



- La Silla
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Portugal and ESO Sign Cooperation Agreement

To some of the experienced diplomats in the attentive audience, the festive ceremony on July 10, 1990, may have been just another of the steps towards European integration, now being taken all over the continent. But for the astronomers from Portugal and ESO, this official act was much more than that; it was a joyous event that marked

the beginning of a new, interactive era with high expectations.

On a hot summer's day in Lisbon, the Republic of Portugal and the European Southern Observatory signed a Cooperation Agreement which is aimed at *full membership of Portugal in ESO within the next ten years.*

During this period, the Portuguese

Government "will allocate an amount equivalent to a percentage of the annual contribution Portugal would have to pay, if it was already a member of ESO, to the development of research in the field of contemporary Astronomy, so as to permit a future efficient usage of ESO's facilities by Portuguese astronomers". This amount will be spent



At the signing ceremony in Lisbon. From left to right: Professor Teresa Lago (Astrophysical Centre, Porto), Professor Harry van der Laan (ESO Director General), Professor José Pedro Sucena Paiva (Portuguese Secretary of State for Science and Technology), Professor Carlos Salema (President of JNICT), Mr. Fernando Gonçalves (Chief of Cabinet of the Secretary of State).

on a number of infrastructures necessary for the development of Astronomy in Portugal and on technological and scientific training actions related to ESO's activities.

In return, Portuguese astronomers will have access to ESO's facilities during the pre-accession period under scientific conditions similar to those of Member Countries. It is expected that the OPC will soon receive the first proposal(s) from Portugal, and that some joint programmes with astronomers from ESO member countries will be worked out before the end of the year.

A Joint Portuguese/ESO Advisory Body is being set up to monitor the development of Portuguese astronomy and its interaction with ESO.

The Agreement was signed on behalf of the Portuguese Government by His Excellency, Secretary of State for Science and Technology, Prof. Dr. José Pedro Sucena Paiva, and for ESO by its Director General, Prof. Dr. Harry van der Laan. Among the invited guests were high government officials, quite a few Portuguese scientists representing other scientific fields, as well as many media representatives who reported extensively about this event in TV, radio and newspapers.

Joining the Secretary of State and the Director General on the platform were the President of Junta Nacional de Investigação Científica e Tecnológica (JNICT: National Board for Science and Technological Research), Prof. Dr. Carlos Salema, and Prof. Dr. Teresa Lago, Astrophysical Centre of the University of Porto, both of whom played key roles during the extensive preparations that preceded the conclusion of this Agreement, which was approved by the ESO

Council in December 1989.

The ceremony commenced with the showing of a short video film about ESO and its role in European astronomy. Professor Lago then commented on the present situation in Portuguese astronomy. It is in a critical period of growth, for which the association with ESO will be a great support and stimulus. The full text of the speech is reproduced on the next page; see also the summary on page 4.

Following the solemn act of signature, Professor van der Laan expressed his great pleasure in connection with the new association between Portugal and ESO. He expressed his conviction that the ancient astronomical tradition in Portugal, particularly evident at the famous naval institute founded by Henry the Navigator and of such a great importance for the far-reaching expeditions of that time, will continue and be strengthened by the interaction with ESO. He surveyed the ESO facilities and the importance of astronomy, not just as a science in its own right, but also as a driver for new and advanced technology which may be of great use in many other fields as well. He looked forward to the day when a new generation of Portuguese astronomers will be able to make full use of their new opportunities within the European astronomical community and when Portugal will become a Member State of ESO.

In his discourse (English translation hereafter), the Secretary of State emphasized the rapid progress in astronomy, in particular because of modern technology. He stressed the importance attached by his country to the furthering of scientific and technological projects within a European framework.

In this connection, significant support is now becoming available, especially after Portugal became a full member of the European Community. In its present quest for development, Portugal can draw inspiration from the Great Maritime Discoveries in earlier centuries.

