

ESO Council Meeting in London, 8–9 July 2002

To mark the occasion of the tenth member state joining ESO, the UK invited ESO to hold its 98th Council meeting in London on 8–9 July 2002. The hosts provided a wonderful venue for the meeting in Trinity House, overlooking the Tower of London. An excursion to the historic Greenwich Observatory and a banquet at Lancaster House helped to make it an especially memorable occasion. A landmark decision made at the meeting was the approval for the construction and operation of the Atacama Large Millimeter Array (ALMA).

The speeches given at the banquet by Lord Sainsbury, A. Freytag and C. Cesarsky are printed below, followed by an article by Prof. Gerry Gilmore on the British astronomers' perspective.



Speeches to Mark the Accession of the UK to ESO

Lord Sainsbury, UK Science Minister

Good evening Ladies and Gentlemen and welcome to you all. It is a great pleasure for me to act as host tonight for this dinner, which is held to celebrate the UK's accession to the European Southern Observatory (ESO). I am delighted too, that we have the opportunity to host this ESO Council meeting, and that we have the ESO Council Members and the principal officials of ESO present here tonight.

I am sure I speak for the entire UK astronomy community when I say how much we are looking forward to participating in ESO and taking advantage of its marvellous facilities. I also hope very much the UK's participation will lead to a strengthening of ESO and a widening of its capabilities for astronomical research.

As Minister for Science, I see my role as the provider of access to World-class facilities for UK scientists rather

than the provider of all the facilities themselves. For this reason, the Science and Innovation White Paper 'Excellence and Opportunity', which we produced two years ago, undertook to develop a ten-year rolling plan for future large-scale facilities, taking account of developments in Europe and elsewhere, to ensure that UK researchers have access to the best facilities in the world.

The Large Facilities Strategic Roadmap, which we produced, represents the first attempt at a ten to fifteen year map of future facility requirements. The aim of the document is to provide a longer-term vision of future requirements of the UK Science and Engineering Base. It reflects the context of future European, or in some cases global, requirements for large-scale facilities in order to assess the most effective approach for satisfying UK needs.

International collaboration is a key part of this strategy because the characteristics of these large-scale facilities often make collaboration the most effective means of provision: They are expensive to build and operate; they frequently serve national and international users; and they tend to be multi-disciplinary.

The UK astronomy community was also asked, a few years ago, to examine their science priorities for the next ten to fifteen years, and also to identify the facilities required to address those priorities. The message received was clear – joining ESO was the top priority for astronomy.

Our astronomers recognized that the current generation of World-leading telescope facilities are on a scale that can only be achieved through international partnerships. This of course has been an increasing trend for some years and



Gathered in the historic Octagon Room of the Royal Greenwich Observatory, London, Ian Halliday (CEO, Particle Physics and Astronomy Research Council) stresses the benefits to British astronomers of belonging to the European Southern Observatory. The Panel consisted of (left to right) Roy Clare (Director of the National Maritime Museum), Arno Freytag (President of the ESO Council), Lord Sainsbury (Science Minister), Gerry Gilmore (Cambridge University), Ian Halliday, Catherine Cesarsky (Director General of ESO) and Pat Roche (Oxford University). Courtesy PPARC.

will no doubt become more pronounced for future telescopes under consideration.

The Government responded to the wishes of the astronomy community in the Government's 2000 Spending Review, when it made a special contribution to PPARC of £100 m over the next 10 years specifically to allow the UK to join ESO. We are of course very pleased that the UK is now at last a member of ESO. The UK has joined probably the World's leading observatory and UK astronomers will gain access to some of the World's most advanced telescopes including ESO's Very Large Telescope. Joining ESO also integrates the UK astronomical community with that of continental Europe.

The UK now embarks on a new journey with the joining of ESO. There are some exciting opportunities ahead and I am aware in particular of the ALMA project.

This global project, with Europe, North America, and possibly Japan, all working together, promises, once completed, hopefully in 2009, to be the largest ground-based astronomy facility ever constructed. The UK is very enthusiastic about becoming involved in ALMA. I know ESO Council has been considering this subject carefully and we look forward to its decision on participation.

The UK currently funds about 5% of World science. This means that over 95% of science is funded elsewhere.

We believe, therefore, that strong international relationships are essential; any society that is closed, inward looking and defensive will not long remain at the forefront of science because it cannot take part in global collaboration. I believe that the UK is stronger when it collaborates internationally and I want the UK to be a key player in European and global science.

The message I want to convey to you is very simple. We are very pleased that the UK has finally joined ESO, we are excited by the opportunities that lie ahead, and we hope UK participation will serve to strengthen this renowned international organization.

