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## EDITORIAL

The core of the current newsletter contains a series of articles presenting the summaries of the five parallel sessions that took place during JENAM 2005 in Liège. I would like to thank the organizers of the sessions for providing this information to those of us who did not have the opportunity to attend it. An article on the Integrated Large Infrastructures for Astroparticle Science (ILIAS), an Integrated Infrastructure Initiative funded under the European Commission's Sixth Framework Programme, which did not make it in the previous newsletter, is also included in this issue.

As it is also mentioned elsewhere, in August 2006 the General Assembly of the International Astronomical Union will take place in Prague. The details of the various Symposia and Joint Discussion sessions, which will take place during the General Assembly, are presented in this newsletter. Hopefully the information presented here will approximate the truth a bit more accurately than the information I had included about the same topic in Newsletter #29. As several of you noticed, in that issue I had provided the list of the IAU Symposia scheduled, but in the process I managed to omit one. I guess that this type of mistakes do come with the territory. The fact though that the Symposium I omitted is actually co-organized by my past postdoc supervisor, who still agrees to write reference letters for me, suggests that no major harm was done. Hopefully these types of unfortunate events will not creep into the present or future newsletters.

Vassilis Charmandaris  
University of Crete, Greece

## MESSAGE FROM THE PRESIDENT

Reports from the very successful JENAM in Liège this summer are featured in this issue of our Newsletter. We have also started looking forward to the IAU General Assembly in Prague next August (14-25) and, given the broad scientific program of the IAU-GA, the EAS Council has decided not to organize a separate European scientific meeting next year. Instead, we will reserve a meeting room and designate a day to deal with European matters, such as initiatives from the EU Commission, actions from the EAS, reports from EU research networks, and of course, a brief EAS General Assembly. This 'European Day' has provisionally been fixed for Monday, August 21, 2006.

The EAS Council will be partly renewed at the EAS General Assembly in Prague. Outgoing Council members are myself as President, Birgitta Nordström as Treasurer, Cesare Chiosi as Vice President, and Councillors Oddbjorn Engvold and Michel Dennefeld. A Nominating Committee has been formed, to be chaired by Lo Woltjer and including also Françoise Combes (France) and Boris Shustov (Russia). The Nominating Committee has been soliciting proposals from members to email ulla.dw@bluewin.ch with a copy to eas@iap.fr.

On another matter of wide interest, we have been following discussions among governments and funding agencies on future

large scale astronomical facilities, in particular the ELT for optical-IR work and SKA for radio observations. At the global level, spin-off meetings have resulted from the OECD's Global Science Forum and the workshops it held in the last two years. These meetings are exploring the possibilities of full global cooperation on these instruments. No indication yet when the discussions may yield consensus but it is a very positive development that they are taking place. We hear that the ESO Council is also studying whether it might be able to take on oversight of large projects other than the currently planned optical-IR and mm-wave telescopes. That would entail a substantial change in the way the ESO Council operates but would be a welcome development for those sub-fields of astronomy that have no organizational home at the European level.

As I noted in the last Newsletter, within Europe we have discussions taking place on several levels relating to future planning. The European Strategic Forum for Research Infrastructures (ESFRI) is an inter-governmental forum charged with developing a list of essential European scale research infrastructures for consideration by governments and the European Commission. ESFRI is currently canvassing plans around the continent and interviewing project leaders. The plan is to provide a first list of essential large-scale facilities to governments by the summer of next year, to include in particular projects that are nearly ready for implementation. This list will be unprioritized but will include major required facilities across all fields of science.

In parallel with ESFRI, the e-Infrastructure Reflection Group (e-IRG) is producing a Road Map for large-scale e-science infrastructures, some of which will be extremely interesting for our community next decade, both for computation and data storage, and for remote facilities access.

Specifically in astronomy and astrophysics there is also much activity. The EU network of European research council representatives in the field, AstroNet, has been successful in its bid for EU funding and has begun its deliberations on planning for the future. As a first task, AstroNet will repeat and update the inventory made by the EAS two years ago of the main priorities of our diverse national programs. It will then produce its own list of recommended facilities, likely including smaller scale facilities that will be required as well the large ones. Our research infrastructure networks OPTICON, RadioNet and ILIAS will be informing AstroNet of the priorities they see as dominant. The AstroNet list will then take form in the course of 2007. No one quite understands whether there will be consequences to the obvious phasing difference between the AstroNet and ESFRI processes. Presumably, time will tell.

