



EUROPEAN ASTRONOMICAL SOCIETY **NEWSLETTER**

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EDITORIAL

This newsletter will reach all EAS members just before the 2011 European Week of Astronomy and Space Science (EWASS) kicks off in Saint Petersburg (Russia). The program of the meeting appears very exciting with several symposia and many well-focused special sessions. As usual, those of us who will not have the opportunity to attend it will read brief summaries about the events in the December 2011 newsletter. The present issue though contains one last report from the previous EWASS, which we did not include in the previous issue. The report summarizes the science results presented in Symposium #6, entitled "Science Cases for Optical and Infrared Interferometry – Present and Future".

In the current newsletter we also have the pleasure to announce the laureates of the two annual EAS prizes. The 2011 Tycho Brahe is awarded to Prof. Michael Perryman for his crucial role in the fostering of high precision, global stellar astrometry from space, and in particular the development of the Hipparcos mission, while the 2011 Lodewijk Woltjer Lecture of EAS is awarded to Prof. George Miley for his fundamental contributions to the study of radio galaxies. We also include a presentation of the minutes of the EAS Council Meeting that was held in Geneva on 18th January 2011, prepared by the Secretary of the Society. In the past these minutes were available only online on the web site of the Society. However the new Council feels that including them also in print will facilitate us members remain more up-to-date regarding the actions and various initiatives of the EAS Council. Along the same lines we include the response of EAS to the green paper of the European Union on the European research and innovation. Furthermore, as some of you are probably already aware, EAS has commenced exploring a more active collaboration with the European Physical Society. You may read a brief statement about this collaboration prepared by the Presidents of the two Societies.

As usual our readers will find a summary of all major activities and progress made over the past six months by the European Virtual Observatory and OPTICON. Finally, we present a brief review of a very interesting book entitled "Observing Photons from Space", which was recently published by the International Space Science Institute, and covers all aspects of experimental space astronomy based on observing the electromagnetic radiation.

Vassilis Charmandaris
University of Crete, Greece

MESSAGE FROM THE PRESIDENT

The EAS is the voice of the European astronomers at the European level.

Taking this motto seriously means expressing our views in the public sphere and in appropriate circles and, therefore, developing our views. Council decided at its meeting in January in



Geneva to set up working groups in this spirit. The first question that is being addressed by such a working group, under the leadership of Prof. M. Watson of Leicester University, deals with an analysis of the future of space astronomy in Europe. This stems from a worry that following a rich period there might be a dearth of upcoming astrophysical missions. Another question that has been brought to the attention of Council and for which a working group is being set up has to do with the way in which we publish our results and fund this part of our activity. A further question that needs a reflexion to which we can and should contribute deals with the involvement that Europe should have in matters regarding the observation and tracking of Near Earth Objects.

Council also decided that the procedure to reach a common EAS view on these and further issues would be that the working groups will post a “close to finished” draft of their work on the Society’s web page at an appropriate time. Members, and members only, will then have the opportunity to make remarks and comments that will be taken into account by the working group in its final round of editing. Council will then approve the final text and publicise and, where appropriate, promote it.

A further matter of great importance for our Society is the financial means available to foster our activities. Organisational membership has been established to this end. These members contribute significant amounts to the Society (in general no less than 1000.– Euros for academic institutions). In return the EAS offers them some level of visibility on its web pages and other appropriate occasions. Income from Organisational membership is in the short term intended to support and maintain an active and dynamic astronomical community across all of Europe. The medium term goal is to be able to hire an appropriate person to help us increase our presence on the European scene. A number of organisational members have already joined. We are very grateful to them. The EAS web site includes now a page that mentions these members.

Members are urged to contact their institutions and see whether and how these can join as Organisational members. Members are also urged to contact private organisations they might have relations with and see whether and how they would be willing to support our efforts. We encourage members who have suggestions in this regard to contact Council or one of the Council members who are all ready to help in this matter.

With both of these actions, that aim on one hand to increase the means available to the Society and on the other to increase our presence on the European scene, the EAS is continuing in its development, serving the European astronomical community.

