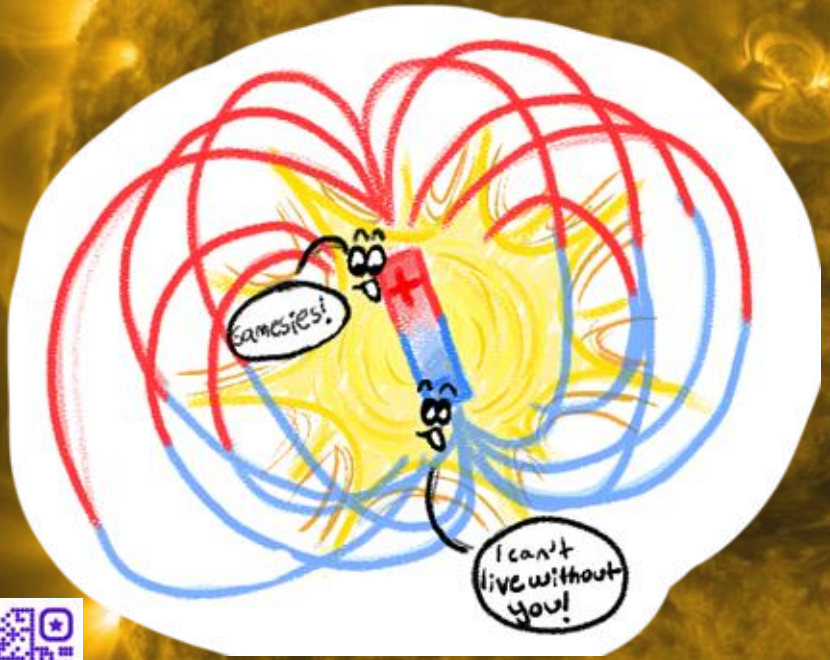
1. **Day Before:** prepare your **thickened water** according to the instructions on the thickener. I like to use gallon jugs to transport the water.
2. **Setup:** Use 2-3 **trays** per 6' table, pour ~1" **thickened water** into each one.
3. Ask each participant to label a sheet of **drying paper** with their name.
4. Ask each participant to pick two colors of **paint** and drip gentle drops of each color all over the water. Then, have them use their **skewers** to gently swirl the colors together. Say: *"This painting method works from the outside in, so we need to make the environment that our Sun lives in. This swirly paint represents the turbulent, messy plasma that is the solar wind."*
5. Ask each participant to choose one color of **paint** that will represent the outside layers of the Sun. Have them place 1-2 drops of that color right in the middle of the water. Say: *"Now, you'll make the outer atmosphere of your Sun in the middle of the solar wind."*
6. Repeat Step 5 twice more; once to represent the solar surface and once more to represent the solar interior. Explain each layer as participants come to it. Feel free to use **SolArt Cards** to reference each zone.
7. Ask participants to take their **skewer** and make the Sun's "rays" by dragging their **skewer** from their solar interior layer to the solar wind background. Say: *"Now, take your stick and pull the energy out from the inside out, making as many sun rays as you'd like all around your Sun."*
8. When the participants are satisfied with their Sun, gently place the **mulberry paper** on top of their design. Place the participant's **drying paper** between you and the tray. Then, grab the two nearest corners of the **mulberry paper** and gently drag it out of the water, carefully setting it onto the **drying paper**.
9. Set the art aside for at least 30 minutes to dry.
10. Distribute the **SolArt Cards** for more information on the Sun's layers and NASA's MUSE mission