While these developments bode well for the development of future large-scale research infrastructures in our science, it is still not clear how much finance will be available at the European level. Rumors abound, but seem all to point in the direction of substantially less funding for research than requested by the Commission. Investment in new infrastructures is said to be a likely victim of such cuts, although the Commission is also said to be considering shortening the duration of the 7th Framework Programme to compensate partially for the expected shortfall. Again, one may hope that the situation will become clearer in the coming months.

On a more positive note, the new European Research Council now seems assured both of EU funding and of operational independence from the European Commission. It will focus its activities to providing research grants to individual researchers and research groups, based on peer review of proposals. This is a wonderful development that the EAS applauds and has supported politically.

Finally, I wish to report on a local (for me) event of European dimension that unfortunately took place right in the middle of the Liège JENAM. On 6 and 7 July, the European Commission scheduled a major press event in the Netherlands. More than a hundred journalists and Commission representatives attended a buffet dinner on the 6th at the Westerbork radio telescope and a press conference on the 7th hosted by the Joint Institute for VLBI in Europe (JIVE) in Dwingeloo. Commissioner Poto\_nik, DG-Research, joined the journalists to hear about the EU's programs in Astronomy, including the FP6 Design Studies for the major future facilities: ELT (optical-IR), SKA (radio) and KM3Net (astroparticle physics). The Commissioner also formally opened the era of e-VLBI, by initiating a real-time observation with radio telescopes across the continent connected by the EU's GÉANT project to the processor at JIVE. Well over a hundred reports in the press, radio and television resulted from the event. I do not know whether we can avoid clashes like this one with our JENAMs (and like the ESA strategy event during the Granada JENAM last year), but we at least know to be alert for such problems.

Harvey Butcher  
President of EAS

## NEWS

### JENAM 2006

As we all know, in 2006, the IAU General Assembly will take place in Prague, from August 14 to 25th. The EAS Council has therefore decided not to organize a separate scientific meeting that year, as the IAU GA will largely cover the scientific activity. However, within the IAU event, a special day will be reserved to deal with European matters such as: Initiatives from the EU Commission, Actions from the EAS, reports from various EU Networks and I3's, possibly a Job Market, and, of course, the EAS General Assembly with partial renewal of its Council. The date for this European day has been provisionally fixed for Monday, August 21st, 2006. More information on this issue will be provided from the EAS web page at <http://www.iap.fr/eas/>

### SUMMARY OF THE JENAM 2005 SESSION ON "ASTEROSEISMOLOGY"

The Asteroseismology session that took place on July 6 and 7 2005, during the JENAM Liège, was organized by the Belgian Asteroseismology Group (BAG). The members of the asteroseismology scientific committee were Conny Aerts (KU-Leuven), Jan Cuypers (ROB), Peter De Cat (ROB), Joris

De Ridder (KU-Leuven), Josefina Montalban (ULg), Arlette Noels (ULg), Richard Scufraire (ULg) and Anne Thoul (ULg). The session was co-chaired by Arlette Noels and Conny Aerts.

We had the extreme pleasure to listen to the “music of the spheres” orchestrated by Don Kurtz during his plenary talk, on July 7. Under Don's direction, stars were really singing. Don showed us, in crystal clear demonstrations, how these songs could help us get information about the internal structure of stars. This was the highlight of the session!

The afternoon sessions were opened with fascinating invited talks. On July 6, Gerald Handler (Vienna Univ.) presented the observational aspects of asteroseismology while on July 7, Eric Michel told us about the theoretical aspects. Both talks were big successes.

The observational and theoretical talks which followed Gerald's and Eric's presentations were challenging and gave rise to numerous questions and comments. A number of talks were presented by young people, even by some PhD students just starting their research work. This session was an excellent opportunity for someone to give his/her first talk in front of an international audience.

The topics discussed during the afternoon sessions were very eclectic. They dealt with important new observations and theoretical advances. Moreover, they covered a large range of the HR diagram: the PMS stars, the new solar chemical composition and the helioseismological puzzle that it raises, the  $\delta$ -Scuti stars, the  $\alpha$  stars, the  $\beta$ -Cephei stars and the K-giants.

All contributions to the session will be published in the “Communications in Asteroseismology”, Vol. 147.