Thierry Courvoisier
President of EAS

NEWS

NEW FROM THE EAS COUNCIL

In addition to the General Assembly and Business Meeting that are held during the European Week in Astronomy & Space Science (EWASS), most recently celebrated in Lisbon in September of 2010, EAS Council conducts its business through face-to-face Council meetings. Two Council meetings were held in Lisbon, one before the EWASS2010 and one later that week, and an account of the highlights was given in the December 2010 EAS Newsletter. In what follows I will report on the EAS Council Meeting that was held in Geneva on 18th January 2011.

EWASS 2011 & 2012

Members might be surprised to hear that preparations for the EWASS in 2012 have already been underway since 2010. It just illustrates the hard work that goes on behind the scenes to deliver year on year an exciting EWASS! The 2012 meeting will be organised by our Italian colleagues. An outline of their plans was presented in Lisbon, and an update was provided to Council by Mary Kontizas, the Council member who within her portfolio is responsible for liaising with the organisers.

EWASS 2011 is now imminent, early July. Mary Kontizas and Iossif Papadakis, who was approached by Council last year and agreed to co-chair the scientific organising committee, representing EAS interests, have been working hard with our Russian colleagues. Alexander Stepanov, the LOC Chair and SOC co-chair, was invited to the EAS Council meeting and reported on progress to date.

The future of EWASS

Following the successful EWASS 2009 held at the University of Hertfordshire in the UK, EAS Council was approached by the RAS, the Affiliated Society from the UK, to try to replicate its set up. The presidents of EAS and RAS met and a plan is evolving where rather than one Affiliated Society taking the lead, EWASS would be organised on a regional basis. EAS Council agreed that this should be further explored in consultation with the Affiliated Societies.

EAS Prizes and awards

EAS awards two prizes, the Tycho Brahe Prize and the Lodewijk Woltjer Lecture (details can be found on our EAS web). Usually after the summer a message goes out to the members, soliciting nominations for the Tycho Brahe Prize. These are collected by the Nominating Committee. This year the committee consisted of

Jørgen Christensen-Dalsgaard (chair)
Poul Erik Nissen
Teresa Lago
Jacqueline Bergeron,
Andy Fabian
Gian-Carlo Setti

EAS Council received the report from the Tycho Brahe nominating committee and accepted their recommendation (see this issue of the Newsletter for the resulting Press Release).

The Lodewijk Woltjer Lecturer is nominated by EAS Council and nominations are collected by the Secretary, the result of which can again be found in these pages of the Newsletter.

Job Market

Joao Fernandes has taken charge of activities related to the Career Services offered by the EAS and since taking up this task has worked hard to implement a number of changes, notably the improvements to the relevant areas on the EAS Web. Members are encouraged to upload job announcements. Importantly, we have opened up this facility to the wider community.

Milan Dimitrijevic investigated for Council the job situation in the Eastern countries of the EAS and it is perhaps interesting to realise that there are two distinct environments, one being represented by the small and mid-size countries, mostly belonging to the Sub-Regional European Astronomical Committee (SREAC), the other being Russia. The SREAC member countries in particular suffer a considerable brain drain. On the other hand, one is hard pressed to find job advertisements in those countries. Council therefore encouraged Milan to bring the EAS Career services to the attention of colleagues in the Eastern region as posting those jobs that do become available would create visibility for the institutes listing them and hopefully trigger interest in these jobs in the community.

Contact with the European Commission

EAS acts as the voice of its community at the European level. In order to exercise that voice, the President met in Brussels with Elena Righi-Steele and David Pasini who welcomed a more active engagement of the EAS with the EC in matters of its policy on research. For example, the Directorate-General for Research & Innovation is being pushed more towards the innovation part in the title and it would therefore be important to hear from the astronomical community to what extent they contribute to innovation and how this should shape the next Framework programme (FP8). EAS was invited to respond to the consultation about FP8 (which has in the meantime happened).

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 issues were discussed:

Bulgarian astronomy

As a result of developments in Bulgaria, EAS has been in contact with our Bulgarian colleagues who are facing major restructuring of their funding situation. EAS will continue to follow closely the developments and impact the austerity

measures are having and will work with our Bulgarian colleagues to try to achieve the best outcome given the circumstances.

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. He has started to chart past, current and future space projects to which European astronomers have access. A draft report is expected to be submitted so it can be reviewed at the time of the EWASS 2011 in Saint Petersburg.

