



# AFRL LA LUZ ACADEMY

*"CREATING THE POSSIBILITIES"*



INSPIRING FUTURE SCIENTISTS  
AND ENGINEERS

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### "Big Al" Talks Racecars with Scalextric Students

Mr. "Big Al" Unser Sr., four-time Indianapolis 500 champion, talked racecars with Van Buren Middle School students on 5 March 2012.

Mr. Unser personally gave the students, who design and test Scalextric model racecars in their STARBASE 2.0 afterschool program, a tour of the Unser Racing Museum, showing them the actual racecars he drove and the racing suits he wore. Mr. Unser discussed what it was like to be a professional racecar driver. He talked about design el-



ements that improve racecar performance, showed the students various racing engines, and discussed the benefits of different tire treads. He also watched while students drove a racecar simulator.



### STARBASE 2.0 Students Tour Printed Circuit Board Factory

Van Buren Middle School students participating in the STARBASE 2.0 robotics program got a tour of the MPC Design Technologies, Inc. printed circuit board (PCB) factory on 8 March 2012.

The students examined various PCBs, which are found at the heart of all modern electronic equipment including smartphones, computers, and the Boe-Bot® robots the stu-



dents are building. Students saw the machinery in operation that places and solders small electronic components to the boards, and ex-



amined a smartphone's PCB components with an X-ray machine.

### Mini-WOWs in April

Wow! After their tours, STARBASE 2.0 Scalextric and Boe-Bot® students have continued meeting weekly after school, progressing towards the



grand finale mini-WOW events on April 24 and 26, respectively. At the mini-WOW events, students will demonstrate completed versions of the Scalextric model racecars they designed and had built, and Boe-Bot® robots they built and programmed, depending on which



group they are in. A "Big WOW" event will follow on 9 May.





# Mars Missions Flight for fifth grade students

Microprobe Evaluation of Lava and Titanium (MELT) Mission 2011-12

## Link-Up Day: Things to Know

Media representatives from Kirtland AFB, local TV stations and newspapers, or elsewhere, may take video footage and pictures of the Link-Up Day event, and ask to interview students.

Student Media Release forms were distributed at the mid-year teacher meeting. We

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



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

can send additional forms to you if you need them. Also, a Spanish version of the Student Media Release form is now available for those that *habla español*.

Bring the signed Student Media Release forms with you on Link-Up Day and turn them in at the Docking Station (Registration).



We will supply special "Please, No Pictures!" badges for those who do not turn in, or indicate "consent denied" on, the Media Release form.

Before the event, please emphasize with students that the

Link-Up Day facility is not a playground, and not a place for roughhousing and horsing around. This means no running, jumping over habitat tunnels, going behind tunnels after construction is complete, or unplugging of power cords or fans as pranks.



Remind students that they are on a serious mission to colonize Mars and should behave accordingly. Thanks!

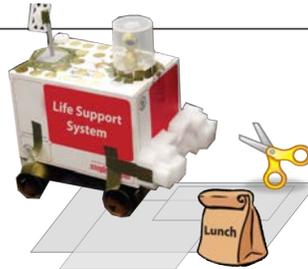
## Link-Up Day: Things to Bring

### Pre-Cut Plastic Habitat Pieces

- TEAM A: Front Wall, Airlock (Door Panel), Floor
- TEAM B: Left Wall, Right Wall, Two Connecting Tunnels
- TEAM C: Ceiling, Back Wall, Fan Tunnel

### Life Support System

You'll need this to do your



Technical Briefing--and to survive on Mars!

### Link-Up Day Lunch

Empty stomachs make for very long journeys and very grumpy astronauts.

## Mars is Inviting

Planning on attending the Mars Missions Flight Link-Up Day event on 4 May 2012? Detailed information and directions will be included with your invitation

packets, which will be mailed out soon.

Let us know if you don't receive your invitation packets.



### Other Items

For a complete list, see the **Manifest List** included with this newsletter, or in your manual on page 103.

## Link-Up Day Date/Site

| Date       | Site                   | Habitats |
|------------|------------------------|----------|
| 4 May 2012 | Albuquerque Conv. Ctr. | 59       |



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



# DoD STARBASE Flight for elementary fifth and sixth grade students

## Chillin' Out and Warming Up

It's Day 4 of the DoD STARBASE Flight, and what are the students doing? Just chillin', with Cryo Mike and the gang.

Mr. "Cryo" Mike Martin, and others from AFRL's cryogenics laboratory including Mr. Tom Fraser, Capt Erin Pettyjohn, and Lt Ben Jewell (husband of our great sub-

stitute educator Ms. Erin Jewell), have been freezing and pleasing during an interactive cryogenics presentation with the students. The cryo experts, who normally use liquid nitrogen to cool satellite heat sensors like the Hubble space telescope's, now flash-freeze various items for the students like marshmallows, popcorn, bananas, balloons, and flowers.

