



EUROPEAN ASTRONOMICAL SOCIETY **NEWSLETTER**

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EDITORIAL

The present newsletter is one of the richest we have published over the past few years. In addition to the reports from the various sessions of the highly successful European Week of Astronomy and Space Science (EWASS), which took place in Rome last July, we are happy to include two extended articles. One is a review from Prof. M. Huber on the status and future planning of European Astronomy. The review is slightly modified in format in order to fit the printing constraints of the newsletter, but it can also be found in the EAS web page. The second is the executive summary of the Working Group on the future of Space Astronomy, prepared by Prof. M. Watson. The full 33-page report can also be retrieved from the web server of the Society. I am certain that all of us will learn a lot on the possibilities, as well as potential hurdles, that lie ahead in European Astronomy.

We also include in the newsletter an article prepared by Dr. I. Arka on the challenges facing several young astronomers who decide to venture into the private sector for employment, after years of study and work in the academia. This is a very timely issue as decreases in the spending for research and higher education over the past few years have made the search for a permanent academic position even more difficult. The article is written in a form of an “open letter” to potential employers and lists the numerous qualifications astronomers have.

Last, but not least, the reader may find the latest news from Opticon, a report from the 7th Astronomical Data Analysis conference, which was sponsored by our Society, as well as an update on the activities of the new EAS Council.

Vassilis Charmandaris
University of Crete, Greece

MESSAGE FROM THE PRESIDENT

There is a substantial number of topics that are progressing within EAS these days. This dynamism is very healthy and welcome. Let me highlight some of the questions we have taken up.

Of particular relevance at an EWASS event, is the evolution of those meetings. EAS council and the affiliated societies met in Rolle at the very beginning of February to address this question. It is generally felt that EWASS should become a truly pan-European meeting, and become the place where European astronomy shapes itself, i.e. the venue where cooperations can be discussed at first informally as most key players would

attend. The format that this could have is still being discussed, but it was generally agreed that the present type of scientific format is rather adequate. However, clearly meetings with of the order of 1500 participants require an organisation that goes beyond those available with affiliated societies.

This discussion led to one on the relationship between the EAS and affiliated societies. It was noted by several that often national science policy decisions are in one way or another related to European matters. This means that affiliated societies need a forum where their positions can be harmonised, which in turn would make them more effective. The EAS and its "business meetings" offer exactly this type of forum. Here again empowering these meetings seems an important next step.

Also very present in Rolle was the question of our relationship with ASTRONET, a subject where considerable work still needs to be done on our side. EWASS meetings should become the privileged place where European planning efforts are discussed with the community. For this, we must, however, make sure that ASTRONET sessions, as well as ESA, ESO, CERN, possibly Roscosmos etc sessions are taken seriously by our members as a golden opportunity to make their opinions heard.

Speaking of opinions, Council has worked out a way to issue EAS papers. You will remember that such papers are prepared by a working group who write a draft position that is then open to members for comments before being approved by council and distributed appropriately. This has come to a successful end for the first time. Council approved a paper on the future of space astronomy. This paper makes some very concrete recommendations. It will be distributed to ESA, SPC, the EC, Roscosmos and widely. Other efforts are underway, e.g. regarding the organisation and funding of the publication process or ethical questions in the pursuit of astronomical research.

The EAS does not work in splendid isolation, but with a network of partners. The EPS is one. The EPS is making efforts towards having 2015 as the international year of light. Since we do have a privileged relationship with light, we are associated with these efforts, albeit at a moderate level, as we just had an international year of astronomy. We will also pursue our collaboration with EPS, in particular for what concerns astrophysics using very high energy photons and particles.

Our affiliated societies are also part of the network around us. I had the pleasure to visit the RAS and the SF2A in the last months. I would be willing to continue and visit some of them in the course of the next couple years.

I had also foreseen to establish contacts with the AAS. This has not yet taken place. Interestingly, M. Huber suggests in a report on European planning exercises that he finished some weeks ago, and that we'll also distribute widely, that contacts with South American societies might be more important than contacts with the AAS for us. Council will see how this can be most fruitfully taken into account.

I have the great pleasure to announce here that Council has approved a memorandum of understanding with the FONDATION MERAC (Mobilising European Research in Astrophysics and Cosmology), a non profit foundation under Swiss law created to promote excellence in astrophysical research. This MOU establishes 3 yearly prizes of 20'000 Euros each for excellent PhD thesis and for young researchers. Nominations for the 2013 prizes, for young researchers in Theoretical astrophysics, observational astrophysics and new technologies (instrumental and computational) are now invited by Members of the Society.

The increased level of activities of the EAS is made possible by the somewhat better status of its finances. This is due to a number of organisational members, institutes and private companies, that support our activities through their membership fees. This is a most welcome evolution. The effort must, however go on. Many more institutions all over Europe should be encouraged to make this step. Your help is needed in this. Please do approach your institutes and council members with a view of enlisting as many institutes and firms as organisational members as possible.

Related to this is the need to encourage our colleagues to join EAS in numbers. This is important for the finances of the Society, but also to give weight to its opinions. I do urge you to talk to colleagues in this sense. In doing so do not forget to mention the many benefits that the Society gives its members.

Thierry Courvoisier
President of EAS

NEWS

NEWS FROM THE EAS COUNCIL

In addition to the General Assembly and Business Meeting that were held during the European Week in Astronomy & Space Science (EWASS) in Rome in July of 2012, the EAS Council met on the 3rd and 4th of July where several new councilors were announced. A report can be found below.

Tasks

The president, Thierry Courvoisier, informed all incoming Councilors that they are expected to take responsibility for certain tasks. In addition to the posts of President, Secretary (who has been taken over by Serena Viti) and Treasurer, the following is the list of responsibilities continuing and incoming Council members have agreed to take on:

Roger Davies (UK) — *Vice-President*

Responsibility: liaison with international organisations such as ESO, ESA, IAU and the EPS.

Mary Kontizas (Greece) — *Vice-President*

Responsibility: overseeing the organization by the LOC and SOC of the European Weeks of Astronomy & Space Science (EWASS) – Mentoring Scheme at EU level

Mike Bode (UK) — *Councilor*

Responsibility: liaison with Astronet and the European Commission

João Fernandes (Portugal) — *Councilor*

Responsibility: Job services of the EAS; recruitment of Organisational Members

Johan Knapen (Spain) — *Councilor*

Responsibility: publications policy; recruitment of Organisational Members

Francesco Palla (Italy) — *Councilor*

Responsibility: Chair of the EAS Prize Committees (Tycho Brahe and MERAC prizes); oversee nomination of the Lodewijk Woltjer Lecturer; Outreach and Newsletter

Juri Poutanen (Finland) — *Councilor*

Responsibility: liaison with the Affiliated Societies, notably in the Eastern European Region; liaison with the Russian Academy and ROSKOSMOS

EWASS 2013

EWASS 2013 will be held in Turku, Finland. Aimo Sillanpaa, chair of the LOC for EWASS 2013 and Sari Ruusumäki, Convention Director, Turku Touring presented the preferred choice for the location of EWASS 2013, called LOGOMO and updated council on the preparations. Proposals for sessions at EWASS 2013 have now been received and are being discussed by the co-chairs of the SOC, Jose Miguel Rodriguez Espinosa and Esko Valtaoja.

EAS position papers

EAS is sometimes asked to take a position on certain events, either by its members, by societies, by national or supranational institutions. At other times Council feels that the EAS needs to formulate an opinion on a particular topic. Lately, the following reports were produced:

■ *Future of Space astronomy*

EAS was alerted to the fact that although currently there are many successful ESA satellites that are providing European astronomers with exciting new data, there is a risk that there will be a decade with little in terms of access to platforms for space science. EAS approached Michael Watson who has been kind enough to agree to put together a committee to look at the future of Space Astronomy from Europe. Michael Watson submitted the report to Council who has approved it. The report is now being distributed to relevant European Institutions including ESA and National Astronomy Societies. A summary is published in this issue of the Newsletter.

■ *Martin Huber's report*

The Council officially received the report by Martin Huber, building up on the "Astroland" document and a summary is published in this issue of the Newsletter.

Evolution of the EWASS

One of the key topics discussed at the Rolle meeting (1 & 2 February 2012) was the evolution of the EWASS. Briefly, EAS envisages EWASS to double in size. If this were to happen, the issue of who and where to organize it, as well as the financial consequences were discussed during the Council Meeting.

To review the many suggestions made on this topic, a working group was set up to look into the organisation of the web interface and that of EWASS2014 and beyond, in detail. The following agreed to serve on this working group: Anne Dutrey, Mary Kontizas, Juri Poutanen, Johan Knapen.

Serena Viti, Secretary of EAS

A WORD ON COUNCILORS LEAVING THE OFFICE IN 2012

Several members leave Council after the EWASS 2012 having completed their term in office. The Society is very thankful for the efforts they have invested at the service of the European astronomical community during their terms in the EAS council.

Those leaving in the Summer of 2012 are:

- Elias Brinks. Secretary. This is a very important function in a light organisation such as the EAS. Elias filled the function with energy, efficiency and in a smiling way. It was great help for all involved in the running of the Society.
- Jan Palous, Vice-president. We are very thankful for contacts that Jan had in our name with IAU and ESO and for his efforts in communicating for the EAS. Jan is an old companion in several European astronomical endeavours. I'm happy that our collaboration will continue in the framework of the European Academies Scientific Advisory Council (EASAC).
- Juergen Christensen Dalsgaard. Councillor. Juergen took care of the Tycho Brahe prize and selection: an important task for the Society that was done with great success.
- Milan Dimitrievich. Councillor. Milan kept us aware with great distinction of the presence of a large community that is some time struggling to be heard, but that is finding its place in the European astronomical landscape.
- Karel van der Hucht. Councillor. Karel launched a reflection on the European place in the world effort on the question of NEO. This did not yet bear fruits in the sense of a working group. A fact that I find worrying, as this question is addressed by the solar system to the whole of mankind, not only the Americans...

To all we wish a happy and fruitful time also outside the EAS council. We very much hope that we'll be able to count on them for support in the coming years.

Thierry Courvoisier
President of EAS

NEWS FROM OPTICON

The present OPTICON contract will finish at the end of December 2012, but the good news is that a new contract has been negotiated and, assuming all proceeds smoothly this new FP7 contract will start on 1 January 2013. This will enable a seamless transition from one contract to the other.

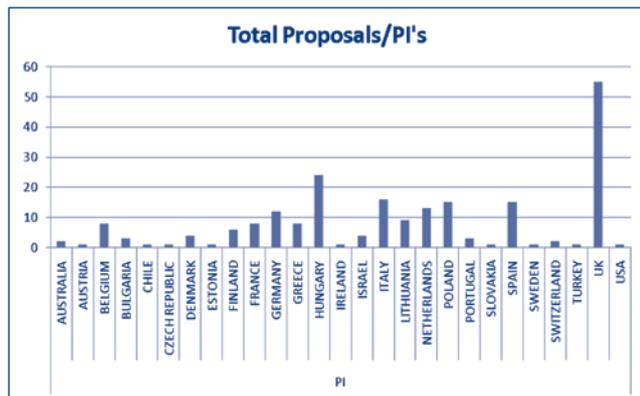
Although similar in shape to the existing contract the new OPTICON, which runs from 2013-2016, has a slightly smaller budget of 8.5 million Euro and differs in a number of ways from its predecessor. Most notable is the departure of our solar colleagues and their telescopes into a new, and quite separate FP7 contract. Although we are sad to see them leave we recognise that the development of a new large solar telescope is now at the stage where the E-ELT was some years ago and it is time for them to concentrate on building the solar community around this new, large project. The new contract also introduces some new activities including a network on Time-Domain-Astronomy which seeks to bring together the disparate groups around Europe who operate small, often robotic, telescope for activities such as supernova and solar system object follow-up and monitoring. This network will be led by Lucasz Wyrzykowski who shares his time between Cambridge and Warsaw.