Near-Earth objects

Karel van der Hucht prepared a document on the perceived lack of European involvement in the area of near-Earth objects, their risks and mitigation thereof. Karel was asked by Council to set up a working group to take this forward on behalf of the EAS.

A note on the approval of EAS position papers

It was agreed that once a full draft of a position paper was available, this would be made available to the members for consultation, with an invitation to send comments and feedback within a set time frame. This feedback will subsequently be taken into account by the committee or working group in the preparation of the final draft. Once a final draft has been adopted by EAS Council, it will become the opinion of the EAS.

It was noted that consultation takes place on a position paper on a topic on which the EAS wishes to express an opinion, on behalf of its membership. Council welcomes suggestions and opinions, but the selection of the topics for future position papers rests ultimately with EAS Council.

Elias Brinks
Secretary
European Astronomical Society

EAS 2011 PRIZES

The 2011 Tycho Brahe Prize of the European Astronomical Society (EAS) is awarded to Prof. Michael Perryman for his crucial role in the fostering of high precision, global stellar astrometry from space, in particular the development of the Hipparcos mission.

The 2011 Lodewijk Woltjer Lecture of EAS is awarded to Prof. George Miley for his fundamental contributions to the study of radio galaxies.

Tycho Brahe Prize to Prof. Michael Perryman

The Tycho Brahe Prize is awarded in recognition of the development or exploitation of European instruments, or major discoveries based largely on such instruments.

Astrometry, the measure of the positions of stars on the celestial sphere, is a fundamental pillar of our knowledge of the Universe. As the centuries passed this knowledge grew little by little. The invention of the telescope and its use to map the sky brought a major step in the 17th and subsequent centuries. From this work a view of our Milky Way as a "Universe Island", a large collection of individual stars standing in the vastness of space, emerged in the early 20th century.

The Hipparcos mission was another immense step forward with the measurement of more than 100 000 stars with a precision such that their distance to the Earth could be established and their velocities on the sky measured. This led to a large number of fundamental results. It is, as an example, possible from the velocities of stars measured with Hipparcos to understand how the Milky Way, our Galaxy, evolved over time.



Prof. **Michael Perryman** was the mission scientist and, during the operational phase, the mission manager of Hipparcos at the European Space Agency (ESA). In these roles he untiringly led the mission through many difficulties to its ultimate success. His understanding of the astrophysics, of the physics and technology involved in

the satellite and its instruments as well as his intelligence of human relations contributed to a major extent to the success of the mission.

Prof. Michael Perryman is of British nationality. He was born in 1954, studied in Cambridge where he obtained his PhD in 1980. He then worked for ESA for the Hipparcos project and its successor mission until 2009, when he left for a visiting position in Heidelberg and now in Bristol.

Lodewijk Woltjer Lecture

The Lodewijk Lecture honors astronomers of outstanding scientific distinction.

The discovery of quasars, bright objects in the deep cosmos, in 1963 opened the possibility to observe objects at the farthest accessible distances and therefore in the still young Universe.

Many galaxies emit radio waves that are hundreds of times more powerful than those radiated by our own Milky Way Galaxy. These "radio galaxies" can be observed out to large distances and are the object of Prof. George Miley's research. In the nineteen eighties and nineties Miley and his group discovered such objects at distances much larger than



previously known. Subsequently, Miley's group showed that these powerful distant radio galaxies were among the most massive galaxies in the young Universe and that they can be used to pinpoint and study clusters of galaxies that are just beginning to form. **George Miley** also established that the radio emission is generated by jet structures that extend over large distances, often requiring that the source of the jet "remembers" its direction for very long periods and is therefore likely to be a rotating black hole. In the seventies Miley showed that radio galaxies moving through clusters of galaxies leave radio "trails" behind them, that are fossil records of their histories.

Prof. George Miley was born in 1942 and has dual Irish and Dutch nationality. He studied at University College Dublin and obtained his PhD in 1968 from the University of Manchester, home of the Jodrell Bank radio telescope. He joined the staff of Leiden University in 1970 and has spent several years in the US, including 4 years on the staff of the Space Telescope Science Institute. Prof. Miley is the initiator of the "Universe Awareness" programme aimed to inspire economically disadvantaged children with astronomy and, as IAU Vice President, he has recently led the development of the IAU Strategic Plan 2010 - 2020, "Astronomy for the Developing World".