Arlette Noels  
Université de Liège, Belgium

#### SUMMARY OF THE JENAM 2005 SESSION ON “ASTROBIOLOGY AND SOLAR SYSTEM EXPLORATION”

Astrobiology is the study of life's origin, evolution, distribution and destiny in the Universe. It is thus interdisciplinary, gathering researchers from astronomy, biology, chemistry, engineering, geology, physics and even law and philosophy. Recent and future exploration in the solar system and beyond offers new opportunities to investigate the possibility of life beyond Earth.

A JENAM session on these exciting developments was organized over three days. The two first days were devoted to the presentation of latest results from ongoing space missions to Mars, Saturn, and Titan. We also invited contributions related to future exploratory programs and missions in the solar system, planetary protection, the formation and detection of rocky (exo)planets, the origin and early evolution of life on Earth, life in Earth extreme environments potentially analogous to extraterrestrial habitats, and the characterization of biosignatures for the detection of life in our solar system and beyond. The third day extension focused on Belgian involvement in astrobiological research.

The JENAM session had two plenary talks, two invited talks, 9 talks and 20 posters. The extension had one plenary talk, 10 talks and 10 posters.

#### JENAM session: Astrobiology and solar system exploration

The plenary speakers were A Knoll and JP Lebreton. A.Knoll gave a superb review on the ongoing exploration of Terra Meridiani, Mars, by the NASA MER rover Opportunity. He described the first stratigraphic section on another planet, showing how the sedimentary rocks of Terra Meridiani recorded episodes of acidic aqueous conditions and eolian arid dune formation. Although such conditions might not favor prebiotic chemistry, they might have been preceded by an early warmer and less acidic Martian history better suited to the appearance of life. This still need to be addressed in future explorations. On Earth, microbial life has adapted to low pH and water limitation, and left (bio)signatures in sulfates and iron oxides, minerals that also occur on the red planet. An interesting recent analogue environment is the acidic river Rio Tinto, Spain where NASA and the CAB (Centro de Astrobiología, Madrid) are testing life-detection instruments. Meridiani Planum is therefore an attractive candidate for Mars sample return mission.

JP Lebreton reviewed the remarkable Cassini-Huygens mission launched in 1997 and the extraordinary observations obtained by the orbiter Cassini in orbit since 2004 after a 7-year interplanetary trajectory. The Huygens mission was one of the highlight of the mission, landing on Titan on January 14th 2005 and revealing a familiar landscape of mountains, rivers and seas, but made of exotic material such as methane ice and organic compounds. Titan is an interesting astrobiological laboratory where complex organic chemistry is taking place in prebiotic conditions somewhat analogue to early Earth conditions. Other talks in the session addressed the chemical composition of Titan's atmosphere, and the (controversial) possibility of an internal ocean and biosphere.

The invited speakers were A. Chicarro and A. Morbidelli. A. Chicarro summarized the scientific results obtained by the European orbiter Mars Express, including the latest evidence of recent Martian volcanism, the polar ice caps composition, the distribution of minerals on the surface of the planet (including the absence of carbonates), and the exciting detection of methane in the Martian atmosphere whose (geothermal/ biological?) origin is subject to much debate. A. Morbidelli presented very interesting hypotheses and models for the origin of the Late Heavy Bombardment (LHB) of terrestrial planets, proposing that the LHB was triggered by the rapid migration of the giant planets between 4 and 3.8 Ga. The question remains if this event brought, erased or did not affect life on early Earth.

Other talks and posters addressed exciting science related to astrobiology, such as the past Martian climate, the variations of the Martian gravity field, the chemical composition of interstellar and interplanetary dust, the detection of exoplanets, the characterization of spectral biosignatures in exoplanetary atmospheres based on diversity of the early earth biosphere, the diversity of extremophiles from Antarctica, the chemical composition of comets, the possible existence of ocean planets, the potential habitats for life in the Venusian environment, the biological adaptation of earth microbes to microgravity conditions in simulation planetary experiments and on ISS and possible implications for planetary protection issues.

### JENAM extension: Astrobiology in Belgium

This extension grouped Belgian researchers interested by astrobiology, and aimed to encourage multidisciplinary and national collaborations in research, teaching and outreach related to astrobiology. The highlight of this third astrobiology day was the brilliant plenary talk of the Nobel laureate C. de Duve who revisited “chance and necessity”, explaining why life is a “cosmic imperative” based on the universality and determinism of organic chemistry. He concluded that life had a good chance of arising on any celestial body with a physico-chemical history similar to Earth’s. Other talks and posters described ongoing research on the geological and biological evolution of early Earth, habitability of planets, life support system for future space missions, microbial physiology, microbial contamination and macromolecules behavior in microgravity conditions of the ISS, latest results of SPICAM instruments aboard Mars Express, cyanobacterial ecology in Antarctica, biochemical adaptations of extremophiles to extreme temperatures, and the appearance of complex behaviors from simple rules in cellular automaton. The new Belgian Federal Center for Complexity and Exobiology (COEX) was officially presented to the scientific community, in the presence of academic and federal authorities.