SolArt

Boys & Girls Club Internship

Boys & Girls Club Internship

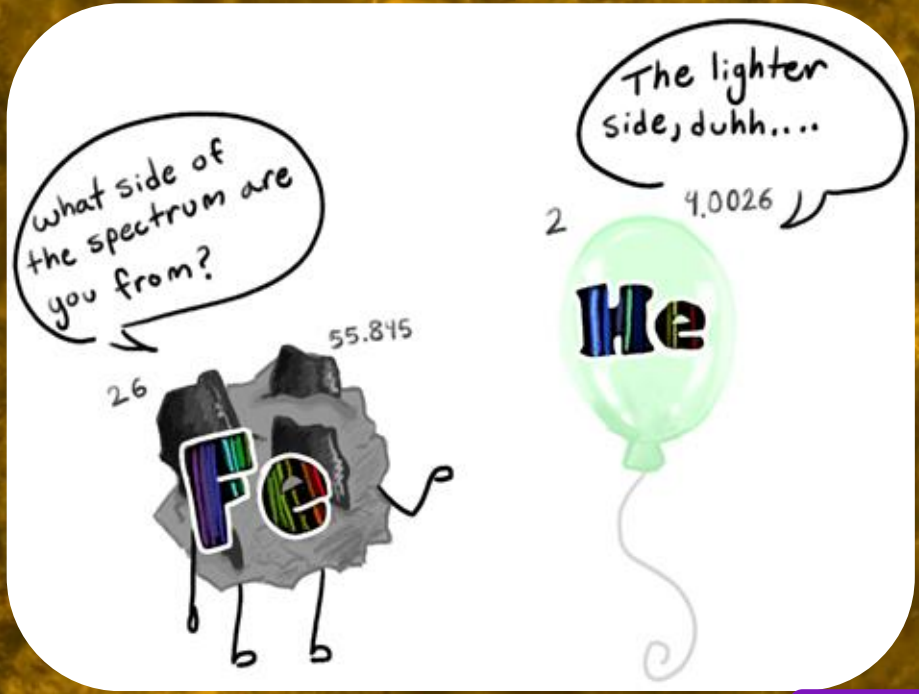
MUSE Outreach Themes: Magnetic Fields



Angel K - Boys & Girls Club Intern 2025

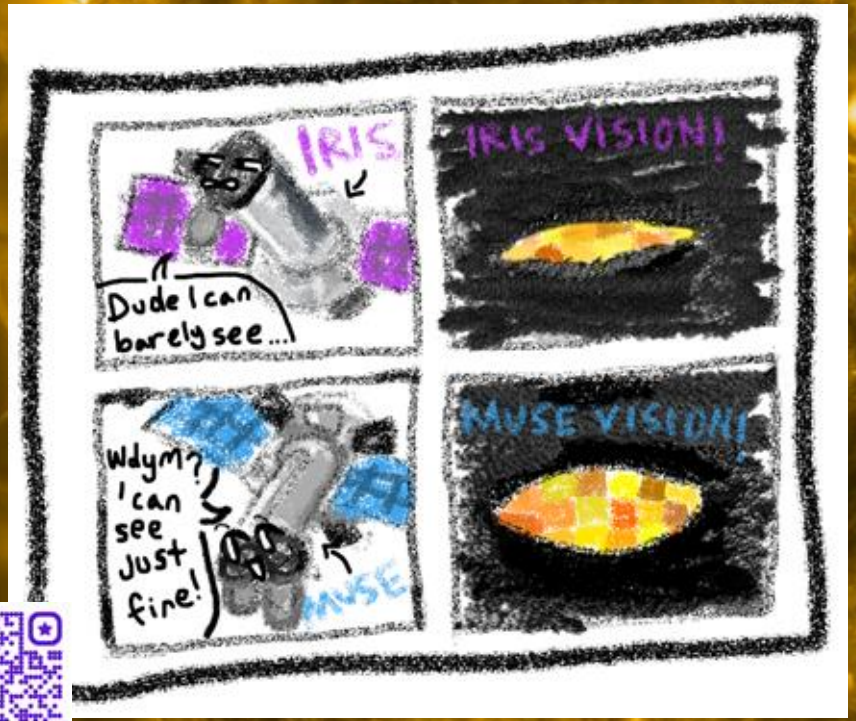
Danny P - Boys & Girls Club Intern 2025

MUSE Outreach Themes: Spectroscopy



Angel K - Boys & Girls Club Intern 2025

MUSE Outreach Themes: Tech & Innovation

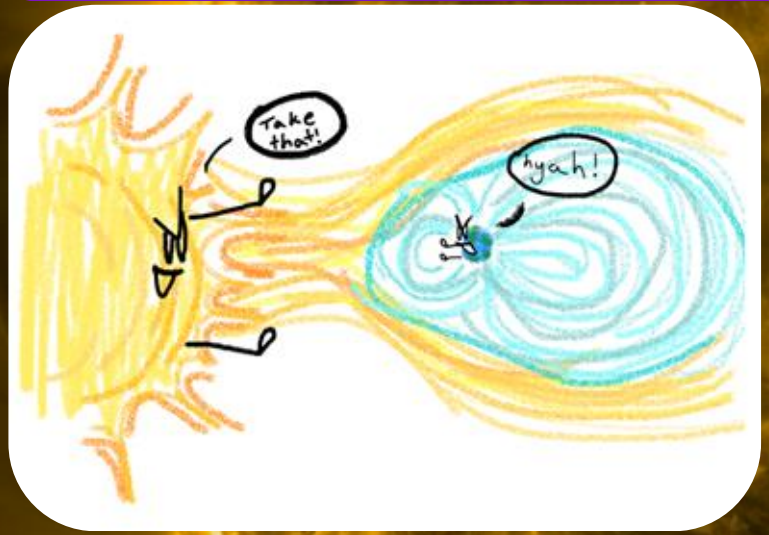


Angel K - Boys & Girls Club Intern 2025

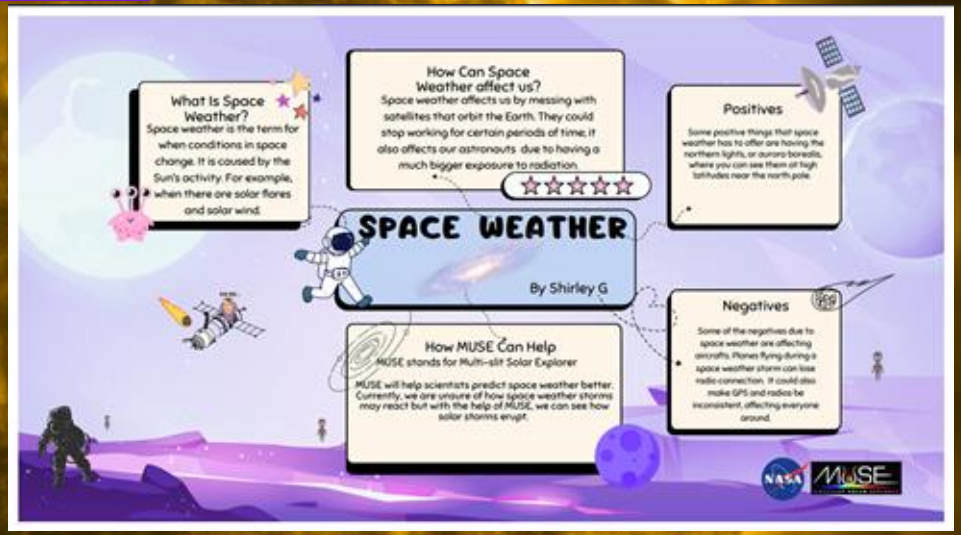
