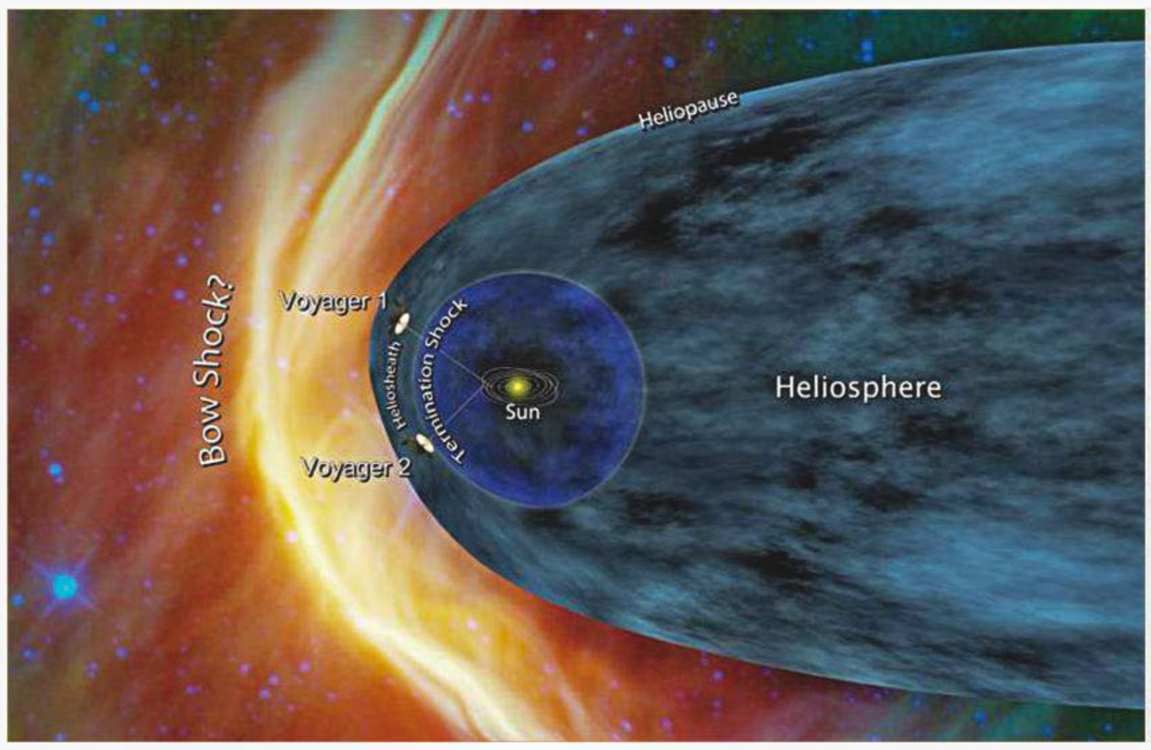
Voyager points to interstellar future

DATA from NASA's Voyager 1 spacecraft indicate that the venerable deep-space explorer has encountered a region in space where the intensity of charged particles from beyond our solar system has markedly increased. Voyager scientists looking at this rapid rise draw closer to an inevitable but historic conclusion -- that humanity's first emissary to interstellar space is on the edge of our solar system.

"The laws of physics say that someday Voyager will become the first human-made object to enter interstellar space, but we still do not know exactly when that someday will be," said Ed Stone, Voyager project scientist at the California Institute of Technology in Pasadena. "The latest data indicate that we are clearly in a new region where things are changing more quickly. It is very exciting. We are approaching the solar system's frontier."

The data making the 16-hour-38 minute, 11.1-billion-mile (17.8-billion-kilometer), journey from Voyager 1 to antennas of NASA's Deep Space Network on Earth detail the number of charged particles measured by the two High Energy telescopes aboard the 34-year-old spacecraft. These energetic particles were generated when stars in our cosmic neighborhood went supernova.

"From January 2009 to January 2012, there had been a gradual increase of about 25 percent in the amount of galactic cosmic rays Voyager was encountering," said Stone. "More recently, we have seen very rapid escalation in that part of the energy spectrum. Beginning on May 7, the cosmic ray hits have increased five percent in a week and nine percent in a month."



This artist's concept shows NASA's two Voyager spacecraft exploring a turbulent region of space known as the heliosheath, the outer shell of the bubble of charged particles around our sun.

This marked increase is one of a triad of data sets which need to make significant swings of the needle to indicate a new era in space exploration. The second important measure from the spacecraft's two telescopes is the intensity of energetic particles generated inside the heliosphere, the bubble of charged particles the sun blows around itself. While there has been a slow decline in the measurements of these energetic particles, they have not dropped off precipitously, which could be expected when Voyager breaks through the solar boundary.

The final data set that Voyager scientists believe will reveal a major change is the measurement in the direction of the magnetic field lines surrounding the spacecraft. While Voyager is still within the heliosphere, these field lines run east-west. When it passes into interstellar space, the team expects Voyager will find that the magnetic field lines orient in a more north-south direction. Such analysis will take weeks, and the Voyager team is currently crunching the numbers of its latest data set.

