

Black holes may precede galaxies

WASHINGTON (Reuters)—Black holes—those massive, invisible objects that suck in everything around them—may have appeared before the galaxies that host them, say astronomers.

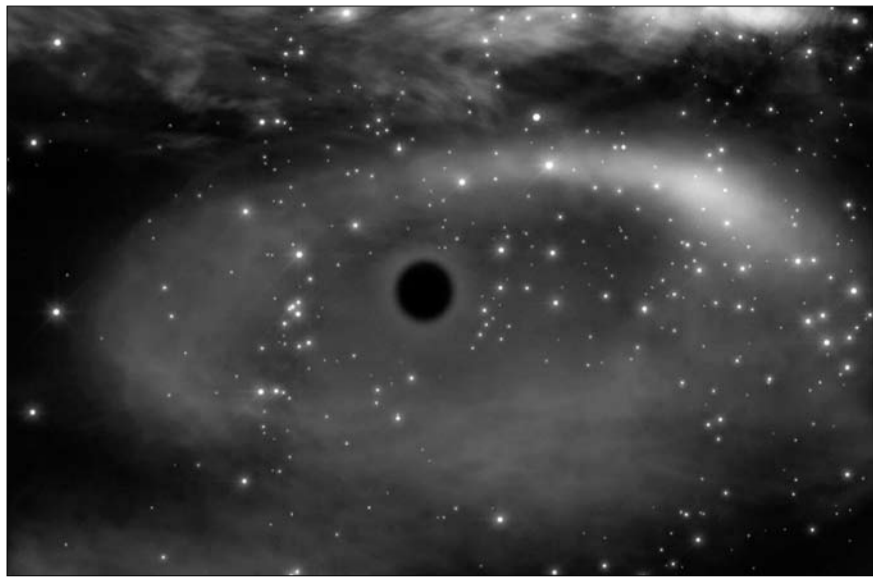
The findings could change the understanding of how galaxies first formed, and what role black holes play in the universe.

'The big question has been whether one grows before the other or if they grow together, maintaining their mass ratio throughout the entire process.'

— Dominik Riechers, Caltech astronomer

Most or all galaxies are believed to have black holes at their centers. Just last month astronomers confirmed that our own Milky Way galaxy has a black hole at its center.

Researchers told a meeting of the American Astronomical Society in Long Beach, California, that they had seen a clear link between the



GALACTIC CENTER: Scientists believe that black holes may originate before the galaxy that surrounds it. ESA/AFFGETTY IMAGES

size of a black hole, as measured by its mass, and the galaxy where it was found.

A black hole's mass is about one one-thousandth of the mass of the surrounding galactic bulge, they said.

"This constant ratio indicates that the black hole and the bulge affect each others' growth in some sort of interactive relationship," said Dominik Riechers of the California Institute of Technology, or Caltech.

"The big question has been whether one grows before the other or if they grow together, maintaining their mass ratio throughout the entire process."

The researchers used the Very Large Array telescope in New Mexico and other instruments to compare nearby, and younger, black holes to those that are farther away and thus older. They have seen back close to the Big Bang, 13.7 billion years ago.

"We finally have been able to

measure black-hole and bulge masses in several galaxies seen as they were in the first billion years after the Big Bang, and the evidence suggests that the constant ratio seen nearby may not hold in the early universe," said Fabian Walter of the Max-Planck Institute for Radioastronomy in Germany.

"The black holes in these young galaxies are much more massive compared to the bulges than those seen in the nearby universe," Walter added in a statement. "The implication is that the black holes started growing first."

What is not understood is how the birth of a black hole might have affected the formation of a galaxy, the astronomers told a news conference and telephone briefing.

"To understand how the universe got to be the way it is today, we must understand how the first stars and galaxies were formed when the universe was young," said Chris Carilli of the National Radio Astronomy Observatory.

For one thing, the light from the black holes outshines any surrounding stars, making them difficult to see.

"With the new observatories we'll have in the next few years, we'll have the opportunity to learn important details from the era when the universe was only a toddler compared to today's adult," Carilli said.