Most of the familiar OPTICON JRA activities will continue, but a cut of 15% imposed on the proposal has meant that

the OPTICON executive was forced to make some sacrifices. The most notable of these has been a drastic reduction in contributions to the highly successful detector group led by Philippe Feautrier from Grenoble which has been responsible for the OCam high speed camera. There have been other smaller changes too, Norbert Hubin of ESO has stepped down as leader of the Adaptive Optics package to be replaced by Jean-Luc Bezoit and the interferometry activity will now be managed by Eric Theibault. The smart instrument activity now falls into the capable hands of Lars Venema of ASTRON.

Unaffected by the reduction in the budget is the OPTICON transnational access programme which will continue into the new contract much as it ends the present one, allocating all the available Trans-national Access funds across a range of 2-4m telescopes via a single Time Allocation Committee. This panel, which was chaired since its inception by UK based Dutch Astronomer Rene Oudmaijer has passed into the hands of Herve Aussel of CEA in France following Rene's appointment to the ESO OPC. Rene did a fabulous job of getting to grips with the new scheme and steering it through its birth pangs and the original TAC laid a solid foundation for the programme to continue.

The new process, which will enter its 6th semester in early 2013, is attracting between 40 and 50 proposals per call which translates roughly to a factor of 3 oversubscription, although the precise pressure factor varies between the telescopes. More specifically, since it began in 2010B, the Common TAC programme has received 216 Proposals involving 969 Team members from 35 countries. Of these 172 proposals were above the scientific quality threshold but, due to the limited budget and number of nights available, only 84 were allocated time. In view of this oversubscription, at its recent meeting the OPTICON telescope directors forum recommended that the budget for the new contract should be spent at a more rapid rate than before, allowing a 30% increase in the number of nights allocated per semester at the inevitable cost of the TNA budget running out in 2015, a year or more before the contract ends.



All the indications are that there are no 'show-stopping' problems to expanding the scheme, should the national communities wish to do so and the experience has been presented to both ASTRONET and to a meeting of national TAC chairs held in Paris in 2011.

The other OPTICON networks have continued to prosper. The Key Technology network held a 'Disruptive technologies' meeting at LAM in Marseilles in 2012, trying to identify key breakthroughs which will not merely advance the state of the art, e.g. the move from vinyl to CDs, but rather completely

change the shape of the field, e.g. the paradigm shift from shops selling CDs to on-line music downloads. Colin Cunningham presented some early conclusions of this meeting at the July SPIE conference in Amsterdam, which also saw splinter meeting of several JRA's and the European Interferometry Initiative.

Training of new researchers has not been forgotten either with the NEON training schools and the Fizeau exchange scheme (<http://www.european-interferometry.eu/fizeau-program>) continuing in 2012. The 10th NEON Observing school was held at the Asiago Observatory in Italy, from September 10 to 22th, 2012. These activities are poised to move ahead in the new contract. A new initiative in this contract will be a scheme being organised by Michel Dennefeld of the Paris Observatory to pair experienced observers who have won time via the OPTICON CTAC to new users who would like to join an observing run to gain experience (see the page at http://www.iap.fr/opticon/la_caille/ for more details)

So OPTICON is ready to move into the new contract at full speed and we will begin with much the same team as before, but sadly Suzanne Holland left the project, and indeed University of Cambridge, in August 2012. Suzanne had worked with us on Opticon for over 8 years, assisting with the challenges of EC reporting, and organising and attending various Board and Executive meetings and her contributions will be sorely missed.

For more information on the project, or to request a visit for discussions on how you can become involved feel free to contact the project scientist John Davies (john.davies@stfc.ac.uk), the PI, Prof Gerard 'Gerry' Gilmore (gil@ast.cam.ac.uk) or visit the OPTICON web page at www.astro-opticon.org

REPORTS & ARTICLES

EAS WORKING GROUP ON THE FUTURE OF SPACE ASTRONOMY

In the following we present the executive summary of the report on the Future of Space Astronomy, prepared by Prof. M. Watson on behalf of the corresponding EAS Working Group. The full report can be obtained from the EAS web page: <http://eas.unige.ch/reports.jsp>

Executive Summary

For more than five decades, space astronomy missions have made an ever-increasing contribution to our knowledge of the Universe, providing access to wavelengths inaccessible from the ground and to measurements whose precision could not be matched with terrestrial facilities and, perhaps most notably, with access to physical regimes not attainable in terrestrial experiments. Today, space missions continue to provide an integral and crucial contribution to our exploration of the cosmos and to essentially every aspect of astrophysical research.

Over the last few years, however, concern has been mounting over the future of space astronomy, stimulated by the perception that the frequency of mission opportunities may be decreasing. The European Astronomical Society's working group was set up to evaluate the situation from a European perspective, to consider the impact on both the science and the European space astronomy community and to consider

what steps could be taken to improve the outlook. There are clear dangers inherent in any decline in opportunities, for example in terms of loss of scientific opportunities and of expertise in the community.

The working group undertook its own survey of space astronomy, examining its scientific context and background and broader connections with ground-based astronomy and assessing the size and scope of the space astronomy community in Europe. It also undertook a survey of the status of space astronomy missions, looking at the record over the last twenty years for past and operational missions, as well as the future plans of both European and worldwide agencies, in order to establish the key trends.

The working group's activities reaffirmed the continued importance of space astronomy as a key component in the future of astrophysical research, noting in particular the ever-increasing synergy between space-based and ground-based studies. The working group identified key issues that need to be addressed to ensure the preservation of Europe's current strengths in space astronomy. The working group's survey of the European space astronomy community demonstrates how large this is, amounting to over 2000 people in more than two dozen institutes, 40% of whom have key technology development roles. Its examination of mission trends reveals an effective decrease in the number of mission opportunities over the next two decades, especially when compared with the last twenty years when the discipline had a relatively 'golden' period. This reduction in opportunities arises from multiple pressures within agency budgets that benefit from only modest growth. The most important pressures include increased mission costs, as new science goals demand ever more complex (and expensive) payloads and place additional requirements on space systems, coupled with new demands for access to space from growing areas such as exoplanet studies.

With this background, the working group formulated four recommendations relating to space astronomy in the coming decades. In summary, the recommendations are as follows:

- **Planning** of the space astronomy program within ESA and other agencies is a complex issue that requires the right balance between stability and predictability on the one hand whilst also allowing for innovation to avoid an uncompetitive program developing. The current approach within the ESA program has problems with the connections between each cycle of the decision-making process and arguably fails to provide the required level of stability. The working group's recommendation in this area emphasizes the importance of stability and predictability of future missions, for example in ensuring that appropriate investments can be made in technology development.
- **International cooperation.** The most ambitious space astronomy missions will inevitably only be achieved at a high cost, requiring full cooperation between the one or more of the major space agencies: ESA, NASA and JAXA. The current mismatch between decision-making procedures and timescales, together with several recent collaboration failures, has had a major impact on the future of several planned major missions. The working group stressed the importance of working to resolve this issue if the boldest projects, with the strongest groundbreaking potential, are ever to be realised.
- **Mission size.** Space astronomy would benefit significantly from having greater flexibility, for example in having access to focused medium/small class missions. Such mis-

sions could be provided through ESA or through national initiatives or a combination of these approaches. The working group welcomes the recent S-class initiative (announced by ESA during the final stages of the working group activities), although it notes that the current constraints on this program are rather restrictive if Europe is to emulate the success of the US Explorer program.

- **European agenda.** The working group noted that space astronomy currently suffers from insufficient coordination at the European level, resulting in a program that can lack coherence and experiences duplication, producing an inefficient program which arguably does not achieve its full European potential. To address this issue, the working group recommends greater and more focused involvement of the EU in stimulating a coordinated development in Europe by providing targeted support such as *integrated activities* specifically for space astronomy.

Mike Watson,
University of Leicester, UK

EUROPEAN ASTRONOMY — REVIEWING NATIONAL AND INTERNATIONAL PLANNING

Summary

This report describes the efforts of Astronet, which assembles the important players of European astronomy, namely the European Intergovernmental Research Organisations ESA and ESO as well as astronomy-related national and regional funding organisations. Following extensive discussions among its partners, Astronet formulated and published a 'Science Vision' in 2007. A Roadmap was then developed and published in 2008. This Roadmap is, to some extent, an equivalent of the US Decadal Surveys, yet it is distinct from its American model: it has a time horizon of 20 to 25 years, rather than a decade only, it covers all fields of astronomy at once, and from the outset takes the global context into account. We also note that the Astronet Roadmap was not developed in isolation: interrelationships existed with other relevant major fora, such as the European Strategy Forum on Research Infrastructures (ESFRI), and with Integrated Infrastructure Initiatives such as ASPERA, a European Research Area network coordinating and funding national research efforts in particle astrophysics. Funding for the first phase of the Astronet exercise came from the EU Framework Programme 6. The second phase of Astronet, funded through Framework Programme 7 started in 2011, and deals with the implementation of the Roadmap. As the European Astronomical Society instigated this report, some debating points for the EAS form part of the conclusions.

Preamble

«The European Astro-political Landscape and the Role of the European Astronomical Society» was the topic of an article by Thierry J-L Courvoisier in the European Astronomical Society's Newsletter No. 35 (June 2008, pp. 2–7). The paper summarised discussions held in January 2008 in Leiden, where EAS Council met for the first time with representatives of the Affiliated Societies of EAS.¹ In the course of these dis-

¹ In contrast to many other European learned societies, the EAS is not a federation of national astronomical societies: EAS has only Individual (and Organisational) Members. However, in order to establish a link to the European national astronomical societies, EAS invited them to

cussions it was noted that many organisations in Europe were making plans, had produced roadmaps and funding recommendations. Some of these studies, it was stated, explicitly used inputs from the community, others less so. Council then proposed to review the planning material generated by that time, be it of national or international origin, and to write a synthetic view of the findings.

Shortly after this meeting a five-year study project funded with 2.5 M€ by the 6th EU Framework Programme published its final report. Astronet had gone into more depth than the task defined by the January 2008 meeting mentioned above; nevertheless this indicated that the report initiated by EAS Council could have turned into a rather extensive exercise. The EU Framework Project in question, Astronet, has been directed by a Board composed of representatives of 29 European astronomy-related national and regional organisations and of ESA and ESO, two astronomy-related European inter-governmental Research Organisations (EIROs).²

At the end of this report we suggest that EAS critically evaluate the premises and conclusions of the Astronet study and discuss any consequences for EAS policies. This will be timely and is advisable also in view of the fact that, following the completion of Astronet of FP6, Astronet 2 has started in 2011 under FP7.

Where does European astronomy planning stand today?

The initial result of the Astronet project had been a «Science Vision», discussed at a symposium in Poitiers in January 2007, and published as a 150-page book in September 2007. Based on this vision, a Roadmap was developed, then presented and discussed in June 2008 at a symposium in Liverpool with over 300 participants. The final outcome of this groundwork was published in November 2008 as the «**Astronet Roadmap Report — a Strategic Plan for European Astronomy**».³

In the ‘pan-European’ sense this report is comprehensive beyond anything achieved before. Moreover, it goes beyond traditional ground-based and space astronomy: the report covers scientific fields, methods and activities that are basic for astronomical research, such as laboratory data of astrophysical interest. Yet such activities are often viewed as belonging to, and therefore also to be funded by other disciplines.

