

# AFRL

## NEW MEXICO STEM OUTREACH

Inspiring Future Scientists and Engineers

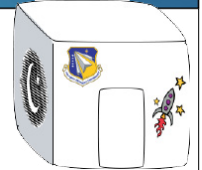
### AFRL NM STEM ACADEMY

Remember, Super STEM Saturday is 22 April 2023, and Link-Up Day is 28 April 2023!

Star Date: Apr 2023  
Volume XX, Issue 8



## The Rocket Report



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# April is Showering STEM

April showers bring May flowers? More like April is showering students with STEM!

On 4 April 2023, the eggs were falling like rain during the high school STEM Challenge Symposium as students tried to launch them safely through a hula hoop and onto a target 30' away. But **coming up fast** are even *more* STEM events and activities!

### Super STEM Saturday

The most exciting STEM event of the year! Super STEM Saturday is a showcase of amazing STEM shows from leading STEM performers. Be dazzled, amazed, learn something new! Open to all ages, one day only, admission is FREE! *Join us!*

**22 April 2023**, 10am-4pm  
Albuquerque Conv. Ctr. Hall 1  
401 2nd St. NW (free parking!)

### Link-Up Day

Mission to Mars fifth grade teams, start heading to your space shuttles! The culminating event of the Mission to Mars is on **28 April 2023!**



In partnership with:



Collaborator:



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



## CNM Research Challenge: Mars!

### Central New Mexico STEM Research Challenge



We went to the Central New Mexico STEM Research Challenge Science Fair event in the Manuel Lujan Bldg, at the NM State Fair EXPO! Fairgrounds on 24 March 2023.

We brought some activities with us that helped 4th/5th grade science fair participants explore a trip to Mars!

Students rotated through four stations: One provided drawing materials and space-themed stickers and shape punchouts to design their own Mars mission patch.

Another had students build a scale model Mars Habitat. At a third station, students programmed Ozobot robots to follow a path from Earth to Mars and back again.

At the fourth station, students constructed paper Hexsat satellite



models like ones that could be sent on a mission to Mars.

### APRIL SHOWERS BRING



**STUDENTS SHOWERED WITH STEM AND EGGS**

## Symposium Egg-tacular

The STEM Challenge Symposium was every bit as egg-tacular as we could have hoped for this year!

On 4 April 2023, 30 high school teams from six schools—AIMS, Atrisco Heritage, Century HS, Homeschool, 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 their STEM knowledge, interviewed about their preparations with AFRL mentors, discussed in a Think Tank how the project impacted them, and showed off their



egg launching skills in the Performance section!

*Continued on page 3*



# Mission to Mars

For Fifth Graders

Mars Exploration and Transmission Laser (METL) Mission 2022-2023

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

## Mars Invitational

Going to the **Link-Up Day** event on **28 April 2023**? Mars teachers should have received invitations at the Mid-Year Meeting, and been sent 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).



Some parents and students may object to having their picture taken.



## Goodbye, Hello

Say goodbye to Earthly meal preparation services that deliver to your door like *HelloFresh*. 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
28 April 2023	Albuquerque Conv. Ctr.	65, + 10 virtual

## New Records Set

No, we're not talking about your grandpa's scratchy old vinyl discs.



We're talking about the Mars *Ingenuity* helicopter setting new *flying speed* and *altitude* records recently: 14.5 mph and 52.5 feet. Not bad for a chopper that only weighs about 4 pounds!

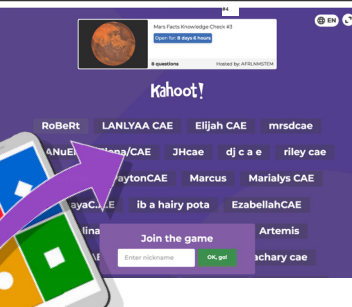


**Your commitment to this mission is crucial to its success**

## Kahoot! Koncludes

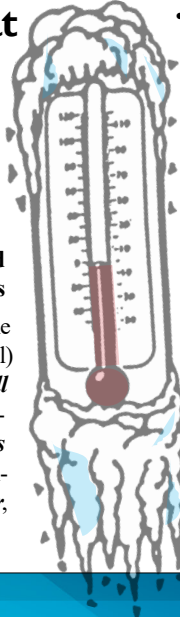
The Mars Challenge Kahoot! games are concluding!

