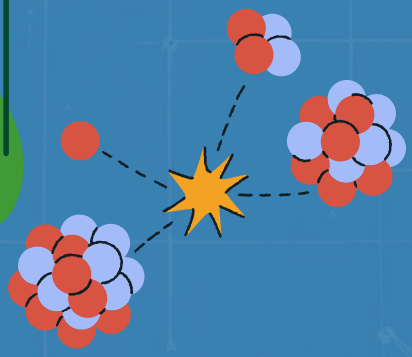
The **STEAM-STEINETTES** Gazette



Edition 7

Physics

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> Nothing in life is to be feared. It is only to be understood. Now is the time to understand more, so that we may fear less.
>
> - Marie Curie

An Introduction to Newtonian Mechanics:

By: Hitej

Tears are pushed out of your eyes and stream down the sides of your face as you are glued to the back of your seat by the rapidly accelerating car. Newtonian Mechanics is the realm of physics that can explain the basic phenomena that occur within our world. This realm is divided into two parts: dynamics and kinematics. Dynamics is the study of the causes of motion, whereas kinematics is the study of motion without being concerned with the actual cause. While you may have heard the terms velocity and acceleration before, their actual definitions are more different from each other than you might think. Velocity is not only the change of speed over time, but also the direction. Because of this commonly misinterpreted definition, acceleration is frequently misunderstood. Acceleration is the change in velocity over time. This means that an object is accelerating even when it is not moving, as long as its direction is changing. We can use these definitions of acceleration and velocity, along with other concepts, to explain not only how much force you feel when sitting in an accelerating car, but also something as significant as the path of celestial objects in orbit.

Read on!

SCIENTIST SPOTLIGHT

By: Bailey

Vera Rubin

Vera Rubin was born on July 23, 1928, in Philadelphia, Pennsylvania. Her father was an intellectual man whose job was in electrical engineering at the Bell Telephone Company and her mother was a choir singer. Rubin's parents encouraged and supported her from a young age. She eventually moved to Washington D.C. at the age of 10. Rubin then went to Vassar College and she graduated with a degree in astronomy. While in school, she met her husband who was a physics student. He fully supported her journey to get a Ph.D even though they had a growing family to support (National Air and Space Museum). Even though Rubin had a degree in astronomy, she made a huge impact on the world of physics.

In 1968, Vera Rubin and Kent Ford were examining the galaxies at Kitt Peak Observatory. She noticed how fast stars were orbiting around the Andromeda Galaxy and how fast the galaxy itself was moving. She knew the mass of the galaxy was no match for the speed at which everything was moving. So how were they not flying apart? She theorized that there was an invisible matter holding everything together. That was correct. Because of Rubin's contribution to the study of dark matter we now know that about 80% of the universe is made of dark matter (Space). She never expected to make such a big impact and only took that job so she wouldn't have to compete with many of the unsupportive and close-minded men at that time.

Her thesis and many of her studies got little to no attention, however, she made a huge impact not only on physics, but also women in science. Rubin became the first woman to observe at Palomar Observatory. In 1981, Vera Rubin was elected to the National Academy of Science, and even got a National Medal of Science in 1993.

Despite being overlooked for most of her life, she made huge discoveries in the world of physics. Dark matter is something that, without her, we may not know much about, and it's still something that's being studied today. She was a scientist, a mother, and a trailblazer. She died in 2016, but she will never be forgotten in the world of physics.

Science Experiments!

By: Stephanie

Easy

Tower of Liquids

To demonstrate density you will be creating a density column. For this experiment, you'll need liquids with different densities. Starting with the densest, carefully transfer just a little of each liquid into a tall jar or glass. The result should be a vibrant tower of liquids. This phenomenon happens because the heavier (higher density) liquids will sink under the lighter (lower density) liquids.

CLICK HERE FOR THE STEPS!

Medium

Scuba Diver

To demonstrate density you will see how the scuba diver is affected by the pressure and density. To test the diver cutout, cut a 1.5 inch diver figure from foil and place it in a 2L bottle filled with water. The diver floats initially because the total densities are less than the water's density. When the diver is inserted, air bubbles in the straw compress, causing the water to expand under pressure, causing the diver to sink.

CLICK HERE FOR THE STEPS!

Global Science Happenings

By: Sofia

It is now possible to control and manipulate spin waves on a chip using superconductors.

Researchers have created the first-ever wireless device able to make magnetism occur within non-magnetic materials.

Scientists developed the highest-resolution single photon superconducting camera containing 400,000 pixels - 400 times more than any other device.

NEW SYSTEM TO CONTROL THE CHAOTIC BEHAVIOR OF LIGHT:

By: Sofia

New research from the CUNY Graduate Center in New York, USA, suggests a method to control the chaotic behavior of light by tailoring its usual scattering patterns using light itself! Typical methods for assessing the behaviors of light utilize circular or normal-shaped resonant cavities – where light bounces and scatters in patterns that are more predictable. However, specifically in circular cavities, only distinct and predictable frequencies (colors of light) can survive. Additionally, each supported frequency is associated with a distinct spatial pattern or mode. However, according to one of the leading researchers, Xuefeng Jiang, “One mode at a single frequency is sufficient to understand the physics at play in a circular cavity, but this approach does not unleash the full complexity of light behaviors seen in complex platforms” (Jiang). Due to the chaotic behaviors of light, any frequency injected into the cavity can potentially excite thousands of light patterns, until now.

The CUNY research team designed a device utilizing a stadium-shaped cavity to control and manipulate light. The device has two channels that direct light into the cavity, with a camera recording the amount of light escaping and its patterns. By adjusting the intensity and delay of the light beams, researchers were able to alter the light's radiation pattern outside the cavity. This control was enabled by a behavior of light known as "reflectionless scattering modes (RMS)," which had been theorized but never observed before. The ability to manipulate these modes has implications for energy storage, computing, and signal processing. The researchers plan to continue studying these light behaviors and incorporate additional adjustments in future studies.

La nascita imperfetta delle cose
by Guido Tonelli

BOOK REVIEW | BY: ACE

Book

Review Rating: 5/5

What do you get when you take the world's sharpest minds and give them an impossible mission? Something extraordinary. And Guido Tonelli's book is the story of that extraordinary accomplishment that helped modern physics find the elusive Higgs boson and gain a deeper insight into matter itself. *La nascita imperfetta delle cose*—in English, literally, "the imperfect beginning of things"—is a must-read for anyone interested in particle physics. If you're curious to learn more about how the universe works at the tiniest of scales, put yourself in the shoes of an experimental physicist at CERN and live vicariously through Tonelli and his brilliant colleagues as they make the impossible possible, building the Large Hadron Collider and searching blindly and methodically for the particle whose existence or non-existence could make or break the Standard Model of Particle Physics. As someone who reads many physics books, I truly appreciated Tonelli's unique perspective and I highly encourage everyone who can (the print book is only available in Italian, but you can probably find some translations online) to read it!

Fantastic Facts!

By: Bailey

Sound produces heat

Something could be a wave and a particle

Physics originated in 3000 B.C

Click each fact to learn more

Meet the Team

A STEAM Club + The Einsteinettes collab

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Special thanks to our awesome advisors, Ms. Cristen Jones and Mr. Chad Hamblin!

Not mentioned: Quote provided by Vasilisa

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