

AFRL

NEW MEXICO STEM OUTREACH

Inspiring Future Scientists and Engineers

Remember, Mission to Mars Link-Up Day is 25 April 2024!

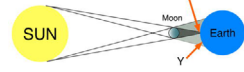
Star Date: Apr 2024
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AFRL NM STEM ACADEMY



The Rocket Report

Eclipse Eclipsed by STEM



following right behind it like the moon chasing the sun.

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In partnership with:



Collaborator:



Remember, Teachers:
It's never too early to make bussing arrangements for our classes and events!



I didn't know eagles even *had* lips, but all day long on 8 April 2024, people kept telling me it was "Eagle Lips Day!" Then again, those same people kept assuring me that the best way to survive an *ellipse* is to be sure to drink your *Ovaltine*.

8 April 2024 was the day the moon *eclipsed* the sun, coming *between* Earth and the sun, casting its shadow across the US in a "path of totality" in which the sun would appear completely covered, briefly, by the

moon. New Mexico wasn't in the totality path, but our TECH Mission students still enjoyed going outside during lunch break that day and observing the *partial* eclipse through special solar eclipse sunglasses, and on our *Sunspotter* tool, while some of our staff traveled to Texas and Arkansas to experience the full effect.

Meanwhile, STEM is eclipsing *everything* this month; we already had our egg-citing STEM Symposium, and the 30th Anniversary Mars STARS Mission Link-Up Day is

CNM Research Challenge

Fourth/fifth grade science fair participants visited our Central New Mexico STEM Research Challenge Science Fair event at the NM State Fair EXPO Fairgrounds on 22 March 2024!

Students rotated through four stations: A cool cryogenic demonstration of flash-frozen marshmallows, flowers, and other items; a STEM-leveraged beanbag and virtual demonstration of the *force* needed to balance a *load* of various distances from a *fulcrum*; a dynamic display of static electricity using a Van de Graaff generator and other

static electricity-producing tools; and a straw rocket *precision vs. accuracy* experiment.



Scouts Aviate

Boy Scouts from BSA troop 85, on Kirtland AFB for 70 years, came to our facility on 8 April 2024 to earn their aviation merit badge.

They experimented with using Bernoulli's Principle to make ping pong balls jump from one cup to another, and to fill Bernoulli Bags with air. Then they flew a virtual Cessna on our Flight Sim computers!



Symposium Egg-clipse

What's *that* blocking out the sun?! That's no moon, Obi Wan Kenobi... that's an *egg!*

On 11 April 2024, 30 high school teams from five schools—AIMS, Atrisco Heritage, Century HS, LADE, and Sandia Prep—competed in the STEM Challenge Mission's culminating event...

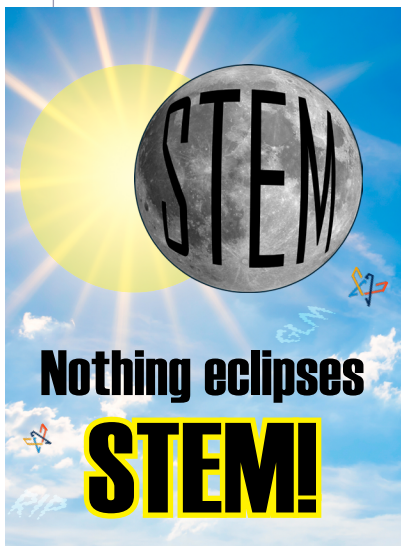
The **STEM Challenge Symposium!**

The goal: Using a remotely triggered launching device, safely launch an egg payload through a hula hoop and land on a target 30 feet away.

At the Symposium, student teams competed in a quiz bowl to test



Continued on page 3





Mission to Mars

For Fifth Graders

Mars Safeguarding Through Asteroid Redirection Spacecraft (STARS) Mission 2023-2024



Notice: Video coverage and photos will be taken during the Link-Up Day event.

Please be aware—some participants and visitors may object to having their picture taken.

Mars Invitational

Going to the **Link-Up Day event** on **25 April 2024**!

Mars teachers should have received **invitations** and communications including a map and instructions for student drop-off on the day of the Link-Up Day event.



Media Coverage/ Pictures

Attending this year in person? Note: There may be lots of paparazzi and media at the Mission to Mars Link-Up Day event.