EAS'S RESPONSE TO THE EU GREEN PAPER

The European Union (EU) is seeking to increase its role in the European research and innovation landscape. This is to be welcome in general. Indeed the competitors of Europe on the world scene are large, continental, entities that are a long way beyond the size of individual European nations. The increased role of the European Union in Research and Innovation is also an opportunity to reflect on this policy and to bring new views. The green paper and the present consultation are interesting steps in this regard.

The green paper suggests that Research and Innovation be closely tied to the political and societal goals of the EU. This is to be welcome also, provided that these goals are soundly set. This is where we see a major difficulty in the paper presented. Research is seen in this paper to serve economic growth and competitiveness. This is a dangerously narrow view of science and leaves out the most important, cultural and societal, aspect of research and science in general. The first impact of science is to provide a framework in which all human actions take place. Astronomy has been, and still is, prime in providing this framework. We see our place in the world differently now that we know that the Earth is a small body in the solar system at the outskirts of one galaxy amongst billions within an expanding Universe than we did some time ago. In recent years Astronomy has opened the electro-magnetic spectrum from radio waves to gamma rays to observations of the sky. The Universe that we discovered is much richer and diverse than the boldest predic-

tions of half a century ago. We also learned that physical phenomena on timescales as short as hours and seconds play an important role in shaping our cosmic environment. While the impact of these results cannot be measured in economic terms, they are of immense importance for all of us, irrespectively of national, political or religious positions. We therefore urge the EU to take these fundamental issues much more into account in defining its research and innovation goals.

While we insist heavily on the cultural value of the research endeavour, we are also deeply aware that the requirements that we have on new astronomical instruments, be they on the ground or in space, are a powerful drive for innovation. We develop detectors that later become useful for everybody, an example in place is certainly CCD detectors. Which developments will prove industrially or societally important is not known in advance. This must be recognised. Trying to imagine what technologies will become important is notoriously difficult. Relying on such predictions is an impoverishment of the technological development. Free scientific research aimed at pure knowledge provides an unbiased set of innovations and technologies, an important element in this frame.

There is a tendency to design complex programs starting from often well thought out top down policies. This is a route that should be limited in scope, leaving more room for bottom up research programs designed by the scientists. Top down designs by politicians too often lack the ability to adapt to given fields and force research in directions that can be fruitful in some instances, but rather sterilising or wasteful in other cases. Integrated activities for research infrastructure programs thus force a mix of activities that has not always been adapted to fundamental astronomical projects.

It is also noteworthy that in the future new large scientific infrastructures will need a coherent and structured frame with a central funding. In the past intergovernmental organisations have provided this frame most successfully. With a more unified Europe, new ways of approaching this question may be needed.

The green paper notes several times the need to simplify the administrative burden linked with EU research funding. We very strongly approve of this line. At present users, in our case astronomers, find the amount of effort needed to understand, and implement the views of the EU in funding proposals disproportionate. Efforts should consistently be made to seek scientific excellence rather than administrative competence.

Thierry Courvoisier
President of EAS, for the EAS Council

EAS-EPS: COLLABORATION IN THE SKY

We could debate endlessly as to whether astronomy is physics applied to the Cosmos and the objects found therein or whether physics is a special branch of astrophysics, one that

deals with the phenomena accessible to the laboratory. What is certain is that both sciences have deep common roots.

The communities of (particle) physics and astrophysics are getting closer now, not only in their intellectual goals, but also through the development and use of common tools, like ground based or space borne telescopes, and laboratory experiments. It is hoped that this increased collaboration will help us understand the deep mysteries revealed by modern cosmological measurements, mysteries such as the nature of dark matter and energy.

Solar physics is a further area of long and fruitful collaboration: here the complex nature of the plasma making up the Sun and its corona can only be uncovered by a common effort of physicists and astronomers.

The European Astronomical Society (EAS) and the European Physical Society (EPS) are working towards bringing this spirit of collaboration between the two communities at the European level. In many respects our societies pursue a similar goal – that of making the voice of our communities better heard in Europe. We must stress the importance of knowledge in our societies and the fundamental value of free research in and above the more economic requirements of the modern world.