Emmanuelle Javaux  
Université de Liège, Belgium

### SUMMARY OF THE JENAM 2005 SESSION ON “QUASARS: HOST GALAXIES AND GRAVITATIONAL LENSES”

The session dedicated to “Quasars: Host Galaxies and Gravitational Lenses” consisted of two plenary talks, ten contributed talks and a number of posters.

In the first plenary talk, Joachim Wambsganss (Astronomisches Rechen-Institut und Universitaet Heidelberg) presented an excellent and vivid review on quasar lensing, starting from an historical perspective, to cover the most recent results on microlensing, time delays and dark matter. The second plenary talk, by Ross McLure (Institute for Astronomy, University of Edinburgh Royal Observatory), was dedicated to quasar hosts galaxies. In this very good talk, Dr McLure discussed in detail the evidence accumulated so far on the relation between the central black-hole and the spheroid component of the host galaxy.

A large fraction of the contributed talks were dedicated to the gravitational lensing of distant quasars, either on the basis of recent observational results or from a theoretical point of view.

F. Courbin described the COSMOGRAIL collaboration, which involves five telescopes as well as astronomers from five different countries and aims at an accurate determination of the Hubble constant from time delays in gravitational lenses. These time delays are complemented by measurements of the missing lens redshifts and precise modelling of the deflecting potential from deconvolved HST images. A. Ullan showed her results on the light curves and variability of SBS 0909+532 A and B as well as the method used to determine the time delay. V.N. Shalyapin discussed the power spectra of quasar microlensing light curves. A.F. Zakharov showed the potential of the space

interferometer Radioastron in the study of quasar microlensing.

In a more theoretical perspective, the same A.F. Zakharov described shadow shapes around Kerr black holes and retro-gravitational lensing. L.C. Popovic showed how a two-component model of the accretion disk could be used to analyze the microlensing of the Fe K-alpha line and the X-ray/UV/optical continuum. These results were further developed in a poster by Ilic, Bon and Popovic.

The transition from gravitational lenses to quasar host galaxies was ensured by J.-F. Claeskens who presented the beautiful HST images of the gravitational lens RXS J1131-1231. These data allowed reconstructing the shape of the host galaxy by inverting the lens equation. G. Letawe presented the main results obtained from on-axis VLT spectroscopy of a sample of 20 low redshift quasar host galaxies. Her study showed that a significant fraction of the bright quasars are found in spiral hosts and confirmed that galactic collisions plays an important role in quasar ignition. T.G. Arshakian discussed the link between the source of continuum emission and the compact jet in the active galaxy 3C390.3. Finally, A.M. Mickaelian reported on the discovery of new bright quasar candidates by the core - host galaxy ratio of their multiband images.

In addition to these interesting and varied presentations and to the posters, the participants acknowledged that this meeting has allowed very interesting and fruitful discussions between astronomers from a variety of European countries.

Pierre Magain  
Université de Liège, Belgium

### SUMMARY ON THE JENAM 2005 SESSION ON “TECHNOLOGY ROADMAP FOR FUTURE INTERFEROMETRIC FACILITIES”

Following the 37<sup>th</sup> Liège International Astrophysical Colloquium (LIAC37) that was held in August 2004 and which was dedicated to the identification of “Science Cases for Next Generation Optical/Infrared Interferometric Facilities (the post VLTI era)”, the European Astronomical Society, the European Interferometric Initiative (OPTICON, FP6) and the Liège University jointly organized this year during JENAM 2005 a follow-up workshop dealing with the definition of a technology roadmap for the construction of future interferometers.

The scientific committee of this workshop was composed of E.J. Bakker, C. Cunningham, F. Delplancke, C. Flebus, M. Fridlund, C. Haniff, Th. Henning, P. Kern, A. Quirrenbach, S. Ridgway, F. Vakili and J. Surdej. The workshop took place on 6-8 July 2005 and it was attended by approximately 60 astronomers and engineers from industry. The programme included 1 plenary talk, 17 invited talks, 9 contributed talks and 3 posters.