Specifically, both the Astronet «Science Vision» and «Roadmap» comprise the following topics:

- i. High energy astrophysics, particle astrophysics, gravitational waves
- ii. Ultraviolet, optical & infrared (OIR) and radio/mm astronomy (ground & space)
- iii. Solar telescopes, solar system missions, laboratory studies

become Affiliated Societies. The 24 Affiliated Societies of the EAS are listed on the web site <http://eas.unige.ch/affiliates.jsp>.

2 The organisations behind this project were subdivided into contractors, associates and forum members. These are 9 Contractors: BMBF/DESY (DE), CNRS (FR, Coordinator), INAF (IT), NWO (NL), ESO, NOTSA (Nordic), NCBiR (PL), MICINN (ES), STFC (UK) and 19 Associates: ESA, FWF (AT), FWO+FRS (BE), BAS (BG), MSES (HR), IA-CAS (CZ), MPG, DFG (DE), ESF (EE), GNCA (GR), HAS (H), LAS (LT), FCT (PT), ROSA (RO), IA SAS (SK), ARRS (SI), SRC (SE), SER (CH), UAS (UA), as well as 6 Forum members: DK, FIN, IS, ISR, NO, LV. With these organisations Astronet covered an astronomy community associated with a total population of over 550 million people in 20 countries.

3 The final report (178 pp) as well as an Executive Summary (12 pp.) can be downloaded from the web site <http://www.astronet-eu.org/FP6/astronet/www.astronet-eu.org/>.

- iv. Theory, computing facilities and networks, virtual observatory
- v. Education, recruitment and training, public outreach.

It is true, of course, — and in accord with the EAS discussion in Leiden — that the «Astronet Roadmap Report» had been initiated by, and elaborated through a collaboration between astronomy-related national and regional funding organisations and the two European Inter-governmental Research Organisations ESA and ESO. Overall, the report nevertheless bears the imprint of the community. As a rule, the Astronet Board Members were astronomers — albeit employed by research funding or research performing organisations — who *ex-officio* had to be in close contact with the community. Moreover we observe that the projects of both ESA and ESO are community-driven.

A main consequence of this set-up was that the Roadmap quite naturally became the agreed plan of the funding agencies themselves: it reflected their consensus on what they considered to be the most effective way of spending their own astronomy budgets.

Involving the funding organisations from the start thus had the beneficial effect that financial realities were kept in mind throughout, particularly as the funding organisations themselves participated dealing with their own projects. This is clearly an advantage of the structure of Astronet, and may hopefully help in maintaining a European virtue — a virtue that could be observed in some previous major European projects and long-term plans, where the cost and time of completed projects and accomplished long-term plans corresponded rather closely to the original estimates. This contrasts with some projects led by organisations overseas.⁴ We also recall that ideas were presented in 1977 for ‘next-generation’ optical telescopes of the 25-m class at an ESO conference on ‘Optical Telescopes of the Future’; none of these are in operation today, 35 years later.⁵

Conversely — after having assured that the member states would be prepared to fund such a project — the Director General of ESO introduced at the same Conference the more modest idea of a 16-m aperture-equivalent telescope. This became the project for the Very Large Telescope that was approved at the end of 1987, and put into operation with all four 8-m telescopes in 2000 (Wolijer 1978, 2005). ESA’s ‘Horizon 2000’ program is another example: it was completed within the foreseen financial limits and within two years of its predicted 20-year timeframe (Bonnet & Bleeker 2011). Similarly, ESO’s recent decision to restrict the diameter of the primary mirror of its European Extremely Large Telescope (E-ELT) to 39.3 metres combined with a faster f-ratio⁶ reflects a considered approach to financially responsible planning, which European policy makers would be well advised to continue pursuing.

Appendix A — «Interrelationships of the Astronet Roadmap» —, which is taken verbatim from the Astronet Roadmap Report, considers and examines Astronet’s many connections to other planning exercises: “...there are several EU initia-

4 See, for example, L Billings (2010) The telescope that ate astronomy, *Nature* **467**:1028-1030. Similar, albeit less pronounced excesses might, of course, also be found among European science projects.

5 Two US-led international partnerships are currently engaged in pursuing projects for Giant Segmented Mirror Telescopes (GSMT), which are expected to become operational in the early 2020s: the Giant Magellan Telescope (GMT) and the Thirty Meter Telescope (TMT); both described in Appendix B.

6 cf. <http://www.eso.org/public/announcements/ann11034/>

tives that seek to enhance the planning and implementation of different aspects of our subject. The ASTRONET Roadmap team sought to foster cooperation and coordination between our project and all the other relevant organisations and initiatives.” As mentioned above, ESA and ESO were directly involved in the elaboration of Astronet’s Roadmap Report. Astronet also had regular interchanges with ASPERA, OPTICON, RadioNet, EuroPlanNet and the European Virtual Observatory. Moreover, the direct link of many founding agencies of Astronet with the work of the European Strategy forum on research Infrastructures (ESFRI) turned out to be very helpful.

The Astronet Roadmap Report presented at JENAM 2010 — a Counterpart to the US Decadal Reports

At the JENAM 2010 in Lisbon the conclusions of the «Astronet Roadmap Report» have been reported by members of the Astronet team. The report was introduced as a “pilot project in coordinated strategic planning”. The «Astronomy Roadmap Report» is, in fact, modelled on, but not merely a European copy of the US Decadal Surveys.

With science advisory and science funding structures being different in Europe, the Roadmap had to be established through a procedure at variance with that employed for the ‘Decadal Reports.’ In Europe, agencies in the individual countries fund both the inter-governmental organisations ESA and ESO as well as their national facilities, and we lack a European equivalent of the US National Research Council (which is operated by the US National Academies, and generates the US Decadal Surveys). A solution then was to have funding agencies initiate a report that was supported by the European Commission as a European Research Area (ERA-NET) project.

Notably, the «Astronet Roadmap Report» diverges from US Decadal Surveys in several respects:

- it covers a 20- to 25-year time span (while, as their name says, Decadal Surveys cover a decade only),
- it presents a coherent picture, as it covers astronomy as a whole in one report (while Decadal Surveys on Astronomy, Planetary Science, Solar Physics etc. appear sequentially as separate Surveys), and
- it is adapted to European as well as global political realities (while Decadal Reports only recently began to take developments outside the US into account).⁷

Astronet aims to establish such an activity permanently in Europe, and considers itself a European initiative that is developing into an irreversible global process. This would tie in with the ‘joint strategic planning’ recommended in the 2010 Decadal Report on astronomy.

Astronet is largely compatible with previous planning — not the least because of the care exercised by Astronet to consider the interrelationships with other fields (cf. Appendix A on «Interrelationships of the Astronet Roadmap»). In particular:

- the top-priority ground-based Astronet projects are those in the ESFRI list,
- the top-priority Astronet astroparticle projects are the same as those in the ASPERA Roadmap (although the ranking sometimes differs), and

7 The 2010 Decadal Report on astronomy «New Worlds, New Horizons in Astronomy and Astrophysics» actually recommended a joint strategic planning process for the future. A free PDF copy of the report can be downloaded from the web site http://www.nap.edu/catalog.php?record_id=12982.

- the larger top-priority space projects in the Astronet Roadmap Report are the same as those in the ESA Cosmic Vision initial list.⁸

It was important to prioritise large projects and to place them in scientific and financial context of the entire field, with proposed schedules. This applies especially to agreed European strategy and to priorities now defined for global-scale projects, such as the Square Kilometer Array (SKA). That Europe was considered a serious partner in the US Decadal Survey is a positive aspect resulting also from the timeliness of the Roadmap Report.

Astronet 2 has started

The extension of Astronet, Astronet 2, has started in 2011 as an activity within the 7th EU Framework Programme. Astronet 2 is funded for a 4-year period with 1.6 M€, and its aim is the implementation of the Roadmap. The Astronet 2 Board has met twice: on 28 September 2011 and on 23 May 2012. At the last meeting a strengthening of relations with EAS was discussed.

Membership and Priorities at the Start of Astronet 2

Astronet 2 (cf. the web site www.astronet-eu.org/) started with a membership that differed somewhat from the original one,⁹ and with a list of Work Packages that reformulated the original list of topics.¹⁰ Priorities for infrastructure projects in categories (i), (ii) and (iii) of the original list of the five topics mentioned earlier are as follows:

For ground-based astronomy:

- Large Scale
 1. E-ELT and SKA (where it is realised that phasing is very important)
- Medium Scale
 1. European Solar Telescope
 2. Cherenkov Telescope Array
 3. Multi-km³ sized Neutrino Telescope (KM3NeT)
- Small scale
 1. Wide Field, Multiplexed Spectrograph (for existing 8-m to 10-m telescopes)

Plus, as a general goal, optimisation of access to existing telescopes: Solar, 2-m to 4-m, and 8-m to 10-m for optical/IR, radio and millimetre to sub-millimetre astronomy)

For space astronomy:

- Large scale
 1. XEUS/IXO and LISA (now replaced by ATHENA and NGO)
 2. Tandem/Laplace¹¹
 3. Exomars

8 This initial list has changed, as ESA developed descope ESA-only missions in response to NASA’s withdrawal from their planned participation in ESA’s Large Missions: EJSM-Laplace, IXO and LISA became, respectively, JUICE, ATHENA and NGO.

9 it now consists of: 1 Coordinator: CNRS/INSU (FR), 10 Contractors: BMBF (DE), ESO, INAF (IT), STCF (UK), NOTSA (Nordic), MINECO (ES), NOW (NL), PT-DESY (DE), NCBI R (PL), CAS (CZ), 21 Associates: ESA, MPG (DE), DFG (DE), LAS (LT), SRC (SE), GNCA (GR), HAS (HU), ESF (EE), SER (CH), AI SAS (SK), FWF (AT), ROSA (RO), NASU (UA), ARRS (SI), BAS (BG), LU AI (LV), ISA (IL), FCT (PT), MZOS (HR), FRS-FNRS (BE), FWO (BE), and 2 Forum Members: FNU (DK), AF (FI)

10 Six Work packages have been defined for Astronet 2: Networking, Coordination of European astronomy, Integration of new members, Coordination action, Common actions, Consortium management

11 now replaced by JUICE, which subsequently was selected on 2 May 2012 by ESA’s Science Programme Committee as project for the next Large Mission.

and Darwin, FIRI, Phoibos, which are foreseen for post-2020

■ **Medium scale**

1. GAIA: data analysis
2. Euclid
3. Solar Orbiter
4. Cross-scale, Simbol-X, Plato, Spica
5. Marco Polo

Plus continued European contribution to the operation of XMM-Newton, Integral, HST, Cluster, SOHO, STEREO, and Hinode over specified terms.

For categories (iv) and (v) in the original list of topics, Astronet 2 starts with these priorities:

- Laboratory Astrophysics; Computing¹²; Theory; Virtual Observatory
 - Enhanced laboratory astrophysics¹³
 - Pan-European (Virtual) Astrophysical Software Lab
 - Further development of the Astrophysical Virtual Observatory
- Wider impact
 - Improvement in communications to the public
 - Greater interactions with European industry
 - Provision of adequate numbers of highly skilled people
 - Measures to enhance science and technology education
 - Enhanced exploitation of results

Conclusions and Debating Points for EAS

Astronet, tried to integrate the many somewhat parallel planning endeavours that transcend the classical discipline ‘Astronomy’. The outcome is as follows:

- the Astronet Roadmap is a kind of European equivalent of the US Decadal Reports
 - and has been taken note of by US policy makers,
- yet it is distinct from its American equivalents,
 - it does not have the stamp of approval of an Academy, but is supported by European Inter-governmental Research Organisations as well as by regional and national funding organisations,
 - it has a time horizon of 20 to 25 years, rather than a decade only,
 - covers all fields at once,
 - and clearly takes into account the global context.¹⁴

European astronomy projects — in particular those led by ESA and ESO — are recognised as being competitive by the US policy makers. This is manifested in the latest Decadal Report on Astronomy, which recommends a joint strategic planning process for the future (cf. footnote 9).