Kahoot challenge #6 will be open through **21 April 2023** (<https://afrlnm.com/stem/2023-mars-metl-mission/>). Link-Up Day is just one week later!



## Packing Heat

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 might 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...

...but then I can't see my M&Ms!

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



an object like a lens, which, depending on the lens, can actually make parallel lines meet.

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

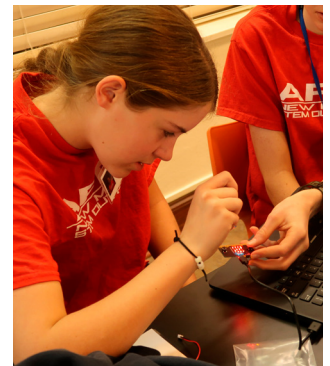
Upon reflection, they discover it gets *harder* to sort the multicolored M&Ms under colored light, because our eyes are merely light sensors in our heads, and they only process the color wavelengths of



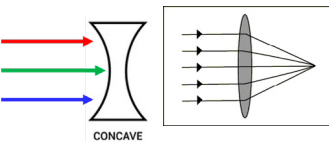
light that *reflect* off the delicious candy-coated shells.

Satellites and micro:bit microcontrollers 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.



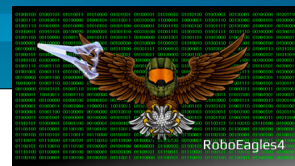
**By the Tuesday of the week before the first class in the series, session, or semester, we will ask you for the name, driver's license number/ state of issue, date of birth, and the FULL Social Security Number, of every adult coming through the base gate for that series of classes.**



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



# Robotics Challenge For Middle Schoolers



## Module 4--Expo Readiness

The final Robotics Challenge module, **Module 4**, has just wrapped up. It prepares Robotics Challenge middle school teams to compete in their biggest challenge yet: The **Robotics Expo**, which will be held **Friday, 12 May 2023** this year. Module 4 breaks the Expo preparation into four tasks:

### Team Logo

Robotics Challenge teams design a logo that demonstrates their understanding of ro-



botics and represents the members of the team in some way. Some are featured here.

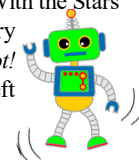
### Pageant Photo

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

You think Dancing With the Stars looks tough? Try dancing with a *robot!* Does it have two left wheels?



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 P2K2-X Bowl.

Now, on to the Expo! Questions? Suggestions? Don't dance around the issue! Contact [lynn@afnlnewmexico.com!](mailto:lynn@afnlnewmexico.com)



# STEM Challenge For High Schoolers

## Symposium Egg-tacular

*Continued from page 1*

Team 05, Ballistas, from AIMS, won the "Knowledge is Power" award, for most Quiz/Quiz Bowl/Interview points.

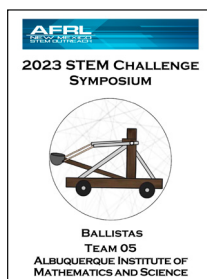
Team 34, Tigers, from LADE, won the "Precise Performance" award, for the best egg-launching performance.

Team 52, Super Talented Egg Masters, a homeschool team, won the "Golden Egg" award for best overall score.



All 30 teams "won" the "Delicious Pizza" hands-on "award" for learning science, technology, engineering, and math hands-on. THANK YOU, coaches, for all your help!

## The Winners!



**Knowledge is Power Award**



**Precise Performance Award**



**Golden Egg Award**



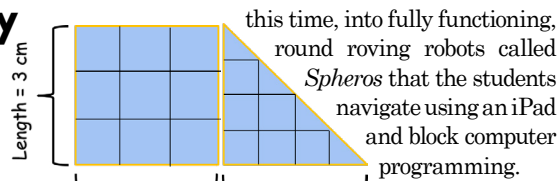
# DoD STARBASE NM For Fifth Graders

## Technology, Chemistry

What's up, doc? Technology is evolving in DoD STARBASE NM Day 3.

Fifth graders in Day 3 simulate energy transfer by forming human electrical circuits and exploring *Newton's Cradles*.

Then the circuits get a little bit more complicated when the students design little electronic devices using *littleBits* compo-



nents like *Output Bits*, which complete some action or task, and *Wire Bits*, which expand a circuit's reach and change its direction.

Then the circuits evolve again...

this time, into fully functioning, round roving robots called *Spheros* that the students navigate using an iPad and block computer programming.