The proceedings of this workshop will be published around the end of this year. Proceedings of the previous one have already been published and are available upon request ([jsurdej@ulg.ac.be](mailto:jsurdej@ulg.ac.be)).

The different talks presented during this JENAM2005 session have addressed the following main topics:

1. A summary of the different science cases, presented during LIAC37, driving the performance requirements. These included the issues of the angular resolution(s), number of baselines, and magnitude range(s) of future interferometric facilities.
2. The complementarity between space and ground-based interferometry, including the very promising site of Dome C in Antarctica.
3. A critical review of existing optical arrays, critical techniques, concepts and components used in interferometry (such as co-phasing, fringe tracking, large field of view, high dynamic range imaging, nulling, long baseline beam transport, reconfiguration of large telescopes, integrated optics, fibers).
4. Present day and future generation detectors and instruments (cf. second generation instrumentation for the VLTI such as VITRUV, and GENIE).
5. Various concepts of future arrays (such as models of the type of the giant LBT, OVLA, Carina, and Darwin)
6. Possible synergies with ongoing and planned ELT and ALMA studies.

For more details see also the dedicated web site of the session at: <http://www.astro.ulg.ac.be/RPub/Colloques/JENAM/interfero/interfero.html>:

Key issues requesting more detailed studies have been identified (cf. beam transportation and combination, mass production of telescope units). It is very much hoped that the outcome of the 2004 and 2005 workshops will contribute to the emergence of concept studies aimed at developing the vision of a next-generation interferometric facility that is very challenging scientifically, technologically feasible and costly affordable.

At the end of the workshop, Dr. Moschopoulos (EU) gave a lively presentation entitled “EC proposal for FP7 and research infrastructures in astronomy”. It is very likely that a proposal dedicated to next generation interferometers will be submitted for FP7 in 2008.

Jean Surdej  
Université de Liège, Belgium

#### SUMMARY OF THE JENAM 2005 SESSION ON “MASSIVE STARS AND HIGH-ENERGY EMISSION IN OB ASSOCIATIONS”

About 35 astronomers including many experts in the field of massive stars attended the afternoon sessions of the workshop. In addition to the two plenary talks by Dr Ian Stevens (Birmingham, UK; X-ray and gamma-ray emission from single and binary early-type stars) and Prof Thierry Montmerle (Grenoble, France; Star-forming regions at high energies: the tip of the iceberg), two invited reviews by Prof Artemio Herrero (La Laguna, Spain; Fundamental parameters of massive OB stars in the Milky Way and nearby galaxies) and Dr Martin Guerrero (Granada, Spain; X-ray survey of Wolf-Rayet stars in the Magellanic Clouds) as well as 12 contributed talks and nine posters were presented during the workshop. A good number of new exciting results

obtained with modern high-resolution optical spectrographs and/or high-energy instruments onboard XMM-Newton, Chandra and INTEGRAL were presented and new questions were raised.

Several contributions were devoted to non-thermal phenomena associated with a subset of the massive stars. Many results presented at the workshop seem to demonstrate that non-thermal radio emission of early-type stars is a signature of colliding winds in binary systems. While this was already established for Wolf-Rayet stars, it becomes now more and more obvious for O stars as well. In this context, the participants emphasized the interest to search for non-thermal X-ray and  $\gamma$ -ray emissions from massive binaries. Such a hard X-ray – soft  $\gamma$ -ray emission could also arise from the collision of a supernova remnant with a stellar wind.

The topic of non-thermal emission is related to one of the most controversial issues of massive star research; their magnetic fields. Magnetic fields certainly play a major role in the generation of the non-thermal radio emission and they might lead to magnetically confined stellar winds (such as observed in  $\theta$  Ori C). However, there are many questions that remain open as to the origin of these fields, their strengths as well as their origin (fossil vs. dynamo...). These properties are essential ingredients of any theoretical attempt to model the non-thermal processes. The participants expressed their hope that upcoming observational facilities as well as new developments in theoretical models will allow to better constrain the properties of magnetic fields in early-type stars.

New questions were also raised concerning the origin of X-ray emission from massive stars. Some observational as well as theoretical results cast doubt on the “standard model” (the shock – X-ray emission paradigm) for the production of X-rays from massive stars. Again, magnetic fields might play a key role here.

