

## Introduction

The Physics Department and TANDAR Laboratory have, once again, delivered a significant production during 2002, a year that will be especially remembered for the hardship that the whole country and its society had gone through. In this context our staff managed to enthusiastically pursue the goals set for the various ongoing research projects. We have continued our experimental and theoretical activities in the fields of nuclear physics, condensed matter, astrophysics, solar energy, amorphous-carbon films, microelectromechanical systems, interdisciplinary research using the heavy-ion accelerator TANDAR, chaos and complex systems. All of these developments have profited from the support provided by the central auxiliary laboratories and sectors in charge of electronics, high-vacuum, target and thin-foil production, mechanical workshop, computers and networks, operation and maintenance of the heavy-ion accelerator, general maintenance, and administration.

Teaching activities at post-graduate level have continued to play a central role in our Department life. Approximately twenty-five graduate students have worked on their thesis work carried out in the framework of the different research projects. In addition, about thirty other students have worked on special assignments required in advanced physics courses, and in the framework of technical training at various levels. Systematic outreach activities organized by the Physics Department have involved large numbers of senior high-school students through special courses, lectures delivered by active researchers, and direct practice in our laboratories.

A summary of the different lines and projects is provided at the beginning of each of the corresponding sections. Therefore I will list in what follows just a few of the most relevant results and facts of the year.

- The heavy-ion accelerator TANDAR has provided its first alpha-particle beam and has put in routine operation a new multicathode ion source. Initial tests have been done to increase the pressure of the insulating gas by means of the partial replacement of pure SF<sub>6</sub> by a much more inexpensive admixture of SF<sub>6</sub> and nitrogen. The gas stripper system has been reconditioned and the production and characterization techniques of thinner solid strippers have been improved.
- In the field of Boron Neutron Capture Therapy using Accelerators, the microbeam facility of the TANDAR accelerator has been used for the first time to produce microdistribution maps of copper in tumoral tissues. Copper was used in this case as a marker for boron-bearing drugs related to BNCT treatments.
- Nuclear Reaction studies have benefited from the upgrading of the control system of the magnetic spectrometer.

- Condensed Matter research has improved its equipment thanks to the donation of a single-crystal x-ray diffractometer made by the University of Durham, UK. The group has successfully organized the international workshop *Frontiers of Condensed Matter (FMC2002)*. This first workshop of the series was motivated as a recognition to the significant contribution of Dr. Mariana Weissmann to the advancement of the field.
- The strong involvement of our research staff and graduate students in the Pierre Auger Project, an international collaboration aimed at the study of the highest-energy cosmic rays, has continued.
- Activities related to microelectromechanical systems (MEMS) have grown in importance in this year. Two agreements have been signed, one with a private firm and the other with the Argentine Space Agency (CONAE) for the development and provision of an electronic nose, and equipment for satellite use, respectively.
- The Solar Panels Project has almost completed its new laboratory for panel integration in connection with the satellite mission SAOCOM.

I would like to thank all members of the Physics Department (scientific, technical and support staff of our home institution, associated research staff from other institutions, students, and external users) who have played the leading role in the results achieved in the year 2002.

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