They explain to the students that the low *thermal mass* of the marshmallows and popcorn, which are largely puffed air, means the frozen marshmallows and popcorn are edible, which is good news for the students happily munching on them. The frozen banana, however, has much more thermal mass, and



use *chromatography* to determine which type of magic marker wrote a message, and explore the *properties of air* using a vacuum pump to inject more air into a container of marshmallows, squeezing and compressing them under the extra pressure.

therefore is too cold to hold with bare hands, much less eat.

Students in Day 4 warm up using *movement mats* and *molecule jars* to demonstrate how adding heat changes the states of matter,

First, we freeze the marshmallows. Then we eat them. Then we get some more marshmallows and compress them to death with lots of air pressure. It seems that STEM is really, really cool...unless you happen to be a marshmallow!

At least one week in advance, please give us the name of each adult per driver's license, the last four digits of their Social Security Number, and the estimated number of students you're bringing. Don't forget to turn in your Media Release forms, too!



## Satellite Snapshots, Simulated Sunspots, and Seeable Sounds

Students simply radiate with joy during the satellite-oriented second semester TECH Flight Day 2.

In the *Listening to the Light* activity, students hook up lasers and light-emitting diodes to a radio tuned to their favorite station, and radiate the light some distance away onto a solar panel linked to a speaker. They discover that sound can travel across *visible light rays!*

As they say in Latin: *Veni, vidi, audivi*—I came, I saw, I heard. (We can conquer later.)

*I come and I go each eleven years, and I help determine whether weather is clear.* Students explore *solar weather* by graphing sunspot activity, which is several years into another eleven-year cycle of radiating activity, and simulating

sunspots and solar storms with a *Van de Graaff generator* (also called the, "You touch it. No, you touch it. ZAP!" machine). It's quite the hair-raising activity—students can often make their hair stand on end from the electrostatic charge.

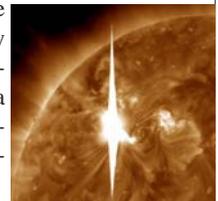
Students experiment with *micro-controllers*, and study *geospatial intelligence* by examining photographs taken from satellites and studying terrain features.



## Super-Sized Solar Storm Strikes

From 8-10 March, a massive X5-class solar storm dumped 26 billion kilowatts of energy, enough to power every home in New York City for two years, into our *thermosphere* (outer atmosphere).

Carbon dioxide (CO<sub>2</sub>) and nitric oxide (NO) in the thermosphere re-radiated most of this back into space; but it was enough to light up auroras, and made the thermosphere temporarily swell, causing extra drag on low-orbiting satellites.



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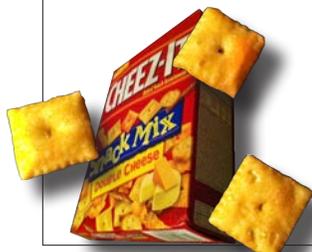
## STEM Challenge Flight for high school students

### Testing Winds Up



STEM Challenge students teams have been hard at work all month building, testing, modifying, and retesting their egg-launching devices, and posting videos and pictures of their efforts to the SchoolTown website.

Some teams, like Media Arts Collaborative Charter School's *Slack Mesa*, even had their work supervised by the Big Cheese!



### Phase 4: Final Presentation and Symposium

April showers us with activity as the STEM Challenge Flight nears the end for this year. Another 1000 points are up for grabs as we enter Phase 4, the final phase.

#### Phase 4: Final Presentation

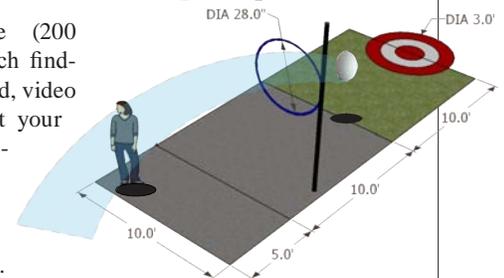
Due Wednesday, 11 April:

- Project Overview (200 pts.). Review the materials submitted in your Project Log. Revise and improve them based on mentor comments. Create a file combining all of your previous submissions once they have been revised. We're looking for your best quality work for this assignment.
- Symposium Competition Strategy (200 pts.) Create a document that illustrates your plans for hula-hoop and launching device placement, and describes your strategy for maximizing your points.

- Supportive Evidence (200 pts.). Provide research findings, test data collected, video evidence that support your launching device design, payload protective device design, and the success of your overall project.

Due Wednesday, 18 April:

- Display Strategy (200 pts.). Create a document describing your Symposium booth design (include requirements for power, projector, etc.) and online sharing of project.
- Lessons Learned (200 pts.). Create a document describing what your team learned, individually and collectively, about how the engineering design process is used in the real world by scientists and engineers, and your experiences working on this project. What lessons did you learn?