In the afternoon, the Director General and his small ESO delegation went to Porto to visit the University and its Centre for Astrophysics, which was officially started here last year. Since 1984, when a programme for astronomical studies was first developed in Porto, there has been an increasing interest and a steadily growing number of students in this discipline. Several Master's degrees have been gained abroad and presently, a number of PhDs are well under way. In a few years, the Porto group can be expected to reach the critical mass, needed to introduce more, high-level courses. For the time being, there is a special interest in stellar studies and cosmology. The Astronomy Centre is neighbour to the University's Computing Centre and many of the students have become involved in image processing; MIDAS is being implemented. Some students have already made short visits to the ESO Headquarters.

It is obvious that Portuguese astronomy is in a phase of rapid and well considered expansion. With access to the ESO telescopes, more young astronomers in this country will be drawn towards observational studies and their possibilities for fruitful interaction with astronomers in other places will increase. And in ten years' time, or perhaps even before, the formal adherence of Portugal to ESO will follow naturally, with the full, mutual benefits.

The Editor

Speech by Professor José Pedro Sucena Paiva

It is indeed a great pleasure and privilege for me to sign on behalf of the Portuguese Government the Cooperation Agreement between the Republic of Portugal and the European Organization for Astronomical Research in the Southern Hemisphere – ESO –, a prestigious international organization devoted to scientific research in the field of Astronomy.

I firmly believe that this Agreement, which sets the conditions for Portugal's adherence to ESO within a ten-year period, will prove to be a decisive milestone for the development of Astronomy and Astrophysics in this country.

During this period Portugal will reinforce its scientific capability in this field,

namely through advanced training of human resources, so that the number of Portuguese astronomers becomes, in proportion to the scientific community, comparable to that of the ESO Member States. ESO will provide access to its facilities to Portuguese scientists and graduate students under scientific conditions similar to those of the Member States.

Man has always endeavoured to study the objects outside planet Earth and its immediate environment, including the Moon, Sun, planets, stars, the Galaxy and similar external star systems, interplanetary and interstellar matter, and the Universe as a whole.

Until the 17th century, astronomy was largely concerned with the measurement of the positions and motions of the Sun, Moon, planets, and apparently fixed stars visible to the unaided eye. Then the laws of planetary motion were discovered, the telescope was invented, and the laws underlying motion and gravitation were formulated.

In the 18th century the first ideas based on extensive observations of the structure of the Galaxy that contains the Earth and of the Universe were put forward.

The 19th century brought the introduction of two basic techniques, spectroscopy and photography, which led to new and quantitative methods for

measuring the quantity and quality of light and enable physical studies to be made of the brightness, temperatures and chemical nature of the stars and nebulae.

Theoretical analysis of the contribution of the stars advanced enormously in the 20th century through the development of quantum theory and other branches of physics, leading to a new discipline: astrophysics.

Astronomy now flourishes as never before: quasars and pulsars have been discovered and there are hopes that answers to problems such as the origin of the Universe, of chemical elements, of the Earth, and of life itself may be found.

The present development of Astronomy is to a large extent due to the use of modern technology, namely advanced telecommunications, electronic computers, precise timekeeping and rocketry.

This is also the case in other areas of fundamental research, the advance of which in effect many times requires the development of advanced technologies, which can partly justify the heavy investment necessary to provide the adequate facilities.

The risks involved in big science projects are not negligible, as the recent mishap with the Hubble Space Telescope well demonstrates. However, the potential rewards are enormous, since the intrinsic value of knowledge itself is invaluable and priceless.

The sight of our beautiful planet from space has made us fully aware of its smallness and fragility. Technology can in some way be defined as the means through which man manipulates the environment. This definition clearly shows that, despite its tremendous achievements, technology must be used in a way compatible with the survival of

Earth for the benefit of ourselves and the future generations. No generation has a freehold on this planet, all we have is a life tenancy, with a full repairing lease.

Science and Technology are now being seriously considered in this country at the political level. After many years of relative neglect, our scientific community is now the object of considerable attention and care. Conditions for scientific research and technological development have considerably improved in recent years, especially since Portugal's integration in the European Community in 1986.

At the turning point that Portugal is now, Science and Technology are key ingredients for our development and full participation in the construction of Europe.

International contacts are being strengthened rapidly and our scientists and engineers are involved in a sizable number of multinational R & D projects, namely in the context of the European Community Framework Programme.