"When the Voyagers launched in 1977, the space age was all of 20 years old," said Stone. "Many of us on the team dreamed of reaching interstellar space, but we really had no way of knowing how long a journey it would be -- or if these two vehicles that we invested so much time and energy in would operate long enough to reach it."

Launched in 1977, Voyager 1 and 2 are in good health. Voyager 2 is more than 9.1 billion miles (14.7 billion kilometers) away from the sun. Both are operating as part of the Voyager Interstellar Mission, an extended mission to explore the solar system outside the neighborhood of the outer planets and beyond. NASA's Voyagers are the two most distant active representatives of humanity and its desire to explore.

The Voyager spacecraft were built by NASA's Jet Propulsion Laboratory in Pasadena, Calif., which continues to operate both. JPL is a division of the California Institute of Technology. The Voyager missions are a part of the NASA Heliophysics System Observatory, sponsored by the Heliophysics Division of the Science Mission Directorate in Washington.

Source: Science Daily

SOG FROM MOG

MDGs show the way

Emerging economies such as Brazil need to balance growth with sustainability.

THOSE debating the substance of Sustainable Development Goals (SDGs) should learn lessons from the Millennium Development Goals(MDGs) and focus on challenges relevant to all countries, not just low income countries, says Jeffrey D. Sachs, former UN special advisor on the MDGs.

Although the MDGs have seen both benefits and shortfalls, most policymakers and stakeholders agree that they have stimulated progress towards poverty reduction, and that a new set of goals expected to be endorsed this month at Rio+20 should be implemented after 2015, when the MDGs officially 'end'.

The urgent need for sustainable development means proposals for SDGs have been well received, says Sachs. Most countries aim for economic development, environmental sustainability and social inclusion "the so-called triple bottom line approach to human wellbeing".

SDGs should be organised along these three broad categories, he suggests, and achieving any of them will depend on global efforts to achieveall of them, as well as on good governmental and private sector governan

Lessons learned from the MDGs could benefit the SDGs, says Sachs. Continued support for the MDGs, 12 years after their adoption, comes down to three strengths: simplicity, which makes it easy to communicate about them; a focus on moral and practical issues, rather than time-consuming legally-binding commitments; and the adoption of specific, actionable measures.

There are lessons to be learned from their weaknesses too. For example, SDGs should ensure there are intermediate milestones for each goal as well as accurate and timely data.

Source: SciDev.net

USHERERS

Father of *Hubble's Law*

PHOTO: AFP

EDWIN Powell Hubble, hero of 20th century astronomy, was an American Astronomer. He lived between November 20, 1889 and September 28, 1953, who is famous for the discovery of the existence of Galaxies other than the Milky Way and galactic Red Shift. Discovery that the loss in frequency -- the Red Shift -- observed in the spectra of light from other galaxies increased in proportion to a particular galaxy's distance from Earth. This relationship became known as "Hubble's Law." Hubble's findings fundamentally changed the scientific view of the universe.

Hubble noted the Doppler Shift interpretation of the observed Red Shift that had been proposed earlier by Vesto Slipher, and that led to the theory of the metric expansion of space. He tended to believe the frequency of any beam of light could, by some so far unknown means, be diminished ever stronger, the longer the beam travels through space.

Hubble then served in the US Army in World War I, and he quickly advanced to the rank of major. In 1919, Hubble was offered a staff position in California near Pasadena, where he remained on the staff until his death.

Hubble experienced a heart attack in July 1949. He died of Cerebral Thrombosis (a spontaneous blood clot in his brain) on September 28, 1953, in San Marino, California.

Source: Wikipedia

FATNESS & GRAVITY

Fatness an environmental problem?

HUMANITY is 17 million tons (15 million metric tons) overweight, according to a study that calculates the adult portion of the human race's collective weight at 316 million tons (287 million metric tons).

That's the equivalent of about 170 military aircraft carriers of extra weight. Or in people weight, it's like having an extra 242 million people of average body mass on the planet.

This is more than just an attempt to make the human race feel uncomfortable about its waistline; looking at the collective mass of humanity can improve understanding of the effects of population growth, contends a team of European researchers.

Collectively, the adult human population weighed at 316 million tons (287 million metric tons) in 2005, researchers calculated.

"[United Nations] world population projections suggest that by 2050 there could be an additional 2.3 billion people," they write in research published online Sunday (June 17) in the journal BMC Public Health. "The ecological implications of rising population numbers will be exacerbated by increases in average body mass." [7 (Billion) Population Milestones]

The argument is simple. More body mass takes more energy to maintain and move; therefore as someone's weight goes up, so do the calories they need to exist. This means increases in population counts don't tell the whole story when it comes to demand for resources, according to the authors.

"Although the largest increase in population numbers is expected in Asia and sub-Saharan Africa, our results suggest that population increases in the USA will carry more weight than would be implied by numbers alone," they write.

