



Second Iberoamerican Graduate School of Astrobiology: Origins from the Big Bang to Civilisations

Montevideo, September 7-13, 2009

In 1999 the Abdous Salam International Centre for Theoretical Physics (ICTP), the International Centre for Genetic Engineering and Biotechnology, both in Trieste, Italy and the Chancellor's Office of the Universidad Simon Bolivar (USB) organized the First Iberoamerican School of Astrobiology in Caracas, Venezuela (28 Nov- 8 Dec. 1999) this event had also the sponsorship of TWAS, UNESCO, NASA and ESA (see J. Chela-Flores, G.A. Lemarchand and J. Oró (eds.), *Astrobiology: Origins from the Big Bang to Civilisation*, Kluwer Academic Pub., 2000) . This graduate school was a success and several of the students that participated in it 10 years later are now leading research groups, performing cutting-edge basic research in several topics related with Astrobiology.

The year 2009 combines a great variety of events:

- International Year of Astronomy 2009;
- 400 years of Galileo's first sky observation with a telescope,
- 400 years of the publication of "*Astronomia Nova*" by J. Kepler;
- Darwin Birth's Bicentenary;
- 200 years of the publication of "*Philosophia Zoologica*" by Jean B. Lamarck;
- 150 years of the publication of "*The Origin of Species*" by Charles Darwin,
- 50 years of the publication "*Searching for Interstellar Communication*" the seminal paper by G. Cocconi and P. Morrison published at the mainstream journal *NATURE*, with the foundations of the present radioastronomical search for intelligent life in the universe.
- 10 years since the *First Iberoamerican School of Astrobiology* (Venezuela, 1999)
- 60 Anniversary of the Regional Bureau for Science in Latin America and the Caribbean.

UNESCO's Regional Bureau for Science in Latin America and the Caribbean in cooperation the School of Sciences from the University of the Republic (Montevideo) and the Argentine Institute for Radioastronomy (Conicet, Argentina) is organizing the Second Iberoamerican School of Astrobiology: from the Big Bang to the Civilizations to be held in Montevideo, Uruguay on September, 7-13, 2009.

This graduate school will provide Latin American and Caribbean students the possibility to contact different regional and international experts in cutting-edge research related with Astrobiology: the search for life in the universe. This is an interdisciplinary and intersectoral research activity that combines knowledge of physics, astronomy,

biology, geology, atmospheric sciences, hydrology, electronic engineering, ecology, cognitive sciences, sociology and philosophy.

The Second Graduate School of Astrobiology will be held in Montevideo, Uruguay and will host 60 national and regional graduate students and about 15 different professors from Latin American & Caribbean countries as well as from Europe and USA.

Project Objectives

- The School will provide graduate students from Latin America and the Caribbean the possibility of contact and strong interaction with different regional and international experts on cutting-edge research related to astrobiology that is usually not accessible in their own countries.
- Build links between students, experts and institutions working in cutting-edge scientific knowledge such as astrobiology.
- Generate an environment conducive for research and regional exchange of innovative ideas through the presentation of scientific reports in a separate section of the Graduate School, where students and teachers can share their ongoing R&D results.
- Support for school science teachers, professors and institutions with innovative learning techniques, focused on basic and engineering sciences and its applications to attract students to enroll in careers in science and engineering.
- To popularize among the general public a set of the most advanced and innovative ideas based in scientific knowledge to understand the origin of life in a cosmic context and the possibility of its detection in other parts of the universe.

Project Goals

- The graduate course aims to strengthen the development of scientific, technological and innovation activities in Latin America and the Caribbean to train students in one of the new cutting-edge knowledge and state of the art technologies that have developed over the past decade. These skills are often not available within the universities in the region.
- Create and strengthen networks for science and technology through exchange of experiences
- Strengthen of scientific North-South and South-South cooperation.
- Promote research, development and application of cutting-edge science in Latin America and the Caribbean related to physics, biogenesis, astronomy, molecular biology, geology, atmospheric sciences, planetary sciences, electronic engineering, hydrology, ecology, cognitive science, sociology and philosophy.
- Promote capacity-building in inter-and transdisciplinary research in Latin America and the Caribbean