The scientific communities of the different countries are certainly among the most internationalized bodies of the society, for obvious reasons. Science has always cut across barriers and frontiers and international contacts are instrumental for its development. Internationalization and mobility of scientists is therefore a cornerstone of our scientific policy.

The Portuguese Scientific Community is still relatively small – about 5000 full-time equivalent scientists – but young, competent and dynamic. This number has to be rapidly increased, both by new entry-level recruits and also by attracting senior foreign scientists.

At this stage, our infrastructures – buildings, equipment and support personnel – are still insufficient, limiting many times the efforts of our scientists

and making their life somewhat difficult. But there are some good prospects on the horizon to overcome this situation.

In the framework of the Structural Funds Reform of the EC, Portugal has submitted a Programme – emblematically named the Science Programme – designed to create new scientific infrastructures, reinforce existing ones and train new scientists. The programme, which was extremely well received by the EC Commission and approved with minor alterations, is now in the first stage of execution.

The articulation of this Programme with the new EC Framework Programme 1990/94 will certainly provide the stage for a rapid development of Portuguese Science and Technology. It is up to the scientific community to seize the opportunities available to them. The government should only create the right environment and of course adequate conditions and then step aside and in due time evaluate the results.

The private sector should be called upon to participate more actively in the R & D activities. We understand that for a small or medium enterprise, R & D is a very expensive activity. That is why University-Industry partnerships should be strongly encouraged and it pleases me to say that some encouraging examples have already flourished in this country.

In its present quest for development, Portugal can draw inspiration to the Great Maritime Discoveries of the 15th and 16th centuries, which were possible by the conjugation of four factors: (1) political will; (2) rigorous and methodic scientific knowledge; (3) enterprising spirit and the capacity of taking risks; (4) mastery of the technological systems of that time, navigation and weaponry.

The challenges which confront us nowadays require the same ingredients for an adequate response.

Speech by Professor Teresa Lago

I believe today is indeed an important mark in the development of Astronomy in Portugal. In the present times of awareness for Science and Technology, today's events are of indisputable importance for the future of Astronomy, both in research and education.

They come in the sequence of an initiative taken by JNICT in 1987, and the subsequent proposal for a nationwide programme for the development of Astronomy/Astrophysics. JNICT's initiative was then very important for Astronomy, always forgotten or merely tolerated both by research planners

and university authorities. Astronomy was, for the very first time, considered as one of the areas that should be developed.

Of equal importance was the simultaneous survey of the situation at the Portuguese Observatories – the first done in modern times – including a full enquiry on the facilities, personnel, activity (teaching and research), programmes and projects being carried out at the three University Observatories (Porto, Coimbra and Lisboa) and at the National Observatory (Lisboa). The conclusions of this survey gave a realistic image of the

situation at the, until then, unique State- or University-financed Institutions for astronomical activity. Although this is neither the place nor the time to comment on those results, they should, even today, be given serious and urgent attention. Qualified human resources are the crucial component, otherwise all efforts are condemned to failure.

The situation of Astronomy in Portugal remains very worrisome: instead of the "European average" of 10 to 20 astronomers/1,000,000 inhabitants, we are still short by a factor of 10! And the lack of long tradition of research work in

the field has made recovery more difficult.

The situation has substantially improved over the last two years. Some investment has been made. However, any programme for the development in Astronomy must necessarily include simultaneous components, risking to compromise the objectives aimed at, would any of them be neglected. These components are

(i) the education of a new generation of astronomers, both at University level and at doctoral level. At the doctoral level this should preferably take place abroad or through international collaborative projects, until a "critical mass" is achieved; this implies a steady number of grants for some period of time,

(ii) the support of a small number of infrastructures, providing the necessary facilities for research and education, and the support to those fields where competitive work is already being done, in order to avoid dispersion of the available resources,

(iii) the establishment of a small

number of temporary positions, both at the technical support level and post-doctoral level (national and/or foreign) so that research teams can be provided with acceptable working conditions; at a more advanced phase an adequate number of permanent research positions for Astronomy should also be considered,

(iv) finally the access to adequate observing facilities for Portuguese astronomers and postgraduate students.