Mars teachers check in at the Media Release Table and turn in any additional paper Media Release forms they have, besides those filled out online in advance, before proceeding to the Docking Station (Registration).



“Please, No Pictures!” badges will be worn by those who do not turn in a form, or indicate “consent denied.” Respect the badge, please, photographers.

Not Yet, Anyway



Uber Eats is a great phone app. I mean, food delivered right to your door! What could be better than that? Only problem: Mars is not on their delivery route. Teachers and students must eat the nutritious lunch they prepared in advance.

Just No

Students should not run, jump over or go behind tunnels after construction is complete, or unplug fan power cords as pranks. Teachers, remind students in advance—loyal astronauts should be on a serious mission to colonize the Red Planet.



Link-Up Day Date/Site

Date	Site	Habitats	Anniversary
25 April 2024	Albuquerque Conv. Ctr.	75	30th

Almost Thirty

The 30th Anniversary Link-Up Day event is almost here!

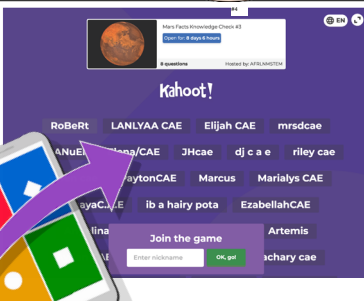


Your **commitment** to this mission is crucial to its success

Kahoot! Koncludes

As of 12 April 2024, the Mars Challenge Kahoot! games have concluded!

Thanks, participants, for Kahooting with us (www.afrlnm.com/stem/mis-sions/mission-to-mars/mars-kahoot-games/)! It's been a *hoot*!



Pack Up

Mars can get chilly! Besides heat, remember to pack these items, Habitat Directors, so your crew's not left out in the cold on Link-Up Day:

- **Pre-Cut/Fabricated Plastic Habitat Pieces**
Front Wall with the Airlock (Door Panel) attached,
Back wall with fan tunnel attached,
 Two **side walls** with connecting tunnels attached,
A floor, and a **ceiling**.
- **Life Support System Model**
 You'll need this to do your

Technical Briefing—and to survive on Mars! Temperature being one of eight possible systems, by the way.



Link-Up Day Lunch

Without Lunch on Mars, the *look* students might give you could be rather *icy*.

Other Items

For a complete list, see the **Manifest List** in the Link-Up Day Guide.



TECH Mission

For Middle Schoolers

Technology and Engineering Challenges—Rocketry and Satellites Missions

Light, Lenses, and Little Sensors

The future's so bright, I've got to wear shades...and it's not because of the eclipse!

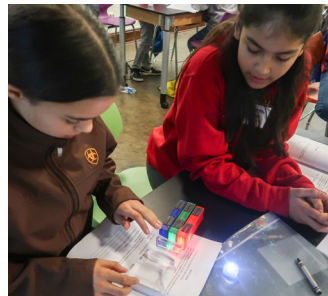
Students in Spring TECH Mission Day 2 study light, lenses, color, and little micro:bit sensors.

First, they get light on their feet

with the help of lightboxes and lenses. Light likes to travel in a straight line, unless it encounters an object like a lens, which can deflect the lines' course.

Students get to explore chocolate-flavored STEM when they try to sort M&Ms by color...under colored light.

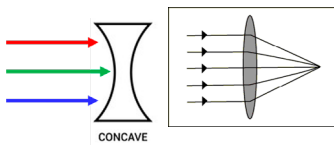
Upon reflection, they discover it gets *harder* to sort the multicolored M&Ms under colored light, because our eyes are merely light



sensors in our heads, and they only process the color wavelengths of light that *reflect* off the delicious candy-coated shells.

Satellites and micro:bit micro-controllers also have sensors in them. Students program their micro:bit to use its sensors to determine functions such as what

orientation it currently is in space, whether it's being shaken, and what the temperature and light levels are around it.



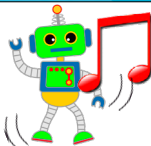
Prior to the first session, we will ask you for the name, driver's license number/state of issue, date of birth, and the **FULL Social Security Number**, of every adult coming through the base gate for that series of classes.