- Promote the development of cutting-edge technologies for the analysis and signal processing using cosmic radio telescopes, designing and building instruments for space missions.
- Development of methodologies for surveying and remote sensing Earth observations from space focused on the analysis of natural resources, environmental behavior, evolution of living systems, impact of climate change on life on earth, comparative studies of long-term climatology of other planets, etc.
- Application of the methodologies used to analyze stellar planetary habitability and its application to understand their influence on the so-called natural disasters on Earth
- Helping to generate a field of postgraduate education in cutting-edge areas of science that are not available in universities in the region.
- Conducting a workshop for teachers and science professors in secondary schools and colleges, lead by the international scientists which will be attending the Graduate Course. Strengthening the education system of the host country and neighboring countries (MERCOSUR).
- Contribute, through a series of conferences and seminars (by international prominent scientists) for the general public and to stimulate public interest in cutting-edge scientific issues. This fact is strengthened by the general interest in the subject of the search for life in the universe.

Dates:

- Graduate School: September 7-12, 2009
- Workshop for science teachers: September 12-13, 2009
- Public Lectures: 4 lectures during the week September 7-13, 2009

Main activities

- Lectures given by international experts from the countries of LAC region, U.S. and Europe.
- Poster sessions, where students and experts presented the results of their R&D.
- Workshop for school teachers and schools with innovative learning techniques focused on the teaching of basic sciences and its applications.
- Public lectures in which experts popularize their cutting-edge research topics about several basic and engineering sciences topics, related to the search for life in the universe.

Project outcomes

- South-South cooperation in basic and engineering sciences is promoted.



- The national and regional capacities for research, human resource training in the basic and engineering sciences are strengthened.
- Educational institutions (universities and schools), national research systems, and the general public awareness on cutting-edge science and technology is promoted.
- The national and regional capacities for advanced training and university education in basic and engineering sciences are strengthened.
- Scientific research enhanced through greater integration of the participants (graduate students and teachers) in the region.
- Lectures recorded and published on the web to increase its impact.
- A textbook about Astrobiology (the first one in Spanish) will be published.

Graduate School Program

1. Origins of the Universe: Contemporary Theories about Cosmic Origins and its Evolution
2. Chemical Evolution of the Galaxy
3. The Search for Solar Analogs
4. Origins and Evolution of Planetary Systems
5. The Search for Exoplanets
6. The Evolution of Planetary Atmospheres
7. Alternative Models of Extrasolar Habitable Zones
8. Cosmochemical Evolution and the Origin of Life on Earth
9. The Search for Life in the Solar System
10. Biological Bases for the Study of the Evolution of Life in the Universe
11. The Study of Extreme Environments for Life: Extremophiles
12. Origins and Evolution of Cognitive Systems
13. Radio and Optical Searches for Artificial Extraterrestrial Signals: Project SETI
14. Lifetimes of Technological Civilizations
15. Philosophical Implications of the Search for Extraterrestrial Life

Invited Speakers

- **Ricardo Amils Pibernat**, *Centro de Astrobiología de Madrid (CSIC-INTA) SPAIN**
- **César Bertucci**, *Instituto de Astronomía y Física del Espacio (Conicet) ARGENTINA**
- **Frank D. Drake**, *SETI Institute, USA**
- **Julio A. Fernández**, *Facultad de Ciencias, Universidad de la República, URUGUAY**
- **Jorge Heraud-Pérez**, *Pontificia Pontificia Universidad Católica del PERÚ**
- **Álvaro Giménez**, *Director, Centro de Astrobiología de Madrid (INTA-CSIC) SPAIN**
- **Antonio Lazcano**, *Facultad de Ciencias, UNAM, MEXICO**