Another major question concerns the duplicity of massive stars and the colliding wind phenomenon. As a result of detailed analyses and high-quality data, we now have better statistics of the multiplicity of massive stars as well as a better knowledge of the observed properties of colliding wind systems over a broad range of stellar parameters. Some features were unexpected, others agree quite well with theoretical expectations. A question that was actively debated is whether or not all Wolf-Rayet stars that emit X-rays or that produce dust are binaries. Finally, wind-wind collisions or magnetic fields might also play a role in the enigmatic variability of some peculiar objects like the Of?p stars.

Some topics related to star formation were also discussed. Recent X-ray observations of massive star clusters reveal a wealth of secondary sources associated with pre-main sequence stars. A new temperature calibration of O-type stars further suggests that massive stars are significantly cooler than previously thought and may actually not appear on the zero age main sequence. These results are crucial for a better understanding of massive star formation and of many interaction processes between massive stars and their surroundings.

The participants of the workshop emphasized the need for more observations of massive stars in the high-energy domain (using XMM-Newton, INTEGRAL and Chandra) as well as in the radio domain and they decided to coordinate their efforts towards this endeavour.

Gregor Rauw  
Université de Liège, Belgium

## EUROPEAN FACILITIES

### INTEGRATED LARGE INFRASTRUCTURES FOR ASTROPARTICLE SCIENCE (ILIAS)

ILIAS is an Integrated Infrastructure Initiative (I3), with 21 contractors, funded under the European Commission's Sixth Framework Programme (FP6). The ILIAS programme, bringing together scientists from across Europe working in the young and growing new field of Astroparticle Physics has had a remarkably successful first 18 months. Based on a set of networks (N), joint research projects (JRA), and transnational access (TA) the programme focuses on three key areas of world-leading science, the search for Double Beta Decay (neutrino mass), Dark Matter and Gravitational Waves, plus a programme coordinating, for the first time, the four largest deep underground laboratories of Europe. We describe here some of the highlights of the programme so far. More information can be found in the web site of ILIAS at:

<http://ilias.in2p3.fr/>

The four largest deep underground laboratories of Europe, the Gran Sasso (Italy), Fréjus (France), Canfranc (Spain) and Boulby (Great-Britain) laboratories provide focus for the first sub-area of ILIAS, linking 3 projects: a network for the labs (N2), a joint programme of low background studies (JRA1), and a joint Transnational Access programme (TA1). Together, run in close coordination, these projects have proved exceptionally successful and have already produced a very positive dynamic between the laboratories. The N2 and JRA1 activities, focusing on low background techniques, not only help underpin activity across the underground labs but are also closely linked to both the dark matter and double beta decay aspects of ILIAS. The overall objective is to identify and measure the different background components of experiments carried out in the underground laboratories, and to design methods and techniques to suppress them. Excellent progress towards these objectives has been made so far.

For the field of double beta decay ILIAS has also been a real success story. The network N4 and research project JRA2 have operated very closely with each other and developed strong links with theory (N6), the underground lab network (N2) and the low background research project (JRA1). For the first time in Europe there is a strong and growing atmosphere of collaboration between the various double beta decay groups, bringing together all the main search projects.

The discovery that WIMPs or axions are indeed the dark matter that makes up about 30% of the matter in the Universe would arguably be one of the biggest breakthroughs in science for a century. ILIAS N3 aims to contribute to this effort by helping to improve coordination



and knowledge exchange within the already world ranking experimental and theoretical community present in Europe. A particular highlight has been the success of the working group on muon/neutron background. This has enabled the first direct comparison of simulation codes of the neutron flux from cosmic ray muons, key to predictions of detector sensitivity. However, arguably a more important result is that the work itself has, for the first time, successfully brought groups from very different dark matter programmes together to work on a common aim. With input from the cryogenic and noble gas groups, progress is being made towards world-beating designs for 3rd generation detectors of possible mass 1 tonne, for instance EURECA and ZEPLIN-Max.

For gravitational waves, a network (N5) and research project (JRA3) have developed in close unison. Again the first success has been to bring together the various European experiments, both operating and planned. A positive impact was rapidly produced, thanks to a new agreement to exchange technical data between VIRGO and GEO and the development of the first multilateral agreements for joint observations of specific classes of sources including compact binaries. A robust team has been established, a particular outcome being the first full comparison of the present sensitivity of all the current detectors – AURIGA, EXPLORER, GEO, MINIGRAIL, NAUTILUS and VIRGO. The first steps towards common data and software standards have also been made. The network has also established specific areas of information exchange, in particular on commissioning of new detectors and operation and data analysis of existing European antenna. Perhaps of most significance has been a move, through a series of detailed meetings, to develop ideas for a joint proposal to upgrade VIRGO and GEO and to study future generation detectors. Two designs currently being studied are large spherical detectors and dual wideband antennas, including the new concept of using two concentric cylindrical masses.