Scientists learn to levitate tiny objects

CHICAGO, (Reuters)—U.S. scientists have found a way to levitate the very smallest objects using the strange forces of quantum mechanics, and said they might use it to help make tiny nanotechnology machines.

They said they had detected and measured a force that comes into play at the molecular level using certain combinations of molecules that repel one another.

The repulsion can be used to hold molecules aloft, in essence levitating them, creating virtually friction-free parts for tiny devices, the researchers said.

Federico Capasso, an applied physicist at Harvard University in Massachusetts, whose study appears in the journal *Nature*, said he believed that detection of this force opened the possibility of a whole new class of tiny gadgets.

The team, including researchers at the National Institutes of Health, has not yet levitated an object, but Capasso said he now knows how to do it. "This is an experiment we are sure will work," he said. His team has already filed for patents.

"By reducing the friction that hinders motion and contributes to wear and tear, the new technique provides a theoretical means for improving machinery at the microscopic and even molecular level," Dr. Duane Alexander of the NIH's National Institute of Child Health and Human Development said.

"The emerging technology of nanomechanics has the potential to improve medicine and other fields," he said in a statement.

The discovery involves quantum

mechanics, the principles that govern nature's smallest particles.

By altering and combining molecules, tiny machines could be devised which could have applications in surgery, manufacturing food and fuel and boosting computer speed.

The discovery arose from Capasso's prior work as vice president of physical research at Bell Labs, the research arm of telecoms gear maker Lucent Technologies, now Alcatel-Lucent.

"I started to think how I can use these exotic quantum mechanical forces for technology," he said in a telephone interview.

Bell had been working on new devices known as Micro Electro-mechanical Systems or MEMS, the technology used in air bag sensors to measure deceleration of cars. "We started to play with nanomechanics or micromechanics," Capasso said.

He knew that as devices became smaller and smaller, they would fall prey to what is known as the Casimir force, an attractive force that comes into play when two very tiny metallic surfaces make very close contact.

In very small objects, this force can cause moving parts to stick together, an effect known as stiction.

A Russian team had predicted this force could be reversed using the right combination of materials.

For Capasso's experiment, the team immersed a gold-coated sphere in a liquid and measured the force as the sphere was first attracted to a metallic plate, then repelled from a plate made from silica.

Capasso said levitating is next. "We just have to do it," he said.

The lion-eating poet in the stone den

By LEONARDO VINTINI
Epoch Times Staff

The Chinese language. This ancient linguistic heritage has a rich and diverse tonal expression that makes it quite different from the languages of the West. Including Mandarin, Cantonese and other dialects, more than a billion people speak some derivation of this time-honored tongue.

As in all tonal languages, in Chinese one syllable can be pronounced in several distinct ways, with each pronunciation having radically different meanings. While this aspect can be confusing for those new to this form of expression, for individuals who have mastered it, Chinese presents linguistic possibilities unachievable in other languages, offering an unparalleled opportunity for articulation.

Consider a poem written by Chinese linguist Yuen Ren Chao that describes the bizarre tale of a lion-eating poet. Yuen's homophonic masterwork performs a most impressive manipulation of tonal gymnastics, revealing a story that—if reproduced phonetically with English letters—would only require the constant repetition of a single word: shi.

Although the perversion of the Chinese language over the years may create a bit of incoherence in the reading of the poem, any moderately-trained reader can still easily enjoy its ingenuity.

In English, the poem basically reads like this:

In a stone den was a poet named Shi, who loved to eat lions, and had resolved to eat ten.

He often went to the market to hunt for lions.

At exactly ten o'clock, ten lions had just arrived at the market.

At that moment, Shi had just arrived at the market too.

Seeing those lions, he shot them with his arrows.

He brought the corpses of the ten lions to the stone den.

The stone den was damp, so he had his servant clean it.

After the stone den was cleaned, he tried to eat those ten lions.

When he ate, he realized the corpses were in fact ten stone lions.

Try to explain this matter.