We would like to foster common endeavors like meetings in those areas of interest to members of both societies. Solar physics and astroparticle physics are indeed two such areas. We would like to invite those who wish to make use of this possibility to approach EAS or EPS council members. We would also like in the coming years to undertake common actions in the field of communication towards the public and education. The council of each of our societies will consider how this can be best approached.

Finally, another great opportunity for collaboration will be the initiative of the Quantum Electronics and Optics Division of the EPS for the declaration of an International Year of Light under the auspices of the United Nations. Most likely this will be held in 2014 or 2015, and will seal the «light-based» links of the EAS and the EPS.

Luisa Cifarelli, President of the EPS
Thierry Courvoisier, President of the EAS

EURO-VO NEWS

The EuroVO-ICE hands-on workshop took place in Strasbourg, France, on March 21-24 2011, and hosted 31 PhD students and young postdocs. During the four days of the School the participants, assisted by 12 scientific and technical VO specialists, carried out a number of hands-on exercises covering the main functionalities of the VO tools. On the third day of the School they



tackled their own science projects working either in small groups or individually. This resulted in a large variety of presentations of new and exiting results on the last day of the workshop. The comments collected on the feedback forms were very positive, stressing the usefulness of the school, the good interaction between participants and tutors, while requesting for longer such events in the future. All details related to the workshop are available at:

<http://cdsweb.u-strasbg.fr/voschool2011/>

The 8th EURO-VO Science Advisory Committee (SAC) meeting took place at ESO, Garching, in February 2011. During this one-day event, the EURO-VO scientists reported on the latest EURO-VO project developments, followed by the SAC's input on selected VO tools and their functionalities, as well as on the ongoing Spectral Energy Distributions (SED) builder International Virtual Observatory Alliance (IVOA) priority project. The agenda and minutes are available in the EURO-VO SAC web page: <http://www.euro-vo.org/cgi-bin/twiki/bin/view/Fc/ScienceAdvisoryCommittee>

The next European Week of Astronomy & Space Science (EWASS) taking place in St. Petersburg, Russia in July 2011, will host a one-day Special Session on «Science with the Virtual Observatory», on July 5th. The aim is to capture the latest developments on the IVOA science priority projects and the impact on astronomical research. The event features many EURO-VO specialists as invited speakers. Details can be found here: <http://www.inasan.ru/eng/conferences/jenam2011/sps3.html>

For more information on EURO-VO lead activities, the available VO tools and the VO-related workshops and meetings, subscribe to the EURO-VO mailing list by providing your e-mail address here:

URL: <http://www.euro-vo.org/pub/fc/subscribe.html>

or visit the EURO-VO web pages: <http://www.euro-vo.org>

Evanthia Hatziminaoglou
on behalf of the EURO-VO Facility Centre

NEWS FROM OPTICON

The present OPTICON contract is a 10+ million Euro programme of activities over the period from the start of 2009 to the end of 2012. As before, it is a mix of technology research and development, networking and a multi-telescope trans-national access programme.

Since the last OPTICON article in the June 2010 issue much has been achieved and, as we are at about the half way point in the grant, most of the major work packages are having mid-term progress reviews this spring. Progress on the fast detectors for adaptive optics, led by Phillipe Feautrier of Grenoble was reported just recently and seems to be well on course to develop a prototype 672 x 672 pixel CMOS device for use with natural

guide stars. The smart instrument technologies work package, led by Colin Cunningham at the UKATC in Edinburgh, has demonstrated a number of micro-robots which can 'drive' around a large focal plane carrying pick-off mirrors to selected points with high precision. The other area of the same work package, the design and fabrication of extreme aspheric optics and adaptive mirrors which can reduce the size and complexity of instruments is also making good progress. The project scientist will be visiting London, Berlin and Paris in May and June for meetings of the adaptive optics, astro-photonics and interferometry work packages respectively.

The activity most likely to be visible to most of the community is the implementation of a common Time Allocation Committee for the trans-national access supported by the EC. This was started about 2 years ago by our solar colleagues in the OPTICON supported network called EAST for the four solar telescopes in the observatory on Teide, but has now been implemented for the OPTICON night-time telescopes as well.

