Science and Nature

THE MEPSICRON. A MEXICAN BREAKTHROUGH IN ASTRONOMY AND TECHNOLOGY

The dividing line between basic science and technology is gradually blurring. Just as science can't do without the new tools provided by advanced technology, many modern technological developments would be unthinkable without the inspirations of the basic sciences. Nevertheless, there are people in the developed countries who maintain that basic science is not a profitable means of generating technological advances. The story of the "Mepracon" serves to prove them wrong.

The Mepracon project got underway in the late 70s to meet a specific need in the field of astronomy. Scientists wanted to observe the sky from ships at sea. To this end, a modern in-depth astronomical observatory was set up in the northern part of continental Mexico with the help of UNAM. This observatory, which was much smaller than the others, did not have a 2.1-meter telescope. The equipment consisted of one light meter, which permits very accurate light collection analysis, and an instrument for extragalactic research, a high sensitivity, low internal noise, good resolution, and extended dynamical range detector. This was necessary but none of the most recent television cameras could meet these requirements.

The project to actually build the new detector took off in 1981, and was named shortly afterwards "Mepracon." The name is an acronym for Microchannel Electron Position Sensor I (and) CRON (then). The success was partially due to previous experiences in television technology which at the time were one of the most advanced techniques for astronomical observations. A series of key experiments were carried out with the cooperation of the Space Science Laboratory at the University of California Berkeley in order to demonstrate that a very high quality detector was possible. Later, the emphasis was on improving and optimizing the design. The detector was designed and built.

The detector was given its first test in 1983 in the Baja California Observatory. A group of technicians tried to guarantee optimal performance of the equipment and to observe its reactions through time and under special operating conditions. A great amount of information has been gathered in the last three years some of which will help serve to correct technical and operational aspects of the equipment. Thanks to the scientific results obtained, those difficult conditions of the first tests will not change to a great extent when the special laboratory currently under way. This will allow for new technological solutions and further advances.

While the first detector had one of the highest resolutions ever achieved with electronic sensors, today a new design is ready that is compatible with a resolution two times higher, and research is underway to achieve a resolution four times higher than the original device.

One of the problems that appeared during the experimental phase was the insufficient stability of the space light sensitive film: the photosensitive elements are still under way in order to guarantee a more stable regime. An additional pleasant surprise is that Mepracon turns out to have applications in scientific and technological fields besides astronomy. Because of its flexibility, it can easily be applied to an electronic microscope in order to supply high-quality images of the micro-world. Experiments carried out in UNAM's Institute of Physics showed that Mepracon is able to provide information on objects not visible to conventional technologies. This is basically related to small, dynamical range, i.e., the capacity to simultaneously detect faint and bright details of an image. Interesting experiments in biology and medicine are also ready to be carried out.
Last September the "Mepsicon" project was awarded first prize by UNAM in the field of technological research. This was a high point in the special attention the University has given this project.

Just as the project has been instrumental in overcoming the false conflict between basic science and technology and the benefits in both directions are obvious now, UNAM is seeking to find applications for this technology in production. The uses of "scientific prototypes" will always be limited in comparison with a manufactured model. Yet the resources put into designing and building an industrial prototype are justifiable on the basis of great production volumes and marketing possibilities. On the other hand, the potential demand from fields in which "Mepsicon" technology may be applied can only be met with industrial production. The process and responsibility of carrying out this project is an important and illuminating experience. It began five years ago as a technological development in astronomy. Then it became a source of inspiration for other fields of science. And now it is possible that "Mepsicon" will even be industrially manufactured, a process from which surely new ideas and inspiration will come.

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