The comprehensive «Astronet Roadmap Report» goes well beyond traditional astronomical activities; it spells out solar physics and solar-system exploration as components of the enterprise, and also formally includes activities such as laboratory astrophysics, the maintenance of a virtual observatory, science and technology education, outreach etc.

12 To underline this point: note that the data flow and concomitant resource requirements of the SKA (to be built 2016-2024) is 20 PB/20 s, >20 MW power for Computing and Data Management (according to ASTRON)

13 Working Group web site: <http://home.strw.leidenuniv.nl/~linnartz/ET-FLA/>

14 Decadal Surveys took the global context into account in the more recent past only.

With growing project size one observes a trend towards inter-continental collaborations. The ground-based Atacama Large Microwave Array (ALMA) located in Chile, for example, is a joint undertaking of ESO, the US National Radio Astronomy Observatory (NRAO) and the National Astronomical Observatory of Japan (NAOJ). And ESO counts on Brazil ratifying its status as Member Country, so that it can realise the E-ELT. The US projects for a 25-m or 30-m telescope, finally, are based on associations with Canada, Japan, China and India, or Australia and South Korea, respectively (cf. Appendix B).

The economic downturn of the past four years¹⁵ and perhaps also what in retrospect appears as an over-achieving attitude in planning as well as a redundancy in projects,¹⁶ have slowed down progress both in implementing missions and further planning.

At a time, when multi-disciplinary approaches are more and more frequently becoming a necessity for decisive steps in the progress of science, too restricted a view of one field — as, for example, in the report by the EAS Working Group on Space Astronomy¹⁷, where heliophysics is excluded — may be interpreted as self-serving exercises for defending a narrow interest. It is to the credit of the report in question though that it takes in the observation of gravitational waves!

Finally we note a tendency of learned societies to also reach beyond their own continent. The Optical Society of America (OSA) is a prime example, they hold conferences in South America with increasing frequency and it has even been suggested that OSA, which anyway has had a large part of its membership working outside of America, may eventually drop the ‘of America’ in its name. Given the number of South-American students in Europe — and also the fact that cultural values in South-America are rather close to the European ones — EAS might also think of establishing links with that part of the World.¹⁸

The EAS might also discuss, whether it should follow more closely the further development of Astronet, for example as an observer. A decision on this matter could moreover entail a discussion on whether the coverage of astronomy by EAS — as it has been practiced up to now — is adequate, or whether it should be broadened to more closely match that of Astronet’s definition of ‘Astronomy’.

15 A specific consequence is the withdrawal of NASA’s planned support during ESA’s three Large Mission studies (EJSM-Laplace, LISA and IXO), cf. footnote 10.

16 Some over-achieving may be inherent in the joint NASA/ESA JWST, while ESA’s ‘Bepi Colombo’ mission may better fit the label of redundancy.

17 The EAS working group on the ‘Future of Space Astronomy’, led by Prof. M. Watson has provided a thoughtful report for consultation to EAS Council. This report concentrates on space astronomy, and, for example does not consider solar physics (including heliophysics) as part of this venture. It addresses, however, procedural aspects of planning (such as the differences between Horizon 2000 and Horizon 2000+ planning vs. that of ‘Cosmic Vision’), but does not prioritise missions. The Astronet Roadmap, in contrast, does prioritise missions and thus shows considerable compatibility with previous planning as presented in the Reports on individual domains of astronomy and astrophysics, although minor differences exist.

18 The European Physical Society (EPS), an EAS sister society, for example, regularly receives reports on the activities of the Federation of Ibero-American Physical Societies (FEIASOFI), and is represented at FEIASOFI general meetings. Similarly, the European Research Council (ERC) decided ‘to go global’, i.e., to award grant also to scientists residing outside Europe.

The European Science Foundation's (ESF) European Space Sciences Committee (ESSC), which follows all space sciences, and thus reaches well beyond astronomy, has been advocating repeatedly a better coordination of efforts concerning surveys conducted by different agencies, especially in Europe and the US. (The EAS might support this recommendation.)

One might think that the many European astronomers who are members of the American Astronomical Society (AAS) would provide a good link to the US community in planning matters. However, European members of the AAS are implicitly supporting the policies of AAS. It is therefore a task for the European Astronomical Society to push from the European side for enhanced collaboration in planning between Europe and the US. The activities of Astronet and a recent workshop on "Lessons Learned in Decadal Planning in Space Science"¹⁹ show that planning, which seriously takes into account financial aspects is alive on both sides of the Atlantic; nevertheless some attention to steady progress in collaboration is bound to be helpful!

In conclusion we might stress again that science has become a multi-disciplinary enterprise, i.e., an endeavour that cannot any more be cleanly subdivided to be dealt with in disciplinary compartments. It may be appropriate therefore to evaluate, whether some of the methods that had been foreign to astronomers, but which have taken on growing importance in measuring, exploring and explaining the Cosmos, should be better taken into account by a learned society such as EAS.²⁰

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¹⁹ http://sites.nationalacademies.org/ssb/CurrentProjects/SSB_070954.htm

²⁰ In recent testimony to a congressional subcommittee on budgetary issues for „astronomy and astro-physics“, the President of the American Astronomical Society, DM Elmegreen included research “on the Sun, Solar System, and the rest of the Universe” in her remarks, but surprisingly avoided any reference to techniques other than the traditional ground-based and space-borne telescope observations and planetary exploration by rovers. No mention was made even of X-rays, and none of gravitational waves, although these are a predominant theme in «New Worlds, New Horizons in Astronomy and Astrophysics», i.e., the 2010 Decadal Report (cf. https://aas.org/files/AAS_Testimony_to_CJS_2012.pdf)

Dec 1977, eds F Pacini, W Richter & RN Wilson) pp 5-12; Woltjer L (2006) *Europe's Quest for the Universe*, pp 43-85 (Les Ulis, EDP Sciences).

Appendices

A. Interrelationships of the Astronet Roadmap

To explain the Interrelationships of the Astronet Roadmap, we reproduce here Section 2.2 of this report (entitled „Interrelationships“):

The Roadmap cannot be developed or implemented in isolation. As well as the national funding agencies themselves, and large pan-European organisations that are responsible for the development of facilities of particular relevance to ASTRONET, there are several EU initiatives that seek to enhance the planning and implementation of different aspects of our subject. The ASTRONET Roadmap team sought to foster co-operation and coordination between our project and all the other relevant organisations and initiatives.

Both the European Southern Observatory and the European Space Agency are formal founding partners on the ASTRONET project; ESO as a Contractor and ESA as an Associate. Both are represented at ASTRONET Board level and have participated in the formulation of the Science Vision and now the Roadmap. ESA's representation was especially valuable on the Roadmap Working Group (see below), particularly through the period in 2007 when ESA was considering submissions for missions to fulfil its Cosmic Vision ambitions. ASTRONET was not privy to the ESA selection process, but performed its own independent evaluation of the proposed projects. The outcomes of the two parallel exercises are discussed in the Panel reports in the subsequent chapters. Good working relations were established to ensure mutual understanding of any differences in outlook and perspective.

The ASPERA²¹ initiative is another ERA-NET comprising national agencies and funded by the EU under the Framework Programme for Research and Technological Development (FP6). Its primary objective is to provide coordinated planning for the future of astroparticle astrophysics in Europe. Its remit overlaps with Astronet's Roadmap Panel A, and to a lesser extent with Panel B. The work of both Panels has benefited from a regular interchange of information on progress. This has included the participation of ASTRONET in ASPERA open meetings as the ASPERA Roadmap was being developed, and taking part in both videoconference and face-to-face meetings. In this way, excellent working relations have been established with ASPERA.

ESFRI²² brings together representatives of EU Member and Associated States, appointed by the Ministers in charge of Research, plus one representative of the European Commission. The role of ESFRI is to support a coherent approach to policy-making on research infrastructures in Europe, and to act as an incubator for international negotiations about well-specified initiatives. Several of the largest infrastructures considered by ASTRONET are on the ESFRI roadmap and several of the founding agencies of ASTRONET are central to the work of ESFRI.

The OPTical Infrared COordination Network for astronomy (OPTICON)²³ is an Integrated Infrastructure Initiative (I3), initially funded under FP6, which brings together all the in-

²¹ http://esa.int/esaSC/SEMA7J2IU7E_index_0.html

²² <http://www.aspera-eu.org>

²³ <http://cordis.europa.eu/esfri>

ternational and national organisations that fund, operate and develop Europe's major optical and infrared astronomical infrastructure, together with several world-class facilities for solar astronomy located in the Canarian Observatories. OPTICON incorporates networking, transnational access (TNA) and Joint Research Activities (JRA) to foster collaboration and development of facilities within its remit. RadioNet²⁴ is another I3 funded under FP6. It has pulled together all of Europe's leading radio astronomy facilities to produce a focused, coherent and integrated project whose goal is to enhance the quality and quantity of science performed by European astronomers significantly. Both OPTICON and RadioNet are represented on the ASTRONET Infrastructure Roadmap Working Group and links between the three initiatives are very strong.

Finally, EuroPlaNet²⁵ is an I3 network linking planetary scientists from across Europe, again funded under FP6. The aim of EuroPlaNet is to promote collaboration and communication between partner institutions and to support missions to explore the Solar System. The EuroPlaNet coordinator was a member of the ASTRONET Roadmap Panel C. Similarly Euro-VO²⁶ aims to deploy an operational Virtual Observatory in Europe. ASTRONET Panel D included a leading member of this initiative.

B. Notes about US Projects for large ground-based telescopes (25-m & 30-m class)

The 2010 Decadal Report describes on pp. 1-11 three projects for future ground-based telescopes:

1. The Large Synoptic Survey Telescope (LSST)
 - an 8.4-meter optical telescope to be sited in Chile, which will image the entire available sky every 3 nights.
 - with a 10-year lifetime this shall result in a publicly accessible database of 100 billion megabyte.
 - its design is relatively mature with an appraised construction cost of \$465 million, of which it is recommended that the NSF and DOE contribute one third each, with the remaining third coming from international and private partners.
 - its annual operations costs are estimated at \$42 million, of which \$28 million is recommended to be split between NSF and DOE.
 - first light is foreseen in 2022
2. Giant Segmented Mirror Telescopes (GSMT)
 - The committee recommended that a choice between the following two projects be made as soon as possible for a federal partnership at a level of about a 25 % investment in one of them. A schedule and budget plan should then be developed. The survey appraises a total GSMT construction cost in the range of \$1.1 billion (GMT appraisal) to \$1.4 billion (TMT appraisal) and assumes that the federal share of the capital cost will be borne by Major Research Equipment and Facilities Construction funding, while recognizing that the total share may be secured through whatever combination of capital cost, operating funds, and instrumentation support is most favourable. The federal share of the operations cost is expected to be carried by the NSF Division of Astronomical Sciences (NSF-AST).