What else is a better conversation starter than some wearable envy? Our Boys & Girls Club intern Emili D thought terms like *dopplergram* and *convective zone* would be sure to turn heads. Enjoy your Team MUSE swag!

Emili D - Boys & Girls Club Intern 2025

MUSE Outreach Themes: Space Weather

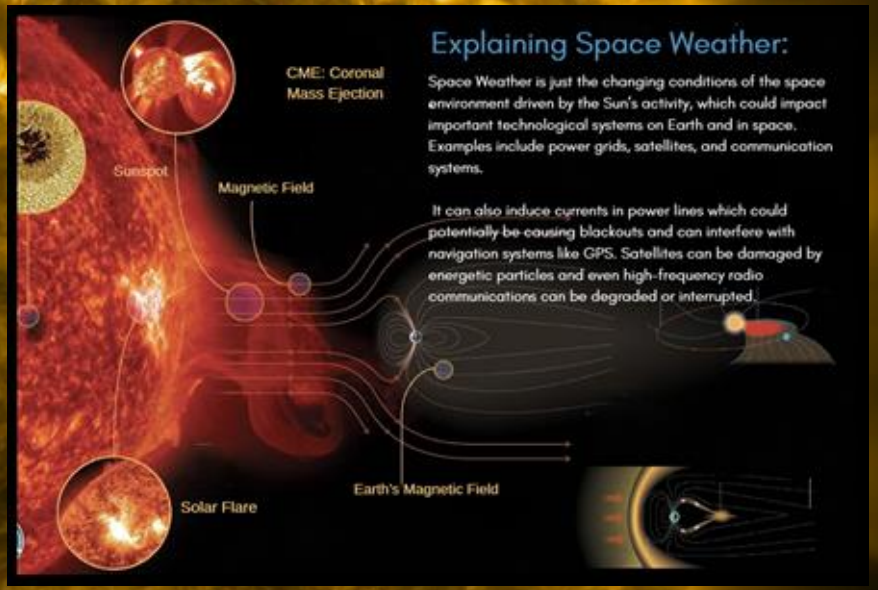


Angel K - Boys & Girls Club Intern 2025



Shirley G - Boys & Girls Club Intern 2025

MUSE Outreach Themes: Space Weather



Elvis D - Boys & Girls Club Intern 2025

Second Original Product: MUSE Board Game

MUSE Board Game @ Death Valley Dark Sky Fest

MUSE Board Game feat. PUNCH!