- **Guillermo A. Lemarchand**, *UNESCO's Regional Bureau for Science in Latin America and the Caribbean* also at *Argentine Institute for Radioastronomy ARGENTINA**
- **Martin Makler**, *Centro Brasileiro de Pesquisas Físicas BRAZIL**
- **Eduardo Mizraji**, *-Facultad de Ciencias, Universidad de la República, URUGUAY**
- **Marcelo I. Guzman**, *School of Engineering and Applied Sciences & Department of Earth and Planetary Sciences, Harvard University, USA**
- **Rafael Navarro González**, *Instituto de Ciencias Nucleares, UNAM, MEXICO**
- **Antígona Segura**, *Instituto de Ciencias Nucleares, UNAM, MEXICO**
- **Gustavo Porto de Mello**, *Universidade Federal do Rio de Janeiro, Departamento de Astronomía, BRAZIL**
- **Gonzalo Tancredi**, *Facultad de Ciencias, Universidad de la República URUGUAY**
- **Felisa Wolfe-Simon**, *Dept. of Earth and Planetary Sciences, Harvard University, USA**

* Confirmed

Beneficiaries:

- Graduate School: a selection of the best candidates among graduate students in basic and engineering sciences programs (master and doctorate level) from LAC region (approximately 20 from Uruguay and 40-50 from other countries in the region).
- Workshop for science teachers: Teachers and professors from secondary education level from Uruguay and MERCOSUR countries (approximately 50 teachers)
- General Public: Members of academia and the general public interested in astrobiology.

Special Considerations:

- UNESCO's contribution will be focused on the selection of students, teachers and school organization, promoting quality and the establishment of guidelines for governments, strengthen linkages between public and private sectors on key issues to ensure the development of cutting-edge knowledge and state-of-the-art technologies.
- Universities, governments and private sectors will benefit by the identification of potential young professionals and researchers and to promote innovative ideas from young graduates.

External factors to be considered:

- Low number of students in master or doctoral level in Latin America and the Caribbean.

- Limitations to cover travel expenses for the students to the host country.
- Access to cutting-edge topics.
- The universities and governments willing to develop human resources in cutting-edge scientific knowledge.

Scientific Organizing Committee (SOC):

- **Julián Chela Flores**, International Centre of Theoretical Physics, Trieste, ITALY
- **Frank D. Drake**, SETI Institute, USA
- **Julio A. Fernández**, Dean, Faculty of Sciences, Universidad de la República (UDELAR), URUGUAY
- **Álvaro Giménez**, Director, Centro de Astrobiología (INTACSIC), SPAIN
- **Guillermo Giménez de Castro**, McKenzie University, BRAZIL
- **Jordi Gutiérrez**, Universitat Politècnica de Catalunya, SPAIN
- **Antonio Lazcano**, Universidad Nacional Autónoma de México (UNAM), MEXICO
- **Guillermo A. Lemarchand**, IAR, ARGENTINA and UNESCO Regional Bureau for Science in Latin America and the Caribbean URUGUAY (Chairman)
- **Pablo Mauas**, Instituto de Astronomía y Física del Espacio (CONICET) ARGENTINA
- **Rafael Navarro González**, Universidad Nacional Autónoma de México (UNAM), MEXICO
- **Adriana Ocampo**, NASA Headquarters, USA
- **Gustavo Porto de Mello**, Universidade Federal do Rio de Janeiro, (UFRJ), BRAZIL
- **Juan G. Roederer**, University of Alaska Fairbanks, USA
- **Antígona Segura**, Universidad Nacional Autónoma de México (UNAM), MEXICO

Local Organizing Committee (LOC):

- **Andrea Sánchez**, Depto. Astronomía, Facultad de Ciencias, UDELAR, Uruguay
- **Gonzalo Tancredi**, Depto. Astronomía, Facultad de Ciencias, UDELAR, Uruguay
- **Lenín Henríquez**, Oficina Regional de Ciencia de la UNESCO para América Latina y el Caribe, Uruguay
- **Leda Sánchez**, Depto. Geología, Facultad de Ciencias, UDELAR, Uruguay
- **Jean Philippe Gibert**, Depto. Paleontología, Fac. de Ciencias, UDELAR, Uruguay
- **Mariana Martínez**, Observatorio Astronómico Los Molinos, MEC, Uruguay

Contacto: <http://www.astronomia.edu.uy/astrobiologia2009/>
<http://www.unesco.org.uy/>