²⁴ <http://www.astro-opticon.org>

²⁵ <http://www.radionet-eu.org>

²⁶ <http://www.europlanet-eu.org>

- a. 30 m Telescope (TMT)
 - A non-profit TMT Observatory Corporation was founded in June 2003, *with Partner Institutions*
 - > Association of Canadian Universities for Research in Astronomy (ACURA)
 - > California Institute of Technology (Caltech)
 - > University of California (UC)
 - with Collaborating Institution*
 - > National Astronomical Observatory of Japan *and with Observers*
 - > National Astronomical Observatories of the Chinese Academy of Sciences
 - > Department of Science and Technology of India
 - Schedule:
 - June 2003: TMT Observatory Corporation founded as a non-profit corporation by:
 - the Association of Canadian Universities for Research in Astronomy (ACURA),
 - the University of California (UC), and
 - the California Institute of Technology (Caltech)
 - March/April 2009:
 - TMT five-year Design Development Phase (DDP) completed
 - TMT commenced its Early Construction Phase
 - 2021
 - TMT is scheduled to begin scientific operations in 2021 on Mauna Kea, Hawaii as a next-generation astronomical observatory.
- b. Giant Magellan Telescope (GMT: seven 8.4 m segments, 24.5 m equivalent collecting area)
 - The GMT Corporation, an international consortium was founded in 2009
 - with seven partners from USA:*
 - > Carnegie Institution for Science
 - > Harvard University
 - > Smithsonian Institution
 - > University of Texas at Austin
 - > Texas A&M University
 - > The University of Arizona
 - > University of Chicago
 - with two partners from Australia:*
 - > Astronomy Australia Ltd.
 - > The Australian National University
 - and one partner from South Korea:*
 - > Korea Astronomy and Space Science Institute
 - Schedule:
 - January 2012:
 - casting of second mirror blank
 - March 2012,
 - rock blasting on Las Campanas to prepare the site
 - 2020
 - first light predicted

An interesting aspect of GMTO concerning budget aspects is that it has a Finance and Audit Committee, consisting of members from Australia, South Korea and four US Universities.

by Martin C.E. Huber

AN OPEN LETTER TO EMPLOYERS

The dreaded time has come again, when you have to sift through a thick stack of resumes in the hopes of finding a worthy employee for your business. Suddenly my resume catches your eye: **I am an astronomer!** But wait, why should you

hire me in your line of work, which might not be relevant to astronomy?

Look at this resume. However many talents I profess to have, you can safely assume I have more. Something you should know about astronomers is that **we take many of our skills for granted**. I might not mention in my resume that I can easily tackle Microsoft Office, Open Office and any basic plotting program. These days I create all my articles, presentations, posters or lectures using LaTeX. **I am used to doing my own typesetting and I can write well-structured texts**. Actually, **I have already written a small book** – my thesis! Sure, I used Microsoft Excel for calculations and plotting during my studies, and still use it from time to time. But I can just as easily use **Mathematica**, or **Matlab**, and very often I write my own **Fortran**, **IDL**, **Python** or **C++** programs even for small calculations. It's just handier.

As an astronomer I am quite familiar with **statistics**, and **handling large data sets** is embedded in my daily routine. I might have learned the techniques of **data mining** in order to gain some insight into the multitude of observational data I am handling, and I am also very efficient in **plotting these data** in a way that makes their significance clear to my audience.

It is possible that I have spent a lot of my time **observing** my favorite celestial objects with some earth-based or space borne telescope, a job that is combined with **developing code**, **data reduction** and sometimes the **development of new instruments and detectors** for various ranges of the electromagnetic spectrum. Thus I might have extensive technical and laboratory experience, on top of my other skills.

If I was involved with large simulations in the past then I have a whole armory of visualization tools at my disposal. And I can pick from a wide range of advanced plotting programs to create my two- and three-dimensional figures. I might even **be able to create my own graphics**, because, let's face it, everybody likes a pretty picture. And I might be as good as a commercial programmer, since I spent most of my day developing and debugging large codes and solving all my programming problems without calling the IT department.

Furthermore, I am used to **routinely presenting my results to diverse and international audiences**. I have given talks and seminars in conferences and scientific institutes all around the world. I might have even explained my highly technical work and my scientific results to **non-experts**, something that has given me the confidence that I would do good in an outreach job. Now that I think of it, I do this in every family gathering and high school reunion, when people ask me about science, astronomy and the universe.

I have often written **research proposals**, either to get observing time with some telescope, or to **ensure funding** for my scientific projects. In those proposals I had to be very convincing about the value of the proposed subject in promoting science and the human knowledge in general. Thus I have learned how to **advertise myself and my activities** and convince people of the usefulness of my research. I have also learned to **work efficiently under pressure** – those proposals were written under a looming deadline!

In the conferences I went to, I tried to **promote my work** to scientists from all over the world, thus honing my marketing skills. I did my best to meet new people and **create a network of colleagues** with some of whom I formed **international collaborations**. I might have been a member of a large international team or collaboration, where I had to communicate and coordinate between people from different countries and backgrounds.

Therefore, I feel right at home among people of different nationalities, and I am fluent in more than one language. **English** has almost become the language I think in, if I'm not a native speaker, since most of my professional interactions

happen in that language. And I have moved around a bit. I have probably lived in at least one foreign country for a couple of years, where I had to learn the local language and adapt to the social environment. As a result I am very **flexible and open to different cultures**.

I can be **independent** in my work, and many of the things I know I have taught to myself, through extensive research and trial-and-error. But of course I can also work in **teams**, since I have always been a part of a scientific group. In these groups I was not afraid to ask for help from the senior, experienced members. I also helped and mentored the younger members, sharing my insights with them and helping them develop their skills. I have almost definitely **taught a class or supervised a laboratory course in a university**. As a result of my interaction with both less and more experienced people in my field, I am not afraid to admit my own mistakes and gain from them. **Actually, the process of learning never stops for me**. I am always open to new input, and to developing new skills.

On top on that, I have honed my **critical thinking** almost to a fault. I don't normally believe something just because I heard or read it somewhere, but I thoroughly research my sources. You can count on me to give you reliable and well-researched information.

Finally, the thing I can do best, irrelevant of whether I worked with data, simulation, astrophysical theory or all of the above, is that **I can take a large problem, break it down in manageable bits and then devise and implement a solution to each part**. I am an expert in **analysis and model development**, and **I can do both logical and creative thinking**.

So, in case of doubt, hire an astronomer! You will not regret it!

Ioanna Arka,

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ADA 7 - THE 7TH CONFERENCE ON ASTRONOMICAL DATA ANALYSIS

The ADA Conference series has become the Number One event for presenting the state of the art in multiscale image and signal processing methodologies, and their application to the major astronomical missions, both current and future. As such, the ADA Conferences play a central role in transmitting skills and insights on data analysis methodology, on software systems, and on the exploitation of astronomical data. For those involved in major astrophysics missions, and in particular for young researchers, the ADA Conferences foster close interactions, discussions and lively debates, typically held at venues that reinforce the learning, and the research sharing and dissemination, that ensues. Held regularly since 2001, the ADA conference series has been characterized by a range of innovative themes, including multiscale geometric transforms such as the curvelet transform, compressed sensing and clustering in cosmology, while at the same time remaining closely linked to front-line open problems and issues in astrophysics and cosmology.

ADA 7 in particular included sessions on asteroseismology, exoplanet detection, large scale structures (weak lensing, galaxy catalogs), CMB (source separation, polarization), restoration (map-making, deconvolution, modeling), hyperspectral data analysis, compressed sensing. The conference took place in May 2012 at the Institut d'Études Scientifiques de

Cargèse, located near the village of Cargèse on the west coast of the island of Corsica (France). It was supported financially by the European Astronomical Society under the EAS Colloquia initiative, which support the exchange of ideas and promotes cross-fertilization of ideas between scientists working in Europe.

Prior to the conference Sandrine Pires, Florent Sureau, Petr Skoda, Florent Sureau, Dan Bamich, Wolfram Freudling, and Jérôme Bobin organized a total of 8 tutorial presentations. The topics included sparse representations and compressed sampling, deconvolution and filtering, data analysis on the sphere, inpainting, and blind source separation.

The keynote and invited speakers of the conference included Martha P. Haynes (Cornell University, USA), François Bouchet (IAP Paris, France), Masahiro Takada (IPMU, Tokyo, Japan), Pavlos Protopoulos (CFA Harvard, USA), Gabriel Peyré (Paris Dauphine, France), Jalal Fadili (Caen University, France), Mike Hobson (Cambridge University, UK), G. Jogesh Babu (Penn State University, USA), Roberto Trotta (Imperial College London, UK), Enrique Martinez (Inst. de Física de Cantabria, Santander, Spain), Yves Wiaux (EPFL, Switzerland), Adrienne Leonard (CEA, Saclay, France), and Benjamin Joachimi (Edinburgh University, UK).

The online presentations consist of the 42 invited and contributed talks, as well as 11 posters. In the online proceedings, there are 17 additional papers. All materials related to the conference are available online at: <http://ada7.cosmostat.org> providing an excellent entry point to the conference topics. We believe that due to the wealth of material addressing the current state of the art in the methodology, applications, and dedicated missions, the above site should be added to one's address book, as a singularly important resource.

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Christian Surace, Laboratoire d'Astrophysique de Marseille, France

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NEWS FROM EWASS 2012

SYMPOSIUM 2: THE ASTROCHEMICAL UNIVERSE UNVEILED WITH HERSCHEL

Since its launch in 2009, the Herschel Space Observatory has unveiled the far-IR window with its high sensitive instrumentation, collecting spectra of important molecules towards a variety of different objects: from comets to protoplanetary disks; from the diffuse interstellar medium and photodissociation regions (PDRs) to dense cloud cores; from star forming regions to the circumstellar environment of evolved stars; from local to early-universe galaxies. In doing so, new molecular species have been discovered; unbiased spectral surveys have unveiled an extraordinary rich chemistry; high spectral resolution line profiles of hydrides and important coolants such as water and carbon monoxide have revealed complex chemical/physical processes and shocked material. In summary, Herschel has emphasized the crucial role of astrochemistry in the whole astrophysical community. The EWASS Symposium 2 has given us the opportunity to bring together different communities, compare the results obtained

in different environments and to discuss their interpretation with the available models.

The last part of the Symposium was dedicated to data interpretation and available models. Open questions, major problems and future developments for data interpretation techniques and chemical/physical models have been jointly discussed. From this discussion it emerged the need for a better understanding/appreciation of the parameters that are really important in the current physico-chemical models. Moreover, modellers should provide more observables as well as error bars/uncertainties on their results, to make major discriminations between the main parameters involved. The top 10 open questions / major problems identified were: (1) grain-surface and PAH chemistry - theory and laboratory work needed to interpret observations of: atmospheres of evolved stars, star forming regions, protoplanetary disks, galactic and extragalactic interstellar medium; (2) coupling chemistry with dynamics; (3) photoprocesses versus shocks along outflows driven by young stellar objects; (4) extrapolations of rate coefficients only measured in a limited range of temperatures; (5) missing collision rates (especially with H and electrons); (6) uncertainties on non-thermal desorption mechanisms in molecular clouds; (7) the H₂ and H₂O ortho-to-para ratio in cold environments; (8) binding energies of crucial surface reactants (e.g. O); (9) chemical processes during dust grain coagulation; (10) identification of molecular diagnostics to study the different components of the interstellar medium in external galaxies (shocked material, PDRs, XDRs, ionized gas).

The high sensitivity far-IR spectra provided by Herschel are a precious legacy which already started to challenge our current understanding of the chemical and physical processes in our solar system, in regions where stars and planets are currently forming, in the atmospheres of AGB stars, in the interstellar medium of the Milky Way and external galaxies. It is now up to us to decipher Herschel data and unveil our astrochemical universe. Thanks to Herschel, astrochemistry just entered a new exciting era.