Robotics Challenge For Middle Schoolers

Module 4—Expo Readiness



The Robotics Expo is **10 May 2024**, and the following teams are in the Top 30 based on points earned, and thus qualify for this year's Expo:

Albuquerque Academy: The Coders, Espresso, Ohio Programmers

Albuquerque School of Excellence: Billy.B.Bobs, Diamond Hackers, Monkeys

Canon Christian Academy: The Crusty Crabbers, The Muppets, S:K:A:N, Z.N.M.

Christ Lutheran School: The Cardigans, The Ducks, The Illusions, Little Mermaids

Desert Willow Family School: Jellybeans 2.0

Homeschool: Bazo Bots

Jefferson Middle School: Firewall, PUR PEEPS

Piñon Elementary School: RoboEagles1, RoboEagles2, RoboEagles3, RoboEagles4, RoboEagles5

Ruidoso Middle School: Larry Land

St. Mary's School Belen: The Cheshires, Holy Cows, Lotaburgers, MBD's Treehouse, Mountain Dew Mocking Birds, One Hit Wonders

Whether your team qualified for the Expo or not, the students learned so much about robotics and coding, and WE ARE PROUD OF THEM!

Module 4 breaks the Expo preparation into four tasks:

Team Logo

Robotics Challenge teams design a logo that demonstrates their understanding of robotics and represents the members of the team in some way.

Pageant Photo

It's a beauty pageant for robots! Student teams dress their robot up in a flashy outfit, and take a picture to upload to the Canvas program. Provided we can still tell there's a robot under there somewhere...

Student team Robotics Pageant submissions will be voted on by a jury of their peers at the Expo.

Dance Fever

Student teams create and film a dance routine for their robot, including musical accompaniment, lasting between 2-4 minutes.

The robotic dance routine should include: At least one 360 degree turn, forward motion, backward motion, lights, sound, sensors and props (optional).

Quiz Question

Student teams create a four-option multiple choice Robotics Challenge question to be used at the Expo in the *cyber:owl*.

Now, on to the Expo! Questions? Suggestions? Don't dance around the issue! Contact caitlin.everhart@afri.newmexico.com!



STEM Challenge For High Schoolers

Symposium Egg-clipse

Continued from page 1

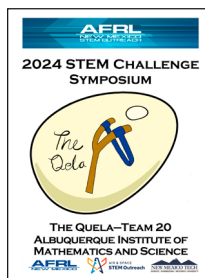
their STEM knowledge, interviewed about their preparations with AFRL mentors, tried their hand at new on-site Angle and Angle/Speed Challenges where they tried to fire projectile balls into buckets, and showed off their egg launching skills in the Performance section!

Congratulations to AIMS Team 20, The Quela, who won the *Knowledge is Power* award;

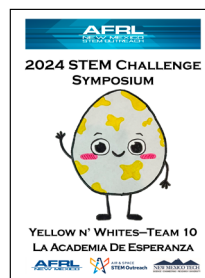
LADE Team 10, Yellow n' Whites, who won the *Precise Performance* award; and AIMS Team 26, The Mongirls, who won the prestigious *Golden Egg* award!



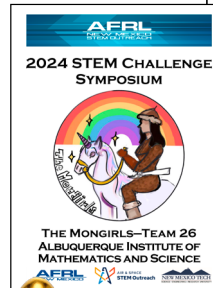
The Winners!



Knowledge is Power Award



Precise Performance Award



Golden Egg Award



DoD STARBASE NM For Fifth Graders



Technology, Chemistry

Every day in the 20th anniversary year of DoD STARBASE NM eclipses every *other* day with STEM, and Days 3 and 4 prove it!

It gets kind of dark during an eclipse, which might explain why space dog Astro got lost in space. Day 3 students program rolling LEGO® robots to help find Astro.

Students use Onshape® 3D CAD software to design a *gyrosphere*.

They *code the road* with color codes, so a rolling Ozobot® robot can help



Chemists for the day, studying *physical* changes in which a material has a new appearance, or *state*, but the same substance, and *chemical* changes, in which a substance is transformed into a *different* one.

Students explore physical and chemical changes with activities such as an *interactive cryogenics demonstration* using liquid nitrogen to flash-freeze things, and making *elephant toothpaste* to prevent big elephant-sized cavities.