They also determine which shape, an octagon or a rectangle, is better suited as an unmanned aerial vehicle landing dock, using triangle and square shapes. STEM! That's what's up, doc.

To prove the point, in DoD STARBASE NM Day 4, students transform into *Chemists* for the day.



Putting on white lab coats constitutes a *physical* change, not a *chemical* one, but the students do change at a molecular level when they use STEM to build *molecular models*.

They also explore physical and chemical changes of matter with activities such as an *interactive cryogenics demonstration* using liquid nitrogen, and making *elephant toothpaste* to prevent elephant cavities.



AFRL NM STEM Academy  
PO Box 9556  
Albuquerque, NM 87119  
(505) 846-8042

[AFRL.RDMX.NMSTEMOutreach@us.af.mil](mailto:AFRL.RDMX.NMSTEMOutreach@us.af.mil)

Website:

[www.afrlnm.com/stem](http://www.afrlnm.com/stem)

YouTube Channel:

<https://www.youtube.com/channel/UC-QuOSd1XTkYuXPONZwlAIHQ/videos>

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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

**METL:** Mars Exploration and Transmission Laser Mission 2022-2023

**MM:** Mission to Mars

**S&Es:** Scientists and Engineers

**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)



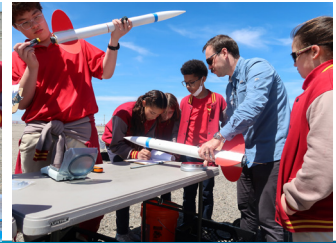
### With a Bang!

Our STARBASE 2.0/3.0 student middle school/high school teams are heading off into the sunset for the school year...but they're going out with a bang!

Albuquerque School of Excellence (ASE) STARBASE 2.0 middle school students showed how excellent they are with a rockin' rocket launch...the last of the school year to make it rain eggs from the sky!

Many thanks to ASE, Albuquerque Institute of Math and Science (AIMS), Del Norte High School (3.0!) and all the teachers, mentors, students, rockets, eggs, and every-

one who helped make STARBASE 2.0/3.0 2022-23 such an *excellent* year!



## STEM Bytes

### Saturday is Super STEM

Super STEM Saturday is *back*, Jack, and that's a fact!

Super STEM Saturday is a super-fun STEM day featuring live STEM shows and STEM booths with hands-on fun for kids of all ages. Be dazzled, amazed, and

learn something new! Mark your calendars *now!*

**22 April 2023, 10 am-4 pm**  
Shows start **11 am and 1:30 pm**

See [www.superstemevents.com/super-stem-showcase](http://www.superstemevents.com/super-stem-showcase).



### Scholarships are \$uper STEM

High school seniors: The **Generation Google Scholarship** was established to help aspiring students pursuing computer science degrees excel in technology and become leaders in the field. Selected students will receive \$10,000 USD for the 2023-2024 school year. Deadline to apply: **Mid-May 2023**. Underrepresented groups encouraged to apply.

See <https://buildyourfuture.with-google.com/scholarships/generation-google-scholarship> for more information.

The New Mexico Out-Of-School Time Network (NMOST) will be awarding \$5000, \$750, and \$1000 **Advancing Young Women in STEM Scholarships** to assist and encourage young women to pursue a STEM career. Applications are open through **30 May, 2023**.

To apply, see [www.nmost.org/nmost-aywistem-scholarships](http://www.nmost.org/nmost-aywistem-scholarships).

### Seeking STEM is Super STEM

The National Society of Black Engineers (NBSE)'s Summer Engineering Experience for Kids (SEEK) program is a three-week summer STEM camp for rising 3rd-5th graders.

The SEEK Program utilizes a hands-on design curriculum, with a major focus on the Engineering Design Process.

See [www.seek.nsbe.org](http://www.seek.nsbe.org).



NATIONAL SOCIETY OF BLACK ENGINEERS  
**SEEK**  
SUMMER ENGINEERING EXPERIENCE FOR KIDS



RaiseMe enables students to earn *micro-scholarships* throughout high school, starting as *early as 9th grade*, for doing all the things that best prepare them to succeed, whether that's getting good grades, volunteering in the community, or joining an extracurricular (or STEM!) activity.

See <https://www.raise.me/>.

### Coming Next Issue...

- Mars METL Mission Accomplished
- STARBASE Day 5
- TECH D3--Soldering
- Robotics EXPO!



**Watch for it!**