Paola Caselli,
Univ. of Leeds, UK

SYMPOSIUM 3: GAS FOR COSMOLOGY IN THE NEARBY UNIVERSE

The Symposium was motivated by the fact that in the near future, many new radio facilities will open new exciting ways to study the role of gas in galaxies and their evolution. However, this will have to be complemented by theoretical studies of the detailed processes in galaxies, and their environments, in order to be able to learn about their complicated physics in a cosmological context. Detailed observations of nearby objects will provide crucial input for understanding the observations of more distant objects. A key component that can be studied in detail for nearby objects is the gas, and in particular the cold gas (atomic and molecular). The accretion of gas, and how various processes, such as AGN and star formation, interact with it, regulate the life of a galaxy.

The Symposium was attended by 65 registered participants. However, given that the meeting was part of the European Week for Space Science and Astronomy, participants of other symposia of this event also attended some sessions. Given the nature of EWASS, most participants were from European countries, but a fair fraction of them were from the USA and Australia.

The science programme aimed to provide an overview of the state-of-the-art of the topic of accretion of gas which fuel a galaxy, and gaseous outflows, which may deplete a galaxy of this reservoir of gas. We have done this starting from the observational point of view and then expand to the theories and predictions that will allow planning the next surveys. The aim to combine theory and observations is underlined by the figure on the poster of the meeting (see Figure 1 below). The figure shows the neutral gas in two galaxies, one being the result of detailed numerical simulations (left), the other of deep HI observations of a real galaxy (right). The two galaxies appear very similar, underlining that now is the moment to start detailed comparisons between observation and theory of gas in galaxies.

The programme started with a look at evidence of gas accretion in the Local Group and nearby galaxies and then expanded this to objects at higher redshift. It is clear that there is a lot of evidence for gas accretion from the IGM, but it is also becoming clear that the observed amounts are much less than what is needed for sustaining star formation in galaxies. Theoretical studies confirm now these results. A particularly interesting presentation was given by Dr. F. Fraternali (Bologna). He suggested that the interaction of hot gas ejected into the halo by star formation with pre-existing gas in the halo, gives a positive feedback for gas accretion and that this may solve the puzzle of small accretion rates.

Particularly interesting was the session on stacking techniques that start to give a glimpse on what deeper future studies of distant objects will bring. The end of the meeting was devoted to an overview of the new instruments. From these presentations it became clear that large-scale cosmological studies, such as large-scale flows or structure formation, will become more and more part of HI studies. Figure 2 (taken from the talk of Dr Fernandez (New York)) illustrates the progress that will be made with the new instruments.

Time was also devoted to AGN and AGN-driven outflows including extensive reviews. An impressive result which was shown by Dr. K. Dasyra (Paris) is the outflow detected in molecular gas in the radio source 4C12.50. Earlier observations done in the HI line had revealed an outflow of atomic gas which is now dramatically confirmed in molecular gas (see Figure 3).

The Symposium summary was given by Prof. J. van der Hulst (Groningen).

About 40% of the speakers were female and the programme gave particular relevance to young invited speakers and contributed speakers (among whom a number of PhD students and young postDoc).

The presentations are available in pdf format at:
<http://www.astron.nl/ewass2012/>

Raffaella Morganti,
ASTRON, The Netherlands

SYMPOSIUM 5: GAIA RESEARCH FOR EUROPEAN ASTRONOMY TRAINING

The GREAT (Gaia Research for European Astronomy Training – <http://www.great-esf.eu> and <http://www.great-itn.eu>) initiative is a pan-European research network involving over 500 researchers in 20+ countries with a common interest in aiming to maximise the science potential of Gaia. This 5th GREAT network annual plenary meeting was co-located at the EAS 2012 EWASS, constituted as Science Symposium 5. It was organised in six sessions over the days 5-6 Jul 2012. In addition there was a related special session (SM2) on Weds 4 July 2012. In a novel open initiative, the community were

invited to submit their proposed talk titles and abstracts on the meeting wiki. The final meeting programme was then generated by the SOC based on those contributions. The symposium was attended by 40 to 60 people, and included the participation of a number of graduate students active in the GREAT-ITN. Full details of the programme and talks for S5 and SM2 are available at <http://great.ast.cam.ac.uk/Greatwiki/GreatMeet-PM5>.

Session 1 contained invited presentations covering the ESA Gaia project and related activities. Prusti provided an update on the Gaia mission, noting that it will be launching end 2013, and giving an overview of Gaia science performance and the plans for data releases. Mignard discussed the activities of the Gaia Data Processing Consortium and how it will generate the science data products from Gaia for the community. Brown discussed how the Gaia data will be released to the community, the challenges being addressed in creating the Gaia data system, and how the community is driving this process. Session 2 saw four presentations covering Gaia/GREAT surveys and instrumentation projects. Randich presented an overview of the Gaia-ESO survey, being carried out with the VLT over 5 years. There followed talks describing the MOONS (Maiolino), 4MOST (de Jong) and WEAVE (Trager) instruments concepts.

Session 3 focussed on GREAT science in the area of Galactic structure. de Bruijne discussed the need for complete radial velocities of those stars in the upcoming Gaia Hundred Thousand Proper Motion data release. McMahon presented a brief overview of the VISTA VHS survey. Kawata noted recent developments in the Chemodynamical Modelling of the Galactic Disk. Advances in 3D extinction mapping of the Galaxy were presented by Hanson. Finally, Faccioli presented a new catalog of RR Lyrae stars (RRLs) observed by the Xuyi Digital Sky Survey of the Galactic Anti Center. Session 4 focussed on Gaia and Transient events, and the impact of Gaia on extragalactic studies. Presentations were given by Blagorodnova, Branchesi, Molloy, Kontizas, Bellas-Velidas and Popovic. Session 5 covered Gaia and exoplanet science with presentations from Anton, Crosta, Sozzetti, Olenick and Martinez. The final Session 6 was primarily devoted to presentations concerning the studies of open clusters. The speakers were Pourbaix, Lobel, Schmeja, Cantat-Gaudin, Vallenari, Mapelli, Spina. The session concluded with a final discussion session.

In addition to the two-day science symposium, there was a special session held on Wednesday 4 Jul 2012. This session was of a more informal nature, where organisers of GREAT supported workshops (see <http://great.ast.cam.ac.uk/Greatwiki/GaiaScienceMeetings>) reported on meetings held over the previous year. Thus presentations covered reports on Quantitative Spectroscopy and Comparative Spectrum Modelling, Brussels, June 2011, The Interstellar Medium in Three Dimensions with Gaia, July 2011, Galaxy Modelling with a Gaia mock catalogue, February 2012, Stars without borders, radial migration in spiral galaxies, May 2012, The metallicity distribution of the Milky Way disks, May 2012, The Milky Way: Stars, Gas, Dust and Magnetic Fields in 3D, June 2012. Finally there were a number of GREAT working group reports and notification of upcoming GREAT supported meetings.

Nicholas Walton,
Institute of Astronomy,
University of Cambridge, UK
Timo Prusti,
ESTEC, ESA, Noordwijk, NL

SYMPOSIUM 7: THEORY AND OBSERVATIONS OF CORE-COLLAPSE SUPERNOVAE

The symposium (S7) on Theory and Observations of Core-Collapse Supernovae was allotted 11 hours and was held over 2 days 2-3 July. There were almost a constant number of attendees (25-30), with a peak during the last session of 45 people. The subject matter ranged over both theory and observational aspects, from X-rays to sub-millimetre wavelengths, and involved speakers from Australia, France, Germany, Great Britain and Northern Ireland, Italy, Japan, Russia, Sweden, Switzerland, and USA. The total number of verbal presentations was 21, whilst 6 posters were exhibited.

These covered the following subject areas: an update on explosive mechanisms and early expansion, past and future searches and rates, the characteristics of the progenitors, the supernova-GRB connection, dust and molecules, and the chemical evolution of galaxies; a special session was devoted to supernova SN 1987A, and the last results from the Herschel infrared satellite were lively debated.

New and exciting results were presented and the sessions used to end in sprightly conversations that extended much beyond the allocated time!

Patrice Bouchet,
CEA/Saclay, France

John Danziger,
Osservatorio Astronomico di Trieste, Italy

SYMPOSIUM 8 - THE SUN: NEW TOOLS AND IDEAS IN OBSERVATIONAL SOLAR ASTROPHYSICS

The EAS Symposium 8 “The Sun: new tools and ideas in observational solar astrophysics” was held on July 5-6, 2012 adjacent to EWASS 2012 conference. As reported in the web page of the Symposium (<http://sites.google.com/site/ewasssun>) present-day solar astrophysics needs high spatial, temporal and spectral resolution observations which imply the development of large aperture next generation telescopes and innovative technologies and instruments both for space and ground-based application. Actually, in this branch of astrophysics, as well as in other fields of science, new ideas and highly developed tools for scientists could arise from such specialized developments. However, the implementation of novel technology to achieve scientific breakthroughs requires the interaction between space and ground-based communities and the establishment of large international partnerships.

For these reasons researchers from all over the world met at the Symposium to present the status of the most relevant projects in experimental solar physics and their science drivers and to discuss about future perspectives. In more detail, the Symposium’s objectives were: i) to review the most significant scientific objectives of present projects; ii) to present the status of the relevant projects in space and ground-based solar physics, and iii) to forecast the development of solar physics community for the achievement of scientific objectives and the management of new international facilities.

More than 50 participants from 13 countries were joining the symposium and due to the excellent talks and the active discussions it was a great success for all of us. Ten invited talks by prominent experts in various topics of the symposium

(Landi degl’Innocenti E., Mueller D., Casini R., Trottet G., Ichimoto K., Collados M., Rimmele Th., Antonucci E., Pilet V., Carlsson M.) were organized. Height contributed talks (Stangalini M. De Simone N., Brajsa R., Muleri F., Calcines A., Giovannelli L., Pieralli F.) and several posters focused attention on various aspects of next generation projects in observational solar astrophysics.

Francesco Berrilli,
Università di Roma “Tor Vergata”, Italy

SYMPOSIUM 9: ASTRONOMY EDUCATION IN EUROPE

On 5 July, during EWASS 2012, was held the Symposium 9 “Astronomy education in Europe”. Following the hugely successful International Year of Astronomy worldwide, Europe is now seeking to build long-lasting legacy projects and programmes in the education of children and students. The symposium has a long tradition: the first one devoted to the Astronomy education in Europe was organized during JENAM 2003.

This symposium focused on the legacy aspects of IYA2009, as well as the wider public outreach and educational activities being undertaken in Europe in support of the broadening of understanding of astronomy and science with the public and with stimulating interest in science, mathematics and engineering subjects with the young people.

The main topics approached were Astronomy and Society, Teaching Astronomy – Experience and Remarks, Outreach Projects and Events. Since the symposium was co-organized by Euro Planet it was also addressed the education taking into the account the new results of the research in the Solar System. We had the opportunity to know the evolution of astronomy education in different countries, as Armenia, Serbia, and of course Italy, the host of symposium. A special presentation was devoted to the IAU Office of Astronomy for Development and to EU-UNAWA, as well as to the Astronomy skills as a vehicle to strengthen science education. An European project “Astronomy vs. Astrology” in educating the young generation was proposed.

The clear and documented the exposures and the debates followed them prove that education remains a priority of the European Astronomical Society and that is absolutely necessary to continue the series of annual meetings on the subject.