The signature of this agreement with ESO is an event of great importance for the development of the astronomical research in Portugal. Not only does it fulfil some of our needs – the access to adequate observing facilities – but it also allows the collaboration and, at some level, participation with ESO at an exciting time – the time in which a very large telescope of a new generation and the important related instrumentation are being developed at ESO.

I believe this agreement constitutes the undeniable proof that the decision makers in Science and Technology in Portugal finally give to Astronomy the

credit it fully deserves and receives in other countries in Europe. I take this ceremony as a real commitment for a continuous and serious effort to develop Astronomy in Portugal. A commitment to provide conditions that allow the Portuguese astronomy to grow to levels comparable to the European ones over a period of time of 5 to 10 years.

I want to thank the Secretary of State for Science and Technology for his decisive support and involvement at the crucial stages of the negotiations with ESO. And to express to the ESO Director General my gratitude for his comprehension and understanding, that has been so important for the conclusion of such an advantageous agreement for us. I feel that Prof. van der Laan's attitude during the whole process was closer to the fellow astronomer and well beyond the negotiator's job.

Of course, years of low profile take time and an enormous effort to be replaced. Mentalities probably take even longer to change. But as an astronomer I must say this is a time of optimism and strong hopes for a brighter future.

A Short Summary of Astronomy at "Centro de Astrofísica da Universidade do Porto"

M. T. LAGO, Astrophysical Centre, University of Porto, Portugal

In 1988 JNICT (the national research council) took the decision to finance the first research centre in Astrophysics in Portugal, the "Centro de Astrofísica" at the University of Porto.

Although in activity since 1988 the Centro was officially created in May 1989 as a financially autonomous association within the University and is housed since October 1989 at the new building of the University Computer Centre.

As personnel it involves

- 2 University staff (Ph.D. in Astronomy, 1979, 1982),
- 8 Ph.D. Students (1 M.Sc. in Applied Statistics, 1988; 2 M.Sc. in Astronomy, 1989, 1990; 1 M.Sc. in Astronomical Technology, 1989; 3 D.E.A. in "Astrophysique et Techniques Spatiales", 1989, 1990; 1 "Licenciado" in Surveying Engineering, Univ. Porto, 1984) and
- 2 temporary staff (1 "Licenciado" in Physics/Applied Mathematics [Astronomy, University of Porto, 1989] in charge of the computer management and assistance to users, general administrative activities and

part-time research, and 1 secretary/librarian).

It also involves several undergraduate students of Astronomy (terminal year).

Because of the particular situation of Astronomy in Portugal, we believe that any programme aimed at the development of Astronomy must necessarily include five simultaneous components. There would be a risk of compromising the objectives if any of them would be neglected; the "Centro de Astrofísica" therefore includes all of these components in its objectives:

1. The education of a new generation of astronomers – the shortage of adequately trained and active prospective supervisors in Astronomy in Portugal implies that, at this initial stage, the majority of the doctorates must be prepared abroad, and those to be prepared at home also need to benefit from a close and continuous collaboration with scientists from well-known foreign institutions; therefore the Centro has been trying to guarantee a continuous and equilibrated scheme of grants as well as the necessary contacts.

At the same time, the Centro provides

conditions for its visitors to collaborate in the undergraduate teaching and to involve the terminal year students in its projects. Therefore the Centro's support for education comes,

– *at university level*: through support to the only undergraduate degree in the country aimed at the education of the new astronomers, at the School of Sciences of the University of Porto; this interdisciplinary degree was set up in 1984 and is jointly offered by the Physics and Applied Mathematics Departments. It has a four-year plan of studies, a *numerus clausus* of 15 students per year and is structured in course units of which 37% are in Physics, 32% in Mathematics, 25% in Astronomy and 6% either in Chemistry, Geology, Mathematics or Physics. The initial three years providing basic training in Mathematics and Physics, except for an introductory course (first year) intended as an overview of modern Astronomy and aiming at keeping alive the student's enthusiasm. The 3rd year offers a general Astronomy course and finally the 4th year includes 5 options from an annual list of various topics in As-