The joint research project in gravitational waves JRA3 aims to improve thermal noise reduction in GW detectors. The project focuses on materials, cryogenics and specific thermal noise issues; a particularly complex and key project within ILIAS yet. A noteworthy feature so far has been the construction and fabrication of special materials and components of exceptionally high quality factor, for instance the completion of the first special resonator prototypes in Si, SiC, Be, Mo, and CuAl. Optical and capacitive transducer prototypes for the advanced materials programme have also been constructed. The sub-project to develop superconducting materials has been especially successful, having already produced mock-up cavities using copper and electron beam welding and successfully used the technique of niobium sputtering on a substrate to give high thermal conductivity and low intrinsic mechanical dissipations. Resonant frequencies within 2% of the expected value with a detector tuning range of 9 to 20 kHz have been achieved. The programme to develop low loss dielectric coatings for advanced detectors has already produced the first coatings and started the first loss measurements on these. Several facilities have been upgraded for the quality factor measu-

rements at room and low temperature, for the optical loss and birefringence measurements, for the direct thermal noise measurements, and for the investigation on the photothermal effect on coatings and substrates.

Improving interactions between theorists and experimentalists through the theory network (N6) in ILIAS represents one of the important challenges in our programme. A particular highlight of N6 has been successful establishment of the dark matter theory sub-network and interactions with the experimental dark matter network of ILIAS, stimulating new research activity, in particular in the area of relating predictions of SUSY particle theories and cold dark matter distributions in galactic halos to the actual response of detectors.

In summary all the projects within ILIAS have made excellent progress in the first 18 months. However, perhaps of most significance has been the exceptional growth in cooperation between the sub-fields of astroparticle physics, the successful development of exchanges between the various programmes, and the interaction with the FP6 projects in Astronomy.

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## ANNOUNCEMENTS

### THE 6TH INTEGRAL WORKSHOP

The International Gamma-Ray Astrophysics Laboratory INTEGRAL launched on 17 October 2002 is ESA's gamma-ray mission (in collaboration with Russia and NASA) of the long term space-science programme "Horizon 2000".

INTEGRAL is dedicated to the fine spectroscopy (2 keV FWHM @ 1.3 MeV) and fine imaging (12' FWHM, arcminute source location) of celestial gamma-ray sources in the energy range 15 keV to 10 MeV with concurrent X-ray (4-35 keV) and optical (V, 550 nm) source monitoring. The observatory is in its extended mission phase. The majority of observing time has been given to the scientific user community at large through a single peer-review process.

The 6th INTEGRAL workshop entitled "The Obscured Universe" will take place from 2 - 8 July 2006 in Space Research Institute, Moscow, Russia. The workshop is being jointly co-sponsored by ESA and IKI. The main goals of this workshop are to present and discuss, via invited and contributed talks as well as posters the scientific results obtained by INTEGRAL and coordinated observations with other observatories and spacecraft.

Presentations shall cover the following scientific topics:

1. X-ray binaries (IGR sources, black-hole candidates, neutron stars)
2. Isolated neutron stars, pulsars, physics of compact objects

3. Nucleosynthesis (supernovae and supernova remnants, gamma-ray line emission)
4. Surveys and extragalactic sources, unidentified sources
5. Gamma-ray bursts and soft gamma-repeaters
6. INTEGRAL status and instrument overviews (invited talks only)
7. Science data processing and analysis (posters only)
8. Future instruments and missions (posters only)

Detailed information on the workshop organizing committees, registration and hotel booking, instructions for authors and kits for the preparation of abstracts will be made available in due time via the web pages of the Local Organizing Committee (LOC) at:

<http://hea.iki.rssi.ru/integral06>

The workshop will be associated with XI Marcel Grossmann meeting (<http://www.icra.it/MG/mg11/>). It is planned that the Marcel Grossmann meeting and INTEGRAL workshop will have a joint opening session in Tavricheskiy Palace, two joint scientific sessions, a common broad cultural program and a common conference dinner. Due to restrictions of the venue the amount of participants will be limited to 150-200.