From semester 2010B the funding for the programme was pooled and the proposals for OPTICON time at all the telescopes were reviewed together by a single Time Allocation Committee. This TAC comprised of 7 scientists, one each from the UK, Fr, De, It, Es, Fi and Hu and was chaired by Rene Oudmaijer of Leeds. The first meeting, scheduled for Amsterdam, was aborted due to last year's volcanic eruption, which caused all the flights to be cancelled, and instead the meeting was held via a 6-way video/teleconference. This was an interesting experience for 8 people who were meeting for the first time to attempt a process that had never been done before, but it worked. Subsequent calls for 2011A and 2011B were held, each attracting a larger number of proposals than before, from a wider mix of countries and with an increasingly high scientific standard. Fears that one or two telescopes, or one or two projects, would dominate the process and mean that the resources would not be shared equally turned out to be unfounded and for each call allocations were made across a large number, but not all, of the telescopes in the pool.

The new process was supported by a common, web-based proposal submission tool called Northstar developed by ASTRON in the Netherlands and adapted, with OPTICON support, for use on optical and infrared telescopes. The system allows a single project to request time on several telescopes in the same proposal and is backed up by a web-based review tool for the TAC to grade proposals. Although not without a few minor issues, this software has worked well for each call and is gradually being improved after each round.

The overarching objective of all this is to demonstrate the feasibility of having a single TAC allocate time across many European 2-4m telescopes, using appropriate tools to balance the national shares being allocated with the contributions from the various partners in the network. This a long standing objective of the OPTICON and ASTRONET integrating activities and indications from the three TAC rounds we have executed has shown no 'show-stopping' problems to expanding the scheme, should the national communities wish to do so. To

this end a meeting of national TAC chairs will be held in Paris in June to discuss the outcome of the OPTICON experience.

Unfortunately the OPTICON proposal to continue our activities until the end of FP7 was not funded in the recent infrastructures call from the EC and it is not clear if the common TAC process, and the funding of access for non-national users of the OPTICON network of telescopes can continue. We are working hard to investigate how best to continue the whole OPTICON programme, including whether can submit a proposal to a future EC call, and hope to have more information soon. If there is to be another common TAC round it will open in early August and finish on or about August 31st.

Looking to the further future a subset of the OPTICON board met in Amsterdam in late April to provide input to the EC's FP8 consultation, and you can see the resulting submission to the commission by clicking the appropriate news item link on the OPTICON web page at www.astro-opticon.org

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) or the PI, Prof Gerard 'Gerry' Gilmore (gil@ast.cam.ac.uk)

BOOK REVIEW: "OBSERVING PHOTONS FROM SPACE"

"*Observing Photons from Space*", a book recently published by the International Space Science Institute, covers all aspects of experimental space astronomy based on observing electromagnetic radiation: the motivation — why go to space —, the technologies and the practical precautions to take when placing an instrument outside the Earth's atmosphere. The goal of astronomers is not just to "detect the photons" but also to accurately determine their direction, rate of arrival, energy, and polarization. This has been the driving force behind the amazing progress that has been made over the past 50 years. In an extensive ~700 pages volume the Editors, M.C.E. Huber, A. Pauluhn, J.L. Culhane, J.G. Timothy, K. Wilhelm and A. Zehnder, have efficiently organized the material in 40 well organized chapters, each containing a review article by selected experts in the field.

The first chapter sets the stage by clarifying the overall scope of the book, along with the motivations on why scientists wish to observe the Universe from space, and by giving a historical 'aperçu' of the development of the technologies that made it possible.

The following seven chapters are focused on the basic physical processes responsible for the production of energy: from high-energy γ -rays originating from accretion disks of quasars, to the cosmic microwave emission, a relic of the Big Bang. What is extremely instructive in these presenta-

tions is that along with the description of the physics, the authors include real data from astronomical observations, putting in context the theory with what can actually be achieved in practice. They also remind the reader of the most important space missions associated with the given wavelength ranges.

The eleven chapters that follow provide a detailed description of all major techniques used to obtain and analyze the data: from simple optical imaging to gratings, X-ray collimators, and far-infrared heterodyne receivers. Specific topics related to astrometry and interferometry, including Fabry-Perot and Michelson type, as well as Fourier Transform Spectrographs, are thoroughly addressed in dedicated chapters.