Using 92 Chinese characters, this poem seems innocent enough, save for the strange narrative it conveys:



POET'S MEAL? The consumption of ten stone lions seems like a ridiculous subject for a poem, but this work has a linguistic, rather than semantic goal. PUBLIC DOMAIN

石室詩士施氏
嗜獅 誓食十獅
氏時時適市視獅
十時 適十獅適市
是時 適施氏適市
氏視是十獅 恃矢勢
使是十獅逝世
氏拾是十獅屍 適石室
石室濕 氏使侍拭石室
石室拭 氏始試食是十獅屍
食時 始識是十獅屍
實十石獅屍
試釋是事

While the ideas expressed in this poem are ridiculous at best, Westerners can most appreciate this work when it is produced in Pinyin, a form of Romanized writing where every character is converted into one syllable and where every tone is expressed by using four distinct accents used by the Chinese language and its derivatives:

Shishi shishi Shi Shi, shi shi,
shi shi shi shi.
Shi shishi shi shi shi shi.
Shi shi, shi shi shi shi shi.
Shi shi, shi Shi Shi shi shi.
Shi shi shi shi shi, shi sh shi,
sh shi shi shi shishi.
Shi shi shi shi shi shi, shi shishi.

Shishi shi, Shi sh shi shi shishi.
Shishi shi, Shi sh shi shi shi
shi shi.
Shi shi, sh shi shi shi shi, shi
shi shi shi shi.
Shi shi shi shi.

Almost like a game, "The Lion Eating Poet in the Stone Den" manages to describe the complete tale of a daring writer, using only the word "shi." Yet how could merely four tones of one word produce such a complete narrative?

A language like English, of course, has homophones too (words that sound alike but have different meanings)—like "flower" and "flour," "meet" and "meat." But sounds are limited to at most two or three concepts. In Mandarin Chinese, a falling, rising, dipping or even tone can vastly change the meaning of a spoken syllable. Add the variable of context into the mix, and the possible meanings for a single syllable becomes disturbingly vast.

Within the poem, concepts such as "stone," "eat," "ten," "promise" and "time" have the same tone of pronunciation, while others like "lair" or "story," are in a different tone. However, the poem loses its original pronunciation if the written characters are read in dialects other than Mandarin, such as Cantonese, Taiwanese or Hakka.

Tonal languages can be found all over the world, and some have even greater tonal variations than those found in Chinese. The apparent confusion caused by the repetition of the same syllable over and over again disappears when one considers that in the mother tongue of the Orient, the context within each phrase says a lot about the meaning itself.

You can find the enunciation of the complete poem at <http://videodownloader.net/especial/shi.mp3> If it doesn't elicit surprise, then this phonetic rarity should be capable, at least, of producing a smile.

NSF, NASA successfully flight-test new balloon over Antarctica

National Science Foundation

The National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA) have successfully launched and demonstrated a newly designed super pressure balloon prototype that will one day enable a new era of high-altitude scientific research. The super pressure balloon is expected to ultimately carry large scientific experiments to the brink of space for 100 days or more.

"This flight test of NASA's seven-million-cubic-foot super pressure balloon is a very important step forward in building a new capability for scientific ballooning based on sound engineering and operational development," said W. Vernon Jones, NASA's senior scientist for suborbital research at NASA Headquarters in Washington. "While the team has a ways to go in scaling up the pumpkin balloon to be able to lift a one-ton instrument to a float altitude of 110,000 feet, the team has demonstrated they are on the right path."

The super pressure balloon was highlighted in the National Research Council's decadal survey, "Astronomy and Astrophysics in the New Millennium," and will play an important role in providing inexpensive access to the near-space environment for science and technology.

The test flight was launched Dec. 28, 2008, from McMurdo Station, NSF's logistics hub in Antarctica. NASA and NSF conduct an annual scientific balloon campaign during the Antarctic summer. NSF manages the U.S. Antarctic Program and provides logistic support for all U.S. scientific operations in Antarctica.

In January 2008, the agencies jointly achieved a new milestone in the almost 20-year history of scientific ballooning in Antarctica by launching and operating three long-duration sub-orbital flights within a single southern-hemisphere summer.