The deadline for receipt of abstracts is 1 March 2006. For more information you may contact:

[integral06@hea.iki.rssi.ru](mailto:integral06@hea.iki.rssi.ru)

### European Astronomical Society

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## IAU SYMPOSIA IN 2006



In addition to the events of the 26th General of Assembly of the International Astronomical Union, which will be held in Prague, Czech Republic, on August 14-25, 2006, the following IAU Symposia will take place in 2006:

### IAU SYMPOSIUM No. 233

Solar Activity and its Magnetic Origin

31 March - 3 April 2006, Cairo, Egypt

Contact: Ahmed Abdel Hady <aahady@yahoo.com>

URL: <http://www.iaus233.edu.eg/>

### IAU SYMPOSIUM No. 234

Planetary Nebulae in our Galaxy and Beyond

3-7 April 2006, Waikoloa Beach, HI, USA

Contact: Michael J. Barlow <mjb@star.ucl.ac.uk>

URL: <http://www.ifa.hawaii.edu/iau234/>

### XXVIth GENERAL ASSEMBLY OF THE IAU

14-25 August 2006, Prague, Czech Republic

Contact: Oddbjorn Engvold <iau@iap.fr>

URL: <http://www.astronomy2006.com/>

### IAU SYMPOSIUM No. 235

Evolution of Galaxies across the Hubble Time

14-17 August 2006, Prague, Czech Republic

Contact: Jan Palous <palous@ig.cas.cz>

URL: <http://astro.cas.cz/iaus235/>

### IAU SYMPOSIUM No. 236

Near Earth Objects, our Celestial Neighbors: Opportunity and Risk

14-18 August 2006, Prague, Czech Republic

Contact: Giovanni B. Valsecchi <giovanni@rm.iasf.cnr.it>

URL: <http://adams.dm.unipi.it/iaus236/>

### IAU SYMPOSIUM No. 237

Triggered Star Formation in a Turbulent ISM

14-18 August 2006, Prague, Czech Republic

Contact: Jan Palous <palous@ig.cas.cz>

URL: <http://astro.cas.cz/iaus237/>

### IAU SYMPOSIUM No. 238

Black Holes: from Stars to Galaxies - across the Range of Masses

21-25 August 2006, Prague, Czech Republic

Contact: Vladimir Karas <vladimir.karas@cuni.cz>

URL: <http://www.astro.cas.cz/iaus238>

### IAU SYMPOSIUM No. 239

Convection in Astrophysics

21-25 August 2006, Prague, Czech Republic

Contact: Ian W. Roxburgh <i.w.roxburgh@qmul.ac.uk>

URL: <http://www.astro.keele.ac.uk/iaus239/>

### IAU SYMPOSIUM No. 240

Binary Stars as Critical Tools and Tests in Modern Astrophysics

22-25 August 2006, Prague, Czech Republic

Contact: William I. Hartkopf <wih@usno.navy.mil>

URL: <http://ad.usno.navy.mil/iaus240>

### IAU SYMPOSIUM No. 241

Stellar Populations as Building Blocks of Galaxies

10-14 December 2006, La Palma, Canary Islands, Spain

Contact: Alexandre Vazdekis <vazdekis@ll.iac.es>

URL: <http://www.astro.rug.nl/~peletier/IAUS241.html>

Furthermore, the following Joint IAU Discussion Sessions will also take place in Prague over the same period as the IAU GA:

- JD01 Particle Acceleration - from Solar System to AGN
- JD02 Pulsar Emission and Related Phenomena
- JD03 Solar Active Regions and 3D Magnetic Structure
- JD04 The Ultraviolet Universe: Stars from Birth to Death
- JD05 Calibrating the Top of the Stellar M-L Relation
- JD06 Neutron Stars and Black Holes in Star Clusters
- JD07 The Universe at  $z > 6$
- JD08 Solar and Stellar Activity Cycles
- JD09 Supernovae: One Millennium after SN1006
- JD10 Progress in Planetary Exploration Missions
- JD11 Pre-Solar Grains as Astrophysical Tools
- JD12 Long Wavelength Astrophysics
- JD13 Exploiting Large Surveys for Galactic Astronomy
- JD14 Modeling Dense Stellar Systems
- JD15 New Cosmology Results from the Spitzer Space Telescope
- JD16 Nomenclature, Precession and New Models in Fundamental Astronomy
- JD17 Highlights of Recent Progress in the Seismology of the Sun and Sun-like Stars

For details on all the events, as well as registration information, visit the web side of the meeting at:  
<http://www.astronomy2006.com/>