Chapters twenty to thirty-two describe the current state of the art of all types of sensors used in space missions and the advanced specifications that have to be met in order to survive the damaging effects of radiation and cosmic rays. The basic solid-state and semiconductor physics affecting the behavior of CCDs, superconducting tunnel junctions, bolometers, calorimeters, radiometers and mixers is discussed and the methods for characterizing their performance are presented.

The four following chapters are dedicated to polarimetry, a topic most astronomers are probably not very experienced with. Four more chapters are dedicated to the technical issues of calibration and cryogenics as well as aligning space structures with lasers and the specifics of Earth and planet observations, particularly also by using radar. The final chapter, before the epilogue, contains a description of the various environments in which the instruments are exposed from the first stages of their construction to their operation on the space facilities, and analyzes how these affect their lifetime and performance.

Overall, the book tackles a broad subject with a balanced description of the theory and the experimental results, making it pleasant and easy to read. Moreover, the detailed references to key science papers related to each subtopic which can be found throughout the book, make this book an ideal starting point of reference for students and researchers alike who wish to learn more about - and hopefully become actively involved in - the exciting field of space astrophysics. This book will also prove to be a useful resource for preparing lectures on experimental space astronomy.

"Observing Photons in Space" may be ordered on-line from <http://www.spacebooks-online.com/index.php?cPath=113>. (Once copies at ESA are exhausted, interested buyers are advised to address secretary@issbern.ch for reserve copies.)

Vassilis Charmandaris
Associate Professor of Astrophysics
University of Crete, Greece

EWASS 2010

SYMPOSIUM 6: “SCIENCE CASES FOR OPTICAL AND INFRARED INTERFEROMETRY – PRESENT AND FUTURE”

Optical interferometry has entered a new era with the advent of VLTI in Europe and of other facilities opened to non-specialist communities in the US. The number of research areas has dramatically increased with the number of interferometer users. Originally devoted to stellar physics, extragalactic astronomy and solar system bodies are now part of the scope of interferometers. Interferometry is such a success in Europe that ESO has decided to start building a second generation of instruments for VLTI making interferometric imaging in the near- and mid-infrared domains a more common tool for astrophysics. These new instruments will open new scientific venues on important topics such as the disks of pre-main-sequence stars and the Galactic Center. Synergies with other facilities (e.g., ALMA) will also have to be exploited. Despite all these efforts and progress, there is still a long way to go to make interferometry relevant for some astrophysical science cases that would require higher quality imaging capabilities, higher spatial resolution and higher sensitivity. This calls for a next-generation facility which may be either a single facility or a multi-component facility like the ALMA array with a compact and a large array serving different purposes. Such a large facility must be given some thought in advance as it will take long to build and as it will require support from the astronomical community at large. On the European side, success will require that the facility be identified as an Astronet priority. Symposium 6 that was organized on 8-9 September 2010 during the EWASS meeting in Lisbon gave an opportunity for interferometrists to meet, present science cases and discuss possible options for the near and long term future.

Some 30 participants have attended the presentations of 8 invited talks, 8 contributed talks, 4 posters and a round table discussion. The talks have encompassed topics such as the present and future perspectives of interferometry from the ground and from space, science cases including exo-planetary systems, young and evolved stars, circumstellar matter, the galactic center and extragalactic astronomy.

More information about the organization of the Symposium is available at the symposium site: http://www.jenam2010.org/index.php?option=com_content&task=view&id=37&Itemid=70

The main recommendations that were reached are the following:

- For the short-mid term future, VLTI remains the highest priority, including upgrades of the existing infrastructure, construction of next generation instruments, etc. A VLTI long range plan that addresses the issues of a 3rd generation of instruments, the possibility to achieve a better UV coverage (cf. 6 telescope combination), better imaging capabilities and higher angular resolution should be set up between ESO and the community of interferometrists.

- Improving the sensitivity of existing interferometers would also attract many more users. Interferometers should also be made more user friendly such that more astronomers would be attracted to use them for their science.
- On the longer term future, European interferometrists should continue their work to propose a major next generation facility. Concept studies should be encouraged and supported at the level of phase A studies and regularly presented and discussed at international meetings.

On behalf of the SOC:
Andreas Quirrenbach (chair),
Guy Perrin and Jean Surdej (co-chairs)

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