Magda Stavinschi (Romania),
Thierry Fouchet (France),
Livia Giacomini (Italy),
Elisa Nichelli (Italy)

SYMPOSIUM 10: THIRTY YEARS OF ITALIAN PARTICIPATION TO ESO

On May 24th 1982 Italy joined ESO becoming the 8th Member State of this organization. In the past 30 years the participation of Italy in all of ESO endeavors has been substantial in all aspects: people, fundamental industrial contributions in the construction of telescopes and the infrastructures, collaboration with the institutes in the development of instrument components and on the science programs. The aim of

the Symposium was to review critically these past achievements and discuss the Italian participation to future ESO projects.

The program started with a historical review by Giancarlo Setti, while Massimo Tarenghi described the contribution of the Italian industry to ESO projects. Several invited talks presented some highlights of scientific results obtained by Italian astronomers using ESO facilities. They were preceded by a review talk from Alvio Renzini on high impact scientific papers led by Italian astronomers. The access to the ESO observing facilities has been highly beneficial for the scientific community in Italy and resulted in a large number of outstanding scientific results and publications: 24 out of the 100 Paranal most-cited papers, and 23 out of the 100 La Silla most-cited papers have an Italian astronomer as first author. The second day was opened by a review talk by Sandro D'Odorico on the Italian contribution to ESO instrumentation. The review showed how there have been an increasing involvement of Italian institutes in the past 30 years. In the framework of the E-ELT there were four talks on instrument studies with significant contribution from Italian institutes: CODEX (Stefano Cristiani), SIMPLE (Roberto Maiolino), MAORY (Paolo Ciliegi), and QuantEYE (Roberto Mignani). Finally, an overview on the VST project was given by Paolo Vettolani and a review talk on ALMA science by Leonardo Testi.

Vincenzo Mainieri,
ESO, Germany

SPECIAL SESSION 1: COSMIC REIONIZATION: UPDATING PHYSICAL SCENARIOS

The focus of the session was the process of reionization by which the cosmic gas was ionized again by stars, quasars and possibly other sources after it recombined 380,000 years after the Big Bang. The main objective was to analyze the current understanding and individuate promising paths for improvement. The Session started with general reviews on the standing situation. And then continue with more specific talks.

Large emphasis has been given to the observational probes of the reionization process, with particular attention on the 21cm line from neutral hydrogen, the Cosmic Microwave Background radiation and the intensity mapping. Present and next generation radio interferometers promise to detect the hyperfine transition of the ground state of neutral hydrogen from the high redshift intergalactic medium (IGM). This would allow unprecedented insight into the spatial and temporal evolution of cosmic reionization. During the Session, particular attention was devoted to LOFAR and PAPER, two SKA precursors in the commissioning phase, which should start delivering results in about one year time. While the 21cm signal could be detected either in absorption or in emission against the CMB, both in terms of its power spectrum and tomography, the main challenge remains a perfect instrument calibration, so to control the strong ionospheric contamination. Examples on how to deal with other foreground contamination were given. Interestingly, a detection of the 21cm signal from the high redshift universe could give valuable information not only on the characteristics of cosmic reionization, but also for example on the existence and nature of dark matter, and on modified gravity. Other lines could be used in alternative to the 21cm line, for example HI Lyman Alpha and CO lines. These could be detected in different frequency ranges and would offer a

complementary probe of the high redshift IGM and galaxy evolution. The possibility of cross-correlating these signals with the 21cm one has been discussed.

In terms of sources, high redshift galaxies are continuously being discovered, either through broad-band Lyman dropout, or narrow band Lyman alpha emission surveys. Although precise redshifts and the low redshift interloper fractions are often not known, these galaxies have the potential to probe the population of reionizing sources. Latest results suggest that the Lyman alpha emitter (LAE) fraction among Lyman break galaxies (LBGs) is sharply decreasing from $z\sim 6$ to $z\sim 7$. If confirmed with a larger sample, such a decrease could be explained with a rapid evolution in the neutral hydrogen fraction, and/or a rapid evolution in the galaxy properties (such as the escape fraction or dust). A growing sample of LBGs is available through surveys with the Canada-France-Hawaii Telescope (Wircam Ultra Deep Survey), and on the Hubble telescope with the CANDELS and BoRG surveys. These surveys are now converging on the LBG Luminosity Functions at $z\sim 5-8$, which show a standard Schechter profile. In particular, we now have better estimates of the stellar content of these galaxies (which require improved dust corrections). The faint slope of the Luminosity Function appears to be very steep, close to the diverging value of -2 , meaning that we are likely missing the bulk of the high redshift galaxies that are too faint to be detected with these surveys. Bright galaxies on the other hand are fairly well constrained, with a recent BoRG discovery of four clustered LBGs, which could be a proto-cluster region at high redshifts. Finally, principal component analysis can be an interesting tool to jointly study CMB and reionization models. Including physically-motivated reionization models can mildly alter predictions of cosmological parameters.

Andrea Ferrara,
Scuola Normale Superiore, Italy

SPECIAL SESSION 2: USE OF GRAVITATIONAL LENSING TO STUDY DISTANT GALAXIES

The Special Session took place on July 5th 2012. The general topic of this session was lens modeling and the use of lensing as gravitational telescopes to probe the distant Universe. The program was subdivided into 5 subsections: lensed quasars, Hubble MCT results, physical properties of high redshift galaxies, surveys of lensed galaxies at very high redshift, and gravitational telescopes.

The lensed quasars subsection combined 2 talks presenting observational results on lensed active galactic nuclei: either using strong lensing or microlensing, we can probe the physical properties of the quasar: size of the torus, dust distribution, chemical composition (including molecules such as water). Then followed a talk reviewing the results of the CLASH cluster program, in terms of observational status, strong lensing / mass modeling, searches for high redshift galaxies. The first afternoon subsection included 3 presentations on the physical properties of distant galaxies, either from the modeling or from the observational point of view. These observations included results on the CO content and on the mass-metallicity relation of lensed galaxies. The section on the very distant Universe combined 3 results illustrating the current efforts to search for very distant galaxies ($z>6$) magnified lensing, either using photometric or spectroscopic techniques. Finally, the last talk of

the session reviewed the status and the perspectives of using lenses as gravitational telescopes, and all the challenges associated with the large number of lenses and sources which will be obtained with instrumentation coming up in the near future.

Johan Richard,
Observatoire de Lyon, France

SPECIAL SESSION 4: THE STRUCTURE OF GALAXY DISKS SHAPED BY SECULAR EVOLUTION AND ENVIRONMENTAL PROCESSES

Aim of the session was to bring together observers, modelers and theoreticians to study the following issues regarding the structure of galaxy disks, namely: which are the main characteristics observed in their stellar and gaseous components? How do they depend on the Hubble type or on the environment? Which observed features can be more fruitfully compared to models in order to constrain the formation mechanisms?

The main topics covered during this one-day session included:

- The radial and vertical structure of galaxy disks, with two reviews on extragalactic and Milky Way disks, and one on the radial stellar density profiles of disk galaxies. Contributed talks discussed the characteristics in terms of structure and stellar populations of the outskirts of galaxy disks, as possible signatures of radial migration theory, the relation between breaks and truncations in spiral galaxies and the properties of thick stellar disks, as revealed by recent surveys.
- The distribution of neutral and ionized gas and dark matter halos in disk galaxies and their impact on the stellar structure, with contributed talks presenting the results of ongoing HI surveys on the distribution of halo gas and on lopsidedness of disk galaxies, and a new scenario for the formation of Hoag's object.
- The impact of secular evolution and environmental processes on disk galaxies, reviewing some of the formation mechanisms of thick disks, through minor mergers and/or stellar radial migration, as well as the characteristics of disk galaxies at high redshift.

Contributed talks discussed the properties of barred galaxies and their relation with the environments, as well as the physical processes that may lead galaxies to evolve from a clumpy unstable phase at high redshift to barred galaxies in the local Universe.

Eight (8) speakers were invited for giving review talks. Of the 33 abstracts received 9 were selected as contributed talks. In addition, 16 contributions were presented as posters. More than 50 people attended, both in the morning and afternoon sessions.

The detailed programme of this one-day session is available at <http://wwwhip.obspm.fr/EWASS2012-SPS4/>

Paola Di Matteo,
Observatoire de Paris, France

SPECIAL SESSION 5: MORPHOLOGY AND KINEMATICS OF INTERACTING GALAXIES

The session was opened with a theoretical overview of one of the key aspects of galaxy interaction: how star formation is affected. Frédéric Bournaud gave a didactic exposition of the processes involved with special stress on the role of interstellar turbulence. He pointed out that galaxy interactions can be used as a laboratory to investigate star formation. The remaining morning sub-session was devoted to observational approaches to galaxy interactions in the local universe: Ewa Lokas discussed the morphology and kinematics of dwarf galaxies formed during disc mergers, Sukanya Chakrabarti explained how the distortion in the HI disc of a major galaxy can be used to detect, and infer the parameters of a minor interacting companion, Javier Zaragoza illustrated some of the points in Bournaud's review when discussing the HII regions formed in the interacting pair Arp 271, while Sotira Trifourki presented a multi-wavelength review of the long tidal tail of the Tadpole galaxy, NGC 10214. Pepe Vilchez showed us how a large IFU spectral pack can be used to disentangle the velocity field in Stephan's quintet, revealing the age sequence of the intergalactic gas components involved in collisions within this system of interacting galaxies, and finally Arag Mickaelian gave an overview of the interacting galaxies in the Byurakan-IRAS Galaxy sample.

The first afternoon sub-session allowed us to take a look at ring galaxies produced by interactions. Enrichetta Iodice gave an interesting review of observations of polar ring galaxies in the last decade, how they have helped us to understand gravitational interactions and yielded information about dark halos, while Marilena Spavone illustrated this with detailed observations of the double ringed galaxy ESO474-G26. Michela Mapelli discussed the properties of ring galaxies produced after collisions. The last talk planned in this sub-session, by Joan Font, compared the physical properties of the molecular clouds and the luminous HII regions in the Antennae, based on data cubes in velocity and surface brightness, showing the existence of interaction induced components in both populations. However the only contribution on the possible link between galaxy interaction and AGNs, by Cristina Ramos Almeida, was also included here. She produced evidence that the powerful AGNs in massive galaxies could well be induced by interactions, while AGNs of lower luminosity in smaller galaxies may not need such triggering.

The third sub-session was a fascinating mixed bag. Alessandro Pizzella explained how counterrotating stellar populations can be separated spectrally, yielding ages and metallicities for more than one merged component. Kevin Casteels showed how the Galaxy Zoo technique can be applied to identify galaxies in interaction. Johan Knapen showed us, via an H α survey, that a close companion can reorganize the star formation morphology in a galaxy but generally has a minor effect on the overall SFR. There was a contrast of view between Carlo Nipoti and Trinidad Tapia about the role mergers may play in the known decrease of compactness in galaxies at decreasing redshift. While Carlo's simulations suggest that mergers are not sufficient to explain the size growth of early type galaxies, those of Trinidad and collaborators suggest that mergers can in fact explain the observations. Clearly the underlying assumptions make the difference and show the limitations of this type of simulations. Finally Burcu Beygu presented the morphology and gas content of a system of three galaxies along a filament within a void as a probe of cosmological modelling.

The posters associated with the session included contributions on possible QSO triggering due to mergers, on polar ring

galaxies, and on a comparison of the ionized gas and stellar kinematics in a galaxy survey.

Those of us present at the Special Session felt that it had been big enough to include a useful variety of relevant themes, and small enough for good personal contacts to be made, which is one of the main aims of a conference such as EWASS.

