Friends Of Galileo ASTRONOMY CLUB

Greg Smith – editor

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Program: Celestial Coordinates
"How to find stuff in the Sky"

Meeting: March 20 2019
Mark Morris LGIC

Sharing the Love

How often do we get to share our love of the night sky with our family and friends? In the picture is my 4 year old granddaughter Cordelia taking her first look at the moon in my 8" Newtonian telescope. Her reaction was priceless. "WOW it is so big. You can see rocks." She stood there for a minute just looking.

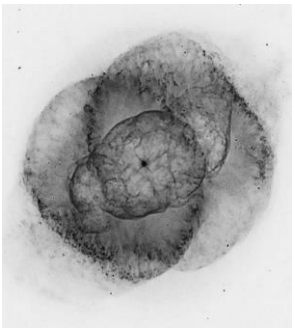
It was one of those cold clear nights that we had recently. The moon was crescent so the shadows on the mountains stood out very well. I think that is why she said she could see rocks. I went on to show her dad the Orion nebula and described the fact that stars were being made there right now. The light from those stars left there when the Vikings were raiding England and Ireland. In astronomical terms that was just this afternoon.

Isn't this part of the joy of owning a telescope?; to be able to share the beauty and mystery of the night sky with those around us. If we have no close by family, then we can share it with our neighbors and people on the street.

We have another opportunity to share the love at the Earth Day event on April 20th. Here we can talk to people who have a passing interest, or actually took an astronomy class in college. It is amazing how many people have told us that they took a class as a science requirement and got hooked on it, but life went on and overwhelmed them. They were not able to actively pursue their interest, but kept up to date by the news stories that come out all the time. Some even have a small telescope that they use occasionally but do not really know what they are looking at, other than the moon. We try to encourage them to get a planisphere to help them, or come to a meeting and get acquainted with us and let us show them how to get started. No telescope required, just an interest in the night sky.

Come join us in sharing with the community the mystery and beauty of the night sky on April 20th.

Every Day is a Star Filled Day
Every Night is a Starry Night



2 Points of Interest

Asteroids are harder to destroy than we thought

By **Deborah Byrd** *in* **SPACE** | March 4, 2019

What if we learned an asteroid was headed toward Earth? How much energy does it take to destroy an asteroid and break it into pieces? More than we thought, it turns out.

In recent decades, astronomers have become increasingly aware that asteroids and comets do sometimes strike Earth. Funding has increased for studies in which our skies are scanned for asteroids, which is the main reason we hear so often nowadays about asteroids sweeping relatively near the Earth. What's more, astronomers have met to discuss what might happen if we found an asteroid headed our way. Popular books and movies have taken up this theme, too, with the idea we might send spacecraft to the asteroid to blow it up. But – according to a new study from Johns Hopkins University – blowing up an asteroid might not be easy.

These scientists used a new understanding of how rocks fracture, and a new computer modeling method, to simulate asteroid collisions. Charles El Mir, a recent Ph.D. graduate from Johns Hopkins University's Department of Mechanical Engineering and the paper's first author, commented in a statement:

We used to believe that the larger the object, the more easily it would break, because bigger objects are more likely to have flaws. Our findings, however, show that asteroids are stronger than we used to think and require more energy to be completely shattered.

These scientists' findings will be published in the March 15, 2019, print issue of the peer-reviewed journal Icarus (preprint here).

They said their work can:

"… aid in the creation of asteroid impact and deflection strategies, increase understanding of solar system formation and help design asteroid mining efforts."

The statement from Johns Hopkins explained:

Researchers understand physical materials like rocks at a laboratory scale (about the size of your fist), but it has been difficult to translate this understanding to city-size objects like asteroids. In the early 2000s, a different research team created a computer model into which they input various factors such as mass, temperature, and material brittleness, and simulated an asteroid about a kilometer (.6 mile) in diameter striking head-on into a 15-mile (25-km) diameter target asteroid at an impact velocity of 3 miles (5 km) per second. Their results suggested that the target asteroid would be completely destroyed by the impact.

In the new study, El Mir and his colleagues, K. T. Ramesh, director of the Hopkins Extreme Materials Institute and Derek Richardson, professor of astronomy at the University of Maryland, entered the same scenario into a new computer model called the Tonge-Ramesh model, which accounts for the more detailed, smaller-scale processes that occur during an asteroid collision. Previous models did not properly account for the limited speed of cracks in the asteroids.

The simulation was separated into two phases: a short-timescale fragmentation phase and a long-

timescale gravitational reaccumulation phase. The first phase considered the processes that begin immediately after an asteroid is hit, processes that occur within fractions of a second.

The second, long-timescale phase considers the effect of gravity on the pieces that fly off the asteroid's surface after the impact, with gravitational reaccumulation occurring over many hours after impact.

In the first phase, after the asteroid was hit, millions of cracks formed and rippled throughout the asteroid, parts of the asteroid flowed like sand, and a crater was created. This phase of the model examined the individual cracks and predicted overall patterns of how those cracks propagate.

The new model showed that the entire asteroid is not broken by the impact, unlike what was previously thought. Instead, the impacted asteroid had a large damaged core that then exerted a strong gravitational pull on the fragments in the second phase of the simulation.

The research team found that the end result of the impact was not just a 'rubble pile' – a collection of weak fragments loosely held together by gravity. Instead, the impacted asteroid retained significant strength because it had not cracked completely, indicating that more energy would be needed to destroy asteroids. Meanwhile, the damaged fragments were now redistributed over the large core, providing guidance to those who might want to mine asteroids during future space ventures.