Darwin the Space Dog find his friends, space pets Hertz the Hamster, Bernoulli the Bunny, and Curie the Cat.

In Day 4, students transform into

Prior to the first session, we will ask you for the name, driver's license number/state of issue, date of birth, and the FULL Social Security Number, of every adult coming through the base gate for that series of classes.



AFRL NEW MEXICO STEM OUTREACH

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Mr. Steve Burke, Technical Writer.

Important Terms and Acronyms

AF: Air Force

AFB: Air Force Base

AFRL: Air Force Research Laboratory

AFRL NM: AFRL New Mexico (AFRL/RD and AFRL/RV), on KAFB

AFRL/RD: The Directed Energy Directorate of the AFRL

AFRL/RV: The Space Vehicles Directorate of the AFRL

DoD: Department of Defense

KAFB: Kirtland Air Force Base, Albuquerque, NM

MM: Mission to Mars

S&Es: Scientists and Engineers

STARS: Mars Safeguarding Through Asteroid Redirection Spacecraft Mission 2023-2024

STEM: Science, Technology, Engineering, and Math

TECH: Technology and Engineering Challenges

USAF: United States Air Force

USSF: United States Space Force

Remember, Teachers:
Get those EPA
Modification forms in!



DoD STARBASE NM (continued)

Advance Qualifiers

Our launches are done; we're just waiting to see if any of our teams' scores qualified for the national [American Rocketry Challenge](#) (ARC).

We had some good scores, too, so...fingers crossed!



STEM Bytes

Summer Fly By

Want to make summer fly by? Here's how.

The [local chapter of the Tuskegee Airmen, Inc. \(TAI\)](#) is hosting their annual [Aviation Camp](#) and [Space Camp](#), 3-7 June and 18-28 June, respectively.

The General "Fig" Newton Aviation Camp is a five-day camp engaging students in an aviation "Ground



School," flight simulator training, aviation career tours, and physical interaction with actual aircraft. It also helps students form deep aviation community partnerships.



Or, girls can still join the waitlist for [STEM Santa Fe's](#) popular [Aviation and Aerospace for Girls](#) camp.

Held 3-7 June 2024, for rising 7th-12th grade girls, it features hands-on activities, demonstrations, and presentations by aviation professionals.

AF Earth Day

Elementary students: Why are weather and climate important to the Air Force?



Find out at a half-hour virtual presentation on **Earth Day**, 22 April 2024, at 11:00 am MST.

Register free at www.dafstem.us.

STEMtoSky

STEMtoSky is designed to facilitate virtual connections between Air Force Airmen and K-12 classrooms. This year's event will take place from 6-24 May 2024.

To register your classroom, visit www.dafstem.us.



Margaret/Moon

Not to be eclipsed by the moon-landing men of Apollo 11, don't forget the woman whose code made it possible: *Margaret Hamilton*.



Dean Robbins even wrote a book about it. See www.deanrobbins.net/.

Laser Math

There's enough laser and math news here to block out the sun!



- Mathematician Michel Talagrand recently won math's Abel Prize for his advances in describing and predicting the universe's [randomness](#).

- [Researchers](#) recently discovered genetic mutations in biology follow a self-repeating fractal pattern called a [Blancmange curve](#), and now you know that math is important, and all evolution is based on French pudding.

- Scientists recently discovered a simple equation based on a

[parabola](#) can accurately describe *melting points*.

- Scientists now think Einstein was right—black holes can generate [light beams](#).

- A recent NASA DSOC "first light" test successfully transmitted communications, via laser, over 10 million miles. See www.space.com.

This issue is dedicated to:



Astronaut Thomas Stafford, commander of Apollo 10, who passed away recently, age 93.

He flew to the moon, but didn't land on it.



Teachers: Need help with the Mission to Mars or Robotics Challenge missions?

There's Zoom "office hours" with our staff every Thursday (excluding holidays) from 4:00 – 5:00 pm.

Email caidin.everhart@afrlnewmexico.com.

Coming Next Issue...

- Mars/STARBASE 30th/20th Anniversary Year Accomplished!
- TECH D3--Soldering
- Robotics EXPO!

Watch for it!

★ 30 ★
Years

20