Thank you.

Dr. Arno Freytag, President of the ESO Council

Lord Sainsbury, distinguished guests, ladies and gentlemen;

Thank you for your warm words of welcome and for inviting us to dinner in these magnificent surroundings, which I must say compare rather favourably with the facilities in Garching!

This is a historic occasion. We are all privileged to be a part of it, no-one more than me. It is indeed an honour to be President of ESO Council, and, on behalf of all the member states and the staff of ESO, to welcome the United Kingdom into our midst.

We have had a most enjoyable afternoon which has served to remind us of Britain's long and distinguished contribution to astronomy. So now the nation of Newton and Herschel joins the nations of Galileo, Kepler, Brahe, Cassini, Messier, and many others who paved the way to where we are now.

But today, of all days, we look to the future. World astronomy has made

enormous progress in the past few decades. The outstanding recent telescopes in space and on the ground are allowing us to accelerate the pace of that progress. Europe has to work together in astronomy – as it has demonstrated it can do in other fields, such as particle physics – if it is to exploit these wonderful instruments. But it is even more important that we work together to prepare for what is to follow.

That is why today is so significant.

For today the ESO Council discussed European participation in ALMA. This is a truly international project with a good prospect of turning into a global project. We know that ALMA was a major force behind the United Kingdom decision to join ESO, and we recognize the mutual benefit, for, without the United Kingdom, ESO could not take up a half share. That would have been a disaster for European astronomy. We also look forward to the contri-

but ion of Vista, a uniquely powerful infrared survey telescope that will considerably enhance the already exceptional capabilities of our Paranal observatory.

I can say, without any false modesty, that ESO has become the leading astronomical observatory in the world. This is due to our clarity of vision, the dedication and skill of our staff, the strength of our community, and the support of our member states. Now that the United Kingdom has joined, we will be stronger and better prepared for the future. We know you share our vision, we know of your skills and dedication, we never doubted the strength of your community, and we now know we can count on your support. I look forward confidently to an outstanding future for ESO and for European astronomy.

I turn once again to you, Lord Sainsbury, and thank you, and everyone else in the United Kingdom who made it possible.

Dr. Catherine Cesarsky, ESO Director General

I would like to thank you, Lord Sainsbury, for your hospitality here and for your kind words.

Forty years ago many of us were still in school or at the beginning of our careers – not able to imagine the incredible developments going to happen to us – to science – to Europe – to the world. But what is 40 years in astronomical terms? 40 revolutions of the Earth around the Sun – a little more than half a revolution of Comet Halley – the orbit first calculated by famous British astronomer Edmond Halley in 1705 – a little less than half a revolution of planet Uranus, discovered in 1783 by British astronomer William Herschel. One 100 millionth of the age of the so-

lar system. But on Earth, a *full* generation of astronomers.

It is also the *age* of ESO this year. And the time needed for us to prove that we are the best in the world in our field, good enough for the UK to join after 40 years of hesitation!

Astronomy is *the* international science, since the earliest times. The heavens know no borders. There are megalithic observatories in your country and also in my country; surely the master builders talked to each other also in those ancient days.

Astronomy demonstrates to all of Europe the benefit of pooling forces – by doing so, we can do better than anywhere else. Let us be honest and proud

of what has been and what can be achieved by working together. So what happens in the next 40 years? Our flagship projects – VLT – ALMA – OWL...

We cannot promise to find that first exoplanet with exo-life, but we will have the means to look for it. We cannot promise that we will understand what the enormous amount of dark matter and dark energy in the Universe is made of, but we will search for it. We cannot promise to discover the ultimate secret of the world in which we live, but we will certainly know much more about it and our own position.

Astronomy has an enormous potential for exciting discoveries that will fascinate the public and it will continue to

attract the most clever minds among future generations.

The UK has a long and successful history in our science, with many trail-blazing results by theoreticians and observers, and we are proud and happy to

welcome it to ESO. Together we have an enormous potential for new breakthroughs.

Minister Sainsbury, we would be very happy to welcome you at Paranal. Do come and experience that unique at-

mosphere. Do sit down at the telescope controls and let us look together towards the end of the universe and the beginnings of time!

ESO AND THE UK

Why Does the UK Need More Astronomy?

GERRY GILMORE, *Professor of Experimental Philosophy, Institute of Astronomy, Cambridge University, UK*

“What was God doing before he made heaven and earth? ... He was preparing hell for those who would pry into such profound mysteries.”¹ This joke was already venerable when quoted by Augustine, in his analysis of the ancient and still modern problem, time.