#### STEM Challenge Symposium

Tuesday, 24 April:

This is it! The egg-citing, egg-xilerating, most egg-cellent egg-stravagansa egg-sperience you've been *scrambling* for! (What, you thought I'd run out of "egg" jokes? Guess the "yolk's" on you, huh?)

At the Symposium, you'll set up and man the booth you described in your Display Strategy, and test your launchers in competition against ones from the other teams!

Let the shelling commence, and may the best egg win!



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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/RD:** The Directed Energy Directorate of the AFRL (formerly AFRL/DE)

**AFRL/RV:** The Space Vehicles Directorate of the AFRL (formerly AFRL/VS)

**DoD:** Department of Defense

**KAFB:** Kirtland Air Force Base, Albuquerque, N.M.

**LF:** Leadership Flight

**MELT:** Microprobe Evaluation of Lava and Titanium

**PRS:** Phillips Research Site

**PWN:** Pinpoint WeatherNet

**STEM:** Science, Technology, Engineering, and Math

**TECH:** Technology and Engineering Challenges

**T<sup>2</sup>:** Technology Transfer

**TTE:** Technology Transfer for Education

**USAF:** United States Air Force

## STEM Bytes

# We're Looking For a Few Good...

### STI Teachers

We're looking for about 30 teachers to attend our week-long Summer Teacher Institute (STI) professional development workshop for teachers. It's scheduled for the week of 16-20 July 2012.

The workshop will be divided into two curriculum groups: one for the high school STEM Challenge Flight and one for the middle school Robot Systems Flight.

### Elementary Schools

We're looking for a few good elementary schools to sign up one or more classes for five non-consecutive curriculum days in our 2012-13 DoD STARBASE Flight.

The inquiry-based curriculum focuses on topics like Physics, Chemistry, Technology, Engineer-



ing, Mathematics Operations and Applications, and STEM Careers.

### Middle Schools

We're looking for a few good middle schools to sign up one class per school to attend a semester of three non-consecutive curriculum days in our TECH Flight; or, to participate in our school-based Robot Systems Flight.

In the TECH Flight, students participate in a STEM engineering-design based curriculum, in either the Fall "Rocketry" semester or the Spring semester.

To participate in the Robot Systems Flight at their school, teachers must have participated in last

summer's Robot Systems Teacher Training, or this year's Summer Teacher Institute—or both.

### Mentors

We're looking for a few good mentors to help set up our Mars Missions Flight Link-Up Day event at the Albuquerque Convention Center. Set-up is on 3 May 2012; the event occurs on 4 May 2012.

### Leadership Flight Students

We're looking for 15-20 middle school students to help as members of Mission Control for our Mars Missions Flight Link-Up Day event on 4 May 2012 at the Albuquerque Convention Center. Qualified students exemplify Air Force Core Values and the ability to work independently.

### Interested in any of the above?

Call Ms. Ronda Cole at 846-8042, Ms. Diane MacAlpine at 853-8110, or email [AFRLLaLuzAcademy@kirtland.af.mil](mailto:AFRLLaLuzAcademy@kirtland.af.mil).

## Let's Talk About the Weather

If you've ever watched KOB-TV4's weather segment, you've probably noticed that the meteorologists will often refer to the current weather conditions at a local middle school.

That's because AFRL La Luz Academy and KOB-TV4 have teamed up with Earth Networks (formerly AWS Convergence Technologies, Inc.) to provide weather stations and student weather activities to middle

schools around New Mexico.

The WeatherBug.com site has some wonderful educational resources for students, whether your school has a weather station or not. Here's how to find them:

1. Go to <http://weather.weatherbug.com/>.
2. Select the green "About WeatherBug > WeatherBug Schools" tab.



3. Click the big blue button marked "For Teachers."
4. Click on the "Sample Interactive Lessons" graphic.

There are a number of interactive weather activities there to choose from. See if any might complement *your* curriculum!

## NASA 500

In previous editions of this newsletter (March and December 2011), we told you about the European Space Agency's real-life "Mars 500" mission, a successful 520-day simulated journey of seven astronauts to Mars and back.

"Yeah," you say, "but that was the European Space Agency. It's not 'official' unless NASA does it. Besides, their capsule was on the ground, not out in space."



OK, you got it! NASA has announced that they are considering doing their *own* 500-day simulated trip to Mars, using the International Space Station as the "capsule."

If so, it would set a new record. 500 days is over 16 months; no one has ever stayed in space that long. A couple of Russian cosmonauts stayed in orbit for 14 months once, but no NASA astronaut has ever spent longer than seven months on one mission. See <http://news.yahoo.com/nasa-considering-space-station-mars-dry-run-181214087.html> for more information.

### Coming Next Issue...

Take a look at what's coming in the next exciting issue of this newsletter:

- Mars MELT Mission accomplished
- Flying through air with the greatest of ease
- Students have the power
- Eggs flying through hoops



**Watch for it!**