Unique atmospheric circulation over Antarctica during the austral summer allows scientists to launch balloons from a site near McMurdo Station and recover them from very nearly the same spot weeks later, after the balloons have circled the continent one to three times. Antarctic flights are of a long duration because of the polar vortex, a persistent, large, low-pressure system, and because there is very little atmospheric or temperature change. Constant daylight in Antarctica means no day-to-night temperature fluctuations on the balloon, which helps the balloon stay at a nearly constant altitude for a longer time.

The newly tested balloon reached a float altitude of just over 111,000

feet and continues to maintain a nearly constant altitude into its eleventh day of flight. The purpose of this flight is to test the durability and functionality of the scientific balloon's unique pumpkin-shaped design and its novel material, a lightweight polyethylene film. The new material is a special co-extruded polyethylene film, about the thickness of ordinary plastic food wrap.

"Our super pressure balloon development team is very proud of the tremendous success of the test flight and is focused on continued development of this new capability to fly balloons for months at a time in support of scientific investigations," said David Pierce, chief of the balloon program office at NASA Goddard Space Flight Center's Wallops Flight Facility, Wallops Island, Va. "The test flight has demonstrated that 100 day flights of large, heavy payloads is a realistic goal."

The promise of ultra-long duration missions using the super pressure balloon is that the balloon cost is considerably less than a satellite and the scientific instruments flown can be retrieved and launched again.

This 7 million cubic foot balloon is the largest single-cell, super-pressure (fully sealed) balloon ever flown. When development ends, NASA will have a 22 million cubic foot balloon that can carry a one-ton instrument to an altitude of just over 110,000 feet—three to four times higher than passenger planes fly.

In addition to the super pressure test flight, two additional long duration balloons have been launched from McMurdo during this year's campaign. The University of Hawaii Manoa's Antarctic Impulsive Transient Antenna (ANITA) launched December 21 and is still aloft. Its radio telescope is searching for indirect evidence of extremely high-energy neutrino particles possibly coming from outside our Milky Way galaxy.

The University of Maryland's Cosmic Ray Energetics And Mass (CREAM IV) experiment launched December 19 and landed January 6. The CREAM investigation was used to directly measure high energy cosmic-ray particles arriving at Earth after originating from distant supernova explosions elsewhere in the Milky Way galaxy.

The Wallops Flight Facility manages NASA's scientific balloon program for NASA's Science Mission Directorate. Launch operations are conducted by the Columbia Scientific Balloon Facility, Palestine, TX, which is managed for NASA by the Physical Science Laboratory of New Mexico State University, Las Cruces.

Panel backs first drug made from DNA-altered animals

ROCKVILLE, Md. (Reuters) U.S. advisory panel recommended approval of what would be the first drug made using genetically engineered animals on the U.S. market, saying it appeared safe and effective despite concerns heard from groups worried about the genetic tinkering.

The product, GTC Biotherapeutics Inc experimental anti-clotting therapy Atryn, is made using a human protein from female goats engineered to produce it in their milk. GTC is seeking approval to sell the intravenous therapy to prevent excessive blood

clots in patients with an inherited clotting disorder.

Company data showed the drug was safe and effective, the majority of the Food and Drug Administration 19-member panel said Friday. The FDA will weigh the recommendation as it decides whether to approve the product. A decision is expected by Feb. 7.

"This will ... set a precedent for what will happen in the future," said Dr. Richard Colvin, the panel's consumer representative and a clinical assistant in medicine at Massachusetts General Hospital.

But some genetic-safety and an-

imal advocates at the meeting expressed concern about the use of such so-called transgenic animals despite the drug benefits, saying more information is needed from the agency about genetically engineered animals overall.

The FDA issued preliminary guidelines in September about how it would regulate animals whose DNA has been altered and called for public comment, but it has not yet issued final details.

"Approving Atryn could be a back door way to approve transgenic animals," said Jaydee Hanson, a policy analyst for the non-

profit group Center for Food Safety.

Between 60,000 and 600,000 people in the United States have the excessive clotting disorder, known as hereditary antithrombin deficiency, according to GTC.

Atryn is made from human protein produced in milk from genetically engineered goats bred using cells injected with human DNA, according to GTC. Females then express the human anti-clotting protein in their milk.

The drug is licensed to Ovation Pharmaceuticals Inc in the United States.