Did you know?

NASA's MUSE mission isn't the only NASA satellite studying the Sun! Here are a few other missions in NASA's Heliophysics fleet:

NASA's Interface Region Imaging Spectrograph (IRIS) observes the dynamic Chromosphere

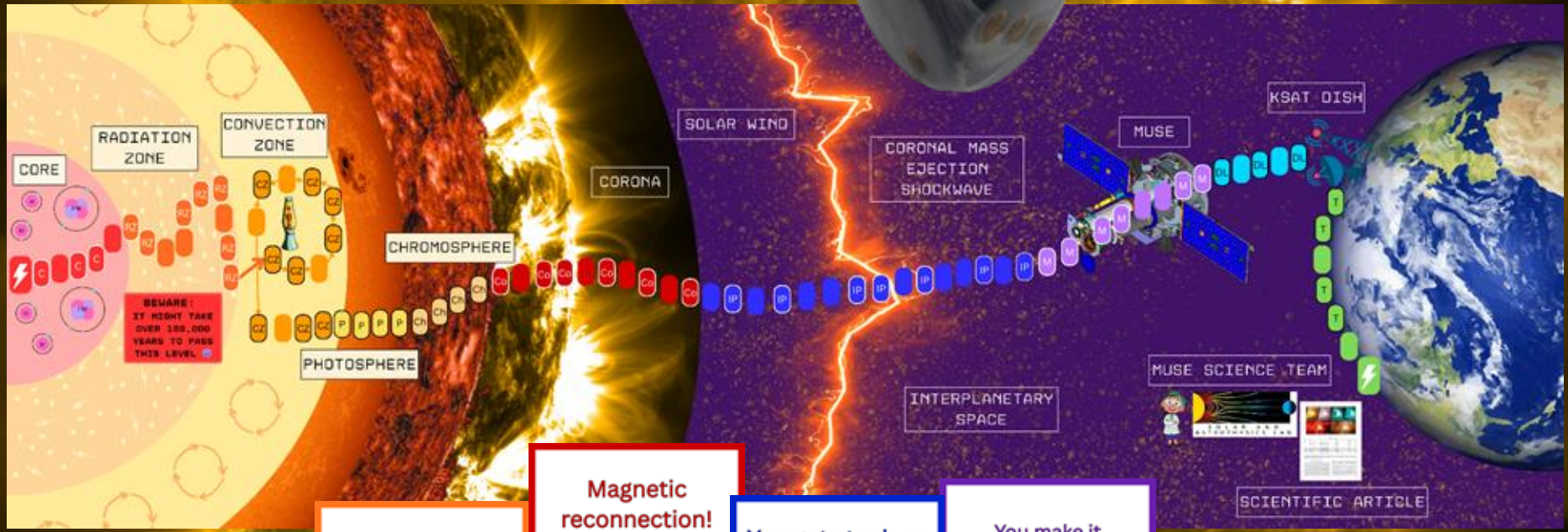
NASA's Solar Dynamics Observatory (SDO) observes the entire Sun from Photosphere to Corona

NASA's Parker Solar Probe (PSP) is in orbit around the Sun, flying through the Solar Wind to give us direct observations

NASA's Polarimeter to UNify the Corona and Heliosphere uses four suitcase-sized spacecraft to study the details of the Solar Wind

ESA/NASA's Solar Orbiter is orbiting the Sun and is the first spacecraft to look at the Sun's poles

You're invited to play!



You collide with another particle and get a boost! Advance 2 steps.

Magnetic reconnection! Bring the closest player to your position.

You get stuck on a huge magnetic loop! Go back to the last Corona "Co."

You make it through the slit mask and diffraction grating! Advance 1 step.


MUSE
MULTISLIT SOLAR EXPLORER