The United States ranked at the top of the "Heaviest 10" category, while the "Lightest 10" list is composed entirely of African and Asian nations. For example, North America has 6 percent of the world population but 34 percent of biomass due to obesity. Meanwhile, Asia has 61 percent of the world population but just 13 percent of biomass due to obesity. [List of heaviest and lightest nations]

Using data from around the world for 2005, researchers used body mass indexes (BMI, or a measure of body fatness) and height distributions to estimate average adult body mass. They then multiplied these results by population size to get a total mass, referred to as biomass. They evaluated body mass using BMI thresholds of greater than 25 for overweight and greater than 30 for obese. The collective mass of the adult population in 2005 due to obesity was 3.9 million tons (3.5 million metric tons), they calculated.

Globally, average body mass globally for an individual was calculated at 137 pounds (62 kilograms).

"Our scenarios suggest that global trends of increasing body mass will have important resource implications and that unchecked, increasing BMI could have the same implications for world energy requirements as an extra 473 million people," they write. "Tackling population fatness may be critical to world food security and ecological sustainability."

Source: Live Science

WORMY LIGHT

Power from fireflies!

WHAT do fireflies, nanorods, and Christmas lights have in common? Someday, consumers may be able to purchase multicolor strings of light that don't need electricity or batteries to glow. Scientists at Syracuse University found a new way to harness the natural light produced by fireflies (called bioluminescence) using nanoscience. Their breakthrough produces a system that is 20 to 30 times more efficient than those produced during previous experiments.

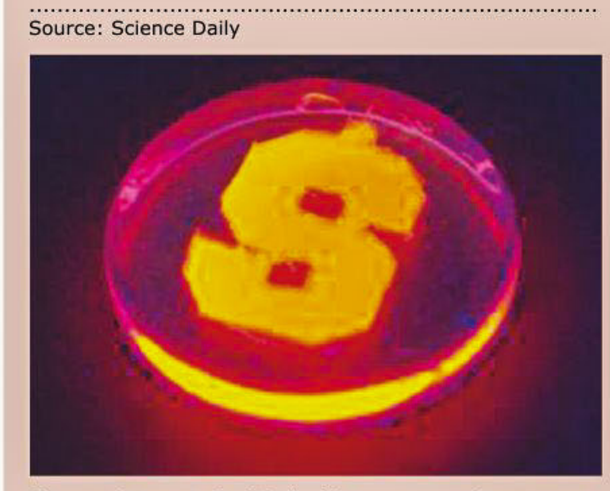
It's all about the size and structure of the custom, quantum nanorods, which are produced in the laboratory by Mathew Maye, assistant professor of chemistry in SU's College of Arts and Sciences; and Rebeka Alam, a chemistry Ph.D. candidate. Maye is also a member of the Syracuse Biomaterials Institute. "Firefly light is one of nature's best examples of bioluminescence," Maye says. "The light is extremely bright and efficient. We've found a new way to harness biology for non-biological applications by manipulating the interface between the biological and non-biological components."

Their work, "Designing Quantum Rods for Optimized Energy Transfer with Firefly Luciferase Enzymes," was published online May 23 in Nano Letters and is forthcoming in print. Collaborating on the research were Professor Bruce Branchini and Danielle Fontaine, both from Connecticut College.

Fireflies produce light through a chemical reaction between luciferin and it's counterpart, the enzyme luciferase. In Maye's laboratory, the enzyme is attached to the nanorod's surface; luciferin, which is added later, serves as the fuel. The energy that is released when the fuel and the enzyme interact is transferred to the nanorods, causing them to glow. The process is called Bioluminescence Resonance Energy Transfer (BRET).

"The trick to increasing the efficiency of the system is to decrease the distance between the enzyme and the surface of the rod and to optimize the rod's architecture," Maye says. "We designed a way to chemically attach, genetically manipulated luciferase enzymes directly to the surface of the nanorod."

Source: Science Daily



Nanorods created with firefly enzymes glow orange. The custom, quantum nanorods are created in the laboratory of Mathew Maye, assistant professor of chemistry.

SQUAT LOBSTER

Crustaceans of the deep

A new species of crustacean has been discovered in the underwater mountains off the northwest coast of Spain, scientists recently announced.

The squat lobster is orange and a little over 2 inches (5 centimeters) long. Squat lobsters are more closely related to porcelain and hermit crabs than true lobsters.

It was discovered at a depth of 4,626 feet (1,410 meters) in August 2011 by the INDEMARES research group and lives among deep corals and sea fans, according to a study published in the March issue of the journal Zootaxa.

Source: Live Science

DID YOU KNOW?

What is phlogiston?

The phlogiston theory first stated in 1667 by Johann Joachim Becher, is an obsolete scientific theorythat postulated the existence of a fire-like element called "phlogiston", which was contained within combustible bodies and released duringcombustion. The theory was an attempt to explain processes of burning such as combustion and therusting of metals, which are now collectively known as oxidation.