Understanding the origin(s), meaning(s), future(s), and significance(s) of time, space, existence, mass, matter, geometry, of origins and endings, of what and where, remains one of the greatest intellectual endeavours of the human mind. From the caves of Lascaux, through the megaliths of Stonehenge to the dreamtime of Australia, mankind has striven to understand his origins and future. Our generation has the exceptional good fortune to be living through the greatest increase in knowledge relevant to these fundamental questions since someone first looked up at night. We are also increasing understanding, while realizing how much more there is in the Universe still to be learned and understood.

Even more wonderful (*sic*) for us, our rate of progress in knowledge is accelerating, as the technological advances resulting from research into basic science feed back positively in turn to advance basic knowledge more rapidly. This is truly a golden age of discovery in astronomy, with almost every class of object we study having been discovered in our working lifetimes.

Why is it so? There are two dominant reasons: technology and people, but only one explanation: efficiency. The astronomical community is at most one order of magnitude larger by number than it was a generation ago: a significant, but not huge advance. Astronomical telescopes today provide the real advance, with not only a very considerable increase in mirror collecting area, but a vast increase in detector area, detector quantum efficiency/sensitivity,

and image quality. Each modern large telescope is both vastly more sensitive, and vastly more efficient, than were 4-metre-class telescopes 20 years ago.

It is this huge increase in generation of high-quality data which drives current progress in astronomy. Consequently, the community with the best technology has the best opportunity to discover the new, and has a head-start in attracting bright young people to science. But it is not just a question of wealth buying power: the huge technological investment of Tycho and Kepler reached its scientific fruition with Newton. Real scientific progress, as that example reminds us, requires both technology and people, complementary approaches, and trans-national collaborations. And it works best with a spice of competition.

Considerations like those above led to the formation of ESO (cf. *ESO's Early History*. A. Blaauw) and the formation of La Silla Observatory, and led the UK to found collaborative observatories in Australia, South Africa, the Canary Islands, Hawaii and Chile. (Radio and space astronomy have their own history and set of personalities, and are not considered in this article.)

A significant motivation in development of these observatories was an attempt to regain international research leadership in astronomy. For whatever mix of reasons, Europe, including the UK, fared much less well relative to the US in astrophysics research in the early 20th century than it did in, for example, quantum theory and relativity.

UK and European astronomy: a micro-history

I am not aware of the factors considered when the UK decided to develop its astronomy independently from ESO, through bilateral partnerships, but by 1980, when I arrived in the UK, it was obviously a successful policy. The Anglo-Australian telescope, with its marvellous IPCS photon-counting system, the UK Schmidt Telescope, com-

plemented by the APM (Cambridge) and COSMOS (Edinburgh) measuring machines, the UK InfraRed Telescope (UKIRT) and the beginnings of the JCMT sub-mm telescope on Hawaii, and the Isaac Newton Group on La Palma were world-quality facilities quite sufficient to challenge those of us fortunate enough to be let loose on them.

These observatories were (mostly) international partnerships, with the UK the largest partner. Next came Gemini, two superb 8-m telescopes, with the UK as a 25 per cent partner. And most recently ALMA, with the UK as (roughly) 20 per cent partner inside the European-wide 50 per cent share. Why the systematic decrease in share? Why is Gemini on-line so long after Keck? Simple: money.

Sometime around 1990 optical/IR astronomy became too expensive for one country, even one as large as the UK. But something else more fundamental changed too. ‘International astronomy’ began to mean more to UK astronomers than ‘astronomy in the former British Empire’, or ‘trans-atlantic astronomy’. Routine collaboration between institutes in the UK and in continental Europe was less common than was collaboration with the US. But this began to change.

Of course, many European countries besides the UK had close scientific links across the Atlantic: the effect of the Netherlands on US astronomy is a famous exemplum. The European (largely Italian) *diaspora* who made the Space Telescope Science Institute in Baltimore so much more than just another NASA center is a major example of the happy internationalization of astronomy. Cheap and easy travel was of course another factor. As was the lesson from space science and radio astronomy, which had much earlier crossed the ‘unaffordable by one country’ barrier. All these factors changed the assumption, and encouraged UK astronomers to look more widely for competition, and for colleagues.

And what did we see happening in

¹“Quod faciebat Deus, antequam faceret caelum et terram?” Respondeo non illud quod quidam respondisse perhibetur, ioculariter eludens quaestio- nis violentiam: ‘Alta’ inquit ‘scrutantibus gehennas parabat’. Augustine, *Confessions* XI xii 14.