El Mir commented:

Our question was, how much energy does it take to actually destroy an asteroid and break it into pieces?

It may sound like science fiction but a great deal of research considers asteroid collisions. For example, if there's an asteroid coming at Earth, are we better off breaking it into small pieces, or nudging it to go a different direction? And if the latter, how much force should we hit it with to move it away without causing it to break? These are actual questions under consideration.

Ramesh added:

We are impacted fairly often by small asteroids, such as in the Chelyabinsk event a few years ago. It is only a matter of time before these questions go from being academic to defining our response to a major threat. We need to have a good idea of what we should do when that time comes – and scientific efforts like this one are critical to help us make those decisions.

Bottom line: Researchers at Johns Hopkins employed a new understanding of how rocks fracture, and a new computer modeling method, to simulate asteroid collisions. They found that asteroids are harder to shatter than previously believed.

First 'Mole' on Mars Hits Rocky Snag Beneath the Red Planet's Surface

By Elizabeth Howell 20 hours ago Science & Astronomy

They're coming up for strategies to make it through.

NASA's InSight lander deploys its heat probe on Mars on Feb. 12, 2019.

The first Martian "mole" encountered some obstacle underground as the NASA InSight lander dug below the surface, NASA reported.

The InSight Mars lander, which touched down on Mars in November, deployed a probe as part of its Heat and Physical Properties Package (also called HP3). The probe, or "mole," is designed to burrow underground and measure heat coming from inside Mars, information that will help scientists better understand the planet's structure and formation.

But the 16-inch (40 centimeters) probe made it only three-quarters of the way out of its housing structure on Feb. 28 before stopping short. A second attempt, on Saturday (March 2), yielded little progress. In a statement, NASA officials said the data received so far suggests that the mole is at a 15-

degree tilt and has hit some rock or gravel. While the instrument is designed to get around rocky obstacles, the German instrument team plans to stop the procedure for further investigation.

"The team has decided to pause the hammering for now to allow the situation to be analyzed more closely and jointly come up with strategies for overcoming the obstacle," Tilman Spohn, HP3 principal investigator at the German Aerospace Center (DLR), said in a blog post. This pause will last for about two weeks, he added.

While the probe isn't moving right now, it's otherwise working as it is supposed to. Once everything is set, the probe will release pulses of heat of 50 degrees Fahrenheit (28 degrees Celsius) to measure how quickly the heat dissipates under the surface.

"This property, known as thermal conductivity, helps calibrate sensors embedded in a tether trailing from the back of the mole," NASA officials said. "Once the mole is deep enough, these tether sensors can measure Mars' natural heat coming from inside the planet, which is generated by radioactive materials decaying and energy left over from Mars' formation."

For now, the team will do more heating tests with their mole to see how the upper surface of Mars conducts heat. The team will also measure temperature changes using a radiometer on the deck of InSight. This week provides an interesting opportunity to do so, as InSight will experience mini-eclipses when one of the Martian moons, Phobos, moves in front of the sun. When Phobos partially blocks the sun, it will cool the terrain surrounding InSight.

Minutes of the February Meeting

Greg Smith called the meeting to order. He talked about the "Touch and Go" Lunar Eclipse that happened in the last month.

Mark Thorsen thanked Greg for the newsletter and Ted Gruber for working on the website and for the article in the Columbia River Reader.

Mark Thorsen, Ted Gruber, Greg Smith and Howard Knytych had a meeting with the Mt. St. Helen's Institute to discuss the Mt. St. Helen's Star Party. It will be the 4th weekend of August. Plans are in place. More information to come.

Greg introduced Howard Knytych from Rose City Astronomers as the Speaker tonight. His talk was called "Basic Imaging Concepts." He discussed some common, basic imaging terminology, recommendations for starting out, and content that might or might not be familiar. Just remember, astroimaging is not a destination, it's a journey.

Steve Powell gave the Treasurer's Report.

Ted Gruber gave the Sky Report. Mercury returns to the evening sky in mid-February and makes its best evening appearance of the year later in the month. It shines at magnitude -0.9 on February 20th, and although it becomes dimmer each evening, it climbs slightly higher in the sky until February 26th. Mars becomes visible high in the southwestern sky as darkness falls. It remains visible until setting in the west around midnight. Jupiter, Saturn, and Venus are easily visible int he pre-dawn southeastern sky. The three planets appear evenly spaced apart in mid-March. The Messier of the Month is M50, the Heart-Shaped Cluster. It is a magnitude 5.9 open cluster in the constellation Monoceros. It is about 3,000 light years away and contains between 200-500 stars. In binoculars you can resolve 2-3 bright stars, smaller telescopes reveal the cluster's heart shape, and the larger telescopes resolve 40 or more stars.

Roy Gawlick talked about uping the website to the next level. It was approved to spend the extra money.

Meeting adjourned.

☞ March 2019 Meeting ☜

DATE: **Wednesday, March 20, 2019**

TIME 7:00 pm

PLACE: Mark Morris High School
Large Group Instruction Center
Use 17th Ave. entrance

PROGRAM Celestial Coordinates
"How to find stuff in the Sky"

SNACKS: Tom Meek

DRINKS: Ted Gruber

Friends of Galileo Club Officers

PRESIDENT	Greg Smith
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ALCOR	Tom Meek

Next Month's Newsletter Deadline

The deadline for items in next month's newsletter is:
Wednesday: seven days before next meeting.

Please feel free to send in your thoughts and experiences about your astronomical adventure.

Submit your material by E-mail to:

grlyth@msn.com