



## **PRESS RELEASE No 2**

**Center for Social Communication / CBPF**

**[For immediate release]**

**What:** Physics Nobel prize will present new results on one of the greatest mysteries of the universe, the dark matter, in international scientific meeting to be held for the first time in South America

**When:** From 02 to 09 July this year.

**Where:** SulAmérica Convention Center.

**Why:** To present the latest scientific results in the physics area.

## **NOBEL OF PHYSICS WILL PRESENT IN RIO UNPUBLISHED RESULTS ON THE MYSTERIOUS DARK MATTER**

**The ICRC (International Cosmic Ray Conference) - which will occur for the first time in South America - will feature the American physicist and 1976 Nobel Prize in Physics, Samuel Ting, who will present the latest results of a space experiment that studies the dark matter, the mysterious component which accounts for about a quarter of the constitution of the universe**

**Rio de Janeiro, March 2013 -** The 33<sup>rd</sup> edition of ICRC (*International Cosmic Ray Conference*)- one of the largest, most important and traditional gatherings of the Physics world - will, on 08/June, have the presentation of the American physicist and 1976 Nobel Prize in Physics, Samuel Ting, the current leader of the AMS experiment (acronym for Alpha Magnetic Spectrometer.)

With a cost of \$ 2 billion, the AMS is a particle collector of seven tons installed in May 2011 at the International Space Station. So far, the machine has captured billions of particles and atomic nuclei - among the latter, electrons and their antimatter, the positrons

- and recorded the energy of each of these subatomic debris.

Such data - Ting will reveal that for the first time at the Conference - may be the first indication of an unambiguous detection of the so-called dark matter, which still eludes direct observation by scientists.

Dark matter is considered one of the greatest mysteries of nature today.

Other experiments like the LHC at CERN (largest particle accelerator in the world), as well as underground detectors, are in the race for dark matter detection.

Competition is fierce in the global scientific community.

This is the first edition of the ICRC in with participation of scientists studying the mysterious dark matter. For this reason, the ICRC adopted the subtitle 'The Conference of Astroparticle Physics'

Only 5% of the constitution of the universe is known. This is called ordinary matter (or baryonic), the one which form stars and planets, humans and micro-organisms - i.e., the entire visible universe around us.

There is evidence that the remaining 95% are divided into dark matter (about 25%) and dark energy (70%). Dark matter can only be detected by the gravitational pull it exerts on other celestial bodies, because it does not emit any form of light - hence the name 'dark'. So far, its nature is a mystery to science.

Instead, dark energy plays a similar role to an 'antigravity' and it is suspected that it is responsible for making the universe expand at an accelerated rate.

**Scientists worldwide** - The 33<sup>rd</sup> edition of the ICRC will be held between 02 and 09 July this year, at the SulAmérica Convention Center in the city of Rio de Janeiro.

This is the first time the event will take place in South America

It is estimated that approximately 1000 scientists worldwide - among which are renowned international experts - will come to Brazil for the seven-day conference.

A first edition of the ICRC - as this meeting is best known by the international community of physics - occurred shortly after the end of World War II, and since then has happened every two years. The last two meetings were in Beijing (China) in 2011, and Lodz (Poland) in 2009.

**Others mysteries of nature** - The ICRC focuses on topics traditionally linked to the physics of cosmic rays and high-energy astrophysics and particle astrophysics. But it also attracts scientists working on topics related to gamma rays and neutrinos - for technical terms, see "**Glossary**" at the end of this release.

There are over 300 scientific lectures planned - in plenary and parallel sessions - as well as several lectures for the general public.

**Organization** - The Brazilian edition of the ICRC is being organized by the Brazilian Center for Physics Research (CBPF) - organ of the Ministry of Science, Technology and Innovation (MCTI) - Federal University of Rio de Janeiro and the Brazilian Physics Society, sponsored by the National Council for Scientific and Technological Development (CNPq), the Coordination for Improvement of Higher Education Personnel (Capes) and the Foundations for Research Support of Rio de Janeiro (FAPERJ) and São Paulo (FAPESP).

**received awards** - At the ICRC are traditionally presented the awards of the IUPAP (International Union of Pure and Applied Physics) for research in physics of cosmic rays and particle astrophysics.

**Tradition** - Last year, we celebrated the 100th anniversary of the discovery of the origin of cosmic rays. The experiments that led to the conclusion about the extraterrestrial origin of this radiation got the Austrian physicist Victor Hess (1883-1964) the Nobel Prize in Physics in 1936.

Brazil has a long tradition in related areas to the meeting, with researchers involved in various international scientific collaborations dedicated to study of the most energetic particles in the universe, such as the Pierre Auger Observatory in Argentina ([www.auger.org](http://www.auger.org)), the European laboratory CERN (European Center for Nuclear Research) in Switzerland ([www.cern.ch](http://www.cern.ch)) and the CTA (*Cherenkov Telescope Array*) ([www.cta-observatory.org](http://www.cta-observatory.org)), the most important experiment in high energy astrophysics in the next decade and whose operations should begin by 2018 - with a great chance of being installed in South America.

The physics of cosmic rays had as one of its pioneers the Brazilian physicist César Lattes (1924-2005), founder of CBPF in 1949 and one of the discoverers, in the late 1940s, of the so-called pi meson, which serves as a particle 'glue' for the protons and neutrons, holding the atomic nucleus together.

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### **GLOSSARY**

**Cosmic rays** - are atomic nuclei - some extremely energetic, the most energetic particles known by science - that bombard the Earth all the time, from space. When they collide with atoms in the atmosphere, they create a 'shower' of particles - sometimes billions - which reach the ground. The less energetic ones come from the Sun, whereas the average energy particles are generated when massive stars explode at the end of their lives. The ultra-energetic cosmic-rays are probably created in black holes that occupy the core of some galaxies.

**Gamma-ray bursts** - are the most energetic events of nature since the birth of the universe, called the *Big Bang*. One of these explosions can emit energy in the form of extremely energetic light (gamma rays), equivalent to that obtained by the total evaporation, in seconds, of the the weight of a thousand planets like Earth.

**Neutrinos** - They are the most elusive particles known to science. They can walk through a wall of lead about 10 trillion km thick without bumping against atoms. Neutrinos are created in abundance in the universe: stars, cosmic rays, on Earth by nuclear power plants, the natural radioactivity of our planet and even the human body - each of us, because of radioactive elements in our bodies, emit about 10 million neutrinos per hour. Every second, trillions of neutrinos pass through our bodies - and therefore the Earth - almost without interacting with matter.



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