John Beckam,
IAC, Spain

SPECIAL SESSION 6: THE EUROPEAN EXTREMELY LARGE TELESCOPE

This session was focused on the science and instrumentation expected in the early years of operation of the European Extremely Large Telescope (E-ELT). Liske (ESO, invited) gave an overview of the project, described the instrumentation roadmap and outlined the science case, much of which is supported with quantitative simulations. Comerón (ESO, invited) described the operations, emphasising the need for flexibility to adapt to a broad science case and a range of users' needs.

Two further invited talks by Davies (MPE) and Arribas (CAB-CSIC) described the science cases and capabilities of the two first light instruments: MICADO (a diffraction-limited imager with a possible spectroscopic mode) and HARMONI (a broadband integral-field spectrograph). Contributed talks covered the Mid-infrared instrument METIS and its science case (Brandner) and Multi-object spectroscopy science cases (Bonifacio).

The emphasis then switched to example science cases: the study of resolved stellar populations of galaxies up to the distance of the Virgo cluster (~ 18 Mpc, Falomo), estimating the absolute age of Local Group stellar systems by applying a new diagnostic based on near-infrared colour-magnitude diagrams (Calamida), measuring the metallicity distribution of stars in galaxies up to distances of ~ 35 Mpc through infrared spectroscopy of red supergiants (Davies), the detection and characterization of the highest redshift galaxies (Welikala), and prospects for high time resolution astrophysics with the E-ELT (Mignani). Finally, Eff-Darwich provided an engaging overview of the seismic and volcanic properties of several astronomical sites, including the Chilean sites of ESO.

The session was attended by about 40 participants. Throughout there were many questions and discussions on a range of issues, including science policy for campaigns and relative priority and readiness of instruments within the roadmap, particularly regarding the adaptive optics systems and the Mid-IR and Multi-object spectrograph instruments.

Most of the presentations are available at the conference website http://www.mporzio.astro.it/ewass_elt/

Isobel Hook,
Oxford University, UK

SPECIAL SESSION 8: HIGH-ENERGY ASTROPHYSICS WITH THE NEXT-GENERATION X-RAY OBSERVATORY

ASTRO-H, the successor of the very successful X-ray astrophysics missions Chandra, XMM-Newton, INTEGRAL and

Suzaku, will be launched in 2014 by the Japan Aerospace eXploration Agency (JAXA). ASTRO-H will be an observatory mission, with some fraction of the time available to European astronomers. It will carry several revolutionary instruments: the first calorimeter on an X-ray satellite, allowing for the first time high-resolution and high-throughput imaging spectroscopy; two hard X-ray imagers with focusing optics, which will improve sensitivity by a factor 100 compared to the current generation; and a sensitive soft gamma-ray detector. Thanks to several European national contributions and a participation from the European Space Agency, ASTRO-H represents a wonderful opportunity for European astronomers to extend and enhance their research in the very productive field of X-ray astronomy over the coming years.

A Special Session has been organized in the framework of the European Week of Astronomy and Space Science 2012 in order to promote the mission in the European community and to start preparing European astronomers for the successful use of ASTRO-H. The first sub-session was therefore devoted to a presentation of the mission itself, by Prof. T. Takahashi, the P.I. of ASTRO-H, followed by presentations of the general capabilities that will be offered by ASTRO-H, as well as the relevant aspects of data analysis and user support for European astronomers, with emphasis on the ASTRO-H Science Operation Center and Science Support Center that will be established at ESAC and at ISDC, University of Geneva, respectively.

Over the two following sub-sessions, the meeting ran over some of the most important science topics where ASTRO-H is expected to make key contributions, namely active galactic nuclei, galaxy clusters, X-ray binaries, stars and supernova remnants. Each of these topics was addressed in a review highlighting the unique opportunities offered by ASTRO-H in this field, completed, as time permitted, by contributed talks, often relating to the future impact of ASTRO-H for their science.

The program consisted in nine invited talks, eight contributed talks and thirteen posters. Attendance was approximately about forty participants.

S. Paltani and M. Audard,
Observatory of the University of Geneva,
Switzerland

SPECIAL SESSION 9: FORMATION AND DISRUPTION OF BLACK-HOLE JETS

Special Session 9 brought together observers and theoreticians interested in understanding how black-hole jets form, and why they sometimes suddenly disappear. In all, there were 3 invited review talks, 10 contributed talks and 4 poster presentations. The subject was certainly broad, and we barely managed to touch upon various issues, but the approximately 30 people who attended our session were rewarded by well-prepared, clear and informative presentations, and lively discussions.

Each of the three sub-sessions included a review talk to set the scene and several contributed talks. The areas covered included the theoretical framework for the accreting black-hole jet paradigm, as well as some problems with this framework, observations and phenomenology of accreting black hole systems associated with AGNs and stars, and numerical simulations and models of accreting black-hole jet systems. One key

discussion topic was whether or not all the physics of AGN and stellar systems with accreting black holes and jets is common, with the main difference being scaling, or whether the different conditions in stellar and AGN systems lead to different effects dominating in these systems. For example, although it is often assumed that the launching of the jets must be magnetic, there is no direct observational evidence for the Blandford-Znajek mechanism powering the formation of black-hole jets in stellar systems. Questions connected with magnetic fields also featured prominently in the session. Central issues discussed were theoretical models for electromagnetic driving, the role of the magnetic field in stabilizing and de-stabilizing electron-positron jets, observational evidence for helical magnetic fields in AGN jets on various scales, and phenomenological and observational evidence for the operation of a Cosmic Battery at the inner edge of the circumstellar accretion disk and the possible consequences of this effect on the currently accepted paradigm.

We concluded that large-scale accretion-disk magnetic fields must play an important role in the formation of black-hole jets. However, their origin and details of their role in the launching of the jet needs further investigation.

Ioannis Contopoulos,
Academy of Athens, Greece

Denise Gabuzda,
University College Cork Ireland

Nick Kylafis,
Univ. of Crete, Greece

SPECIAL SESSION 11: FROM SOLAR PHYSICS TO ASTROPHYSICS: THE SUN AS ROSETTA STONE FOR UNDERSTANDING ASTROPHYSICAL PROCESSES

The Special Session 11 “From Solar Physics to Astrophysics: The Sun as Rosetta Stone for understanding astrophysical processes” was held on July 3, from 11:00 to 18:30, during the EWASS 2012 Conference. The aim of the SpS (http://www.ao-roma.inaf.it/solare/EWASS_2012/index_ss_3.htm) was to bring together specialists in various fields of astrophysics in order to discuss those processes which have been deeply studied on the Sun and have similar characteristics in very different astrophysical contexts, albeit with completely different spatial, time and energy scales. The ability to observe the Sun with an increasing angular resolution, associated with new generation solar telescopes, providing new science drivers and observational perspectives for observational solar astrophysics, is today offering an unique opportunity, in the context of astrophysics, to find details of the interaction between magnetic field and plasma, unattainable in other astrophysical contexts. Never as now the Sun is therefore an essential key to understanding and interpret several astrophysical processes and basic physics.

Several examples have been taken into account and described during the meeting, from the contribution given by helioseismology to asteroseismology, from the knowledge of flares and magnetic reconnection phenomena in the Sun to similar phenomena occurring in compact objects (see, e.g., collimated jets of plasma in black hole accretion disks), to the regeneration process of the magnetic field via the dynamo mechanism, to the characteristics of chromospheres and wave propagation.

During the SpS, 7 Invited Talks (M.P. Di Mauro, L., Gizon, A. Bonanno, S. Jefferies, C. Parnell, F. Yuan, V. Hansteen), 7 contributed talks (A.I. Shapiro, S. Criscuoli, A. Kruglov, F. Zuccarello, S.L. Guglielmino, F. Berrilli, P. Romano) and several posters illustrated the above mentioned topics and gave the possibility to stimulate wide discussions between the participants.

This EWASS EAS Special Session was therefore able to get together various communities involved in the study of the astrophysical processes listed above, by offering the opportunity to start a comparison of the results obtained with different approaches and to discuss open questions and future evolution on these research fields.

For the future, all the participants to the SpS agreed that it would be worthwhile to continue such kind of meetings, in order to allow to different communities to take advantage of the progress obtained in solar physics in understanding these phenomena and to gain new insights in the comprehension of the processes of interaction between plasma and localized magnetic fields.

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SPECIAL SESSION 12: LONG-TERM PRESERVATION... FROM THE STARS

The session was organized by the Vatican Library (BAV: Biblioteca Apostolica Vaticana) to present their proposal to use the FITS format to store scanned ancient documents. It was chaired by L. Ciappetti, the vice-chair of the IAU FITS Working Group (FWG).

Some 60 people attended the session, most with a connection to archival systems and libraries systems. It became evident by the session that the document preservation community in general is going now through a process astronomy passed several years ago, and has no established common standard on topics such as interoperability, lossy or non-lossy compression, etc. The presentations were divided in three types: those dealing specifically with FITS and/or the BAV project (3); those presenting broad-scope activities of national libraries (3); and those of general nature (2).

Activities of national libraries were presented for Italy (Caffo), France (Ledoux) and the Czech Republic (Vychodil). The first presented general activities for Digital Cultural Heritage activities at international level (<http://www.dc-net.org/>). The other two described the activities of their National Libraries (which are responsible of “legal deposit” of documents in their countries). Ledoux showed that for France this can go from printed documents (since 1537), to music or digital video, or even web site content. Each kind of document has its own problems (and its own formats, and they are even ready to reformat all to a new one if the need arises). The issue of different formats for different needs was shown also by Vychodil which presented a s/w tool to evaluate the differences when the same data is stored in different formats (TIFF, JPG, JPEG2000, DjVU etc.), with lossy or lossless compression etc. and concluding that the needs are different. For instance lossy compression may be enough for a modern printed text, while can irremediably lose important details for an ancient manuscript.

Michetti (British Columbia) gave a talk saying that no format may fit all needs, and that a weighted tradeoff analysis shall

be performed (in fact Ledoux showed an example of such kind of analysis for the choice of the format in which to archive commercial posters), including aspects like metadata embedded or in a separate file.

Seadle (Berlin) made a very interesting presentation of the difference in the concept of authenticity for analog documents (e.g. manuscript, paintings, where there are originals, copies and falses) versus digital documents (where all trusted copies are de facto originals). His talk stimulated some discussions whether there are formats which are less prone to propagating error while copying, considered that copies are necessary because modern media are not eternal. Should one multiply copies (compare the LOCKSS initiative <http://www.lockss.org/>), use checksums, or (I added) more sophisticated error detection/correction techniques like in space telemetry ?

The FITS presentations included the one of the author, on behalf of the IAU, the one by Ammenti (BAV), and an independent assessment by Allegranza (Udine). I presented what FITS is (and every astronomer should know), pointed out possible problem areas for usage by non-astronomers and asked some specific questions to BAV. Some of these questions were answered by Ammenti, which indicated the intention of BAV to use FITS as a “deep store” archival format, while users will receive data converted to whatever format their usual viewers support. FITS is interesting for them because it is open source, publicly documented, and has a successful record of continued and stable use (Once FITS always FITS) since 1979. Allegranza (who is a professor of information technology applied to document preservation) made an unsolicited, thorough and even too enthusiastic assessment of FITS as a format for preservation purposes.

Topics emerged during the discussion include the licensing status of common formats like TIFF, JPEG or JPEG2000, and the size limits implied by some of them. and the problems of robustness, long term preservation etc. and also some problem of FITS (like the fact it does not support non-Latin scripts and UNICODE). As IAU FWG I gave assurance of a consulting support to BAV.

As a concluding remark I may quote the invitation by Monsignor Pasini (the BAV Prefect) to proceed “with courage and humility”.

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