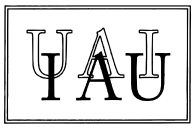

INTERNATIONAL ASTRONOMICAL UNION
UNION ASTRONOMIQUE INTERNATIONALE

POST MEETING REPORTS OF IAU SYMPOSIA IN 2006

compiled by

Ian F. Corbett, IAU AGS
and
Karel A. van der Hucht, IAU GS

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IAU SYMPOSIUM No. 233, POST MEETING REPORT

1. IAU Symposium No.: 233

2. Title of meeting: Solar Activity and its Magnetic Origin

3. Dedication of meeting: 223

4. Location: Cairo, Egypt

5. Dates of meeting: 31 March - 3 April 2006

6. Scientific Organizing Committee:

Volker Bothmer	(co-Chair, Germany)	Jay M. Pasachoff	(USA)
Dirk K. Callebaut	(Belgium)	Pillet V. Martinez	(Spain)
Kenneth P. Dere	(USA)	Eric R. Priest	(UK)
Cheng Fang	(IAU ex officio, China)	Mosalam A.M. Shaltout	(Egypt)
Bernhard Fleck	(ESA, USA)	Kazunari Shibata	(Japan)
Lyndsay Fletcher	(UK)	Sami K. Solanki	(Germany)
Ahmed Abdel Hady	(co-Chair, Egypt)	Alexander V. Stepanov	(Russia)
Serge Koutchmy	(France)	Jingxiu Wang	(China)
Donald B. Melrose	(Australia)	David F. Webb	(USA)

7. Local Organizing Committee:

A.B. Ahmed	(Azhar University, Cairo)
M.M. Abdel Wahab	(Cairo University, Giza)
Ahmed Abdel Hady	(Chair, Cairo University, Giza)
S.M. Hassan	(NRIAG, Cairo)
Rabab Helal	(NRIAG, Cairo)
A.I.M. Osman	(NRIAG, Cairo)
M.I. Wanas	(Cairo University ,Giza)
Shahinaz M. Yousef	(Cairo University, Giza)

8. Number of participants: 223

9. Countries represented: 33

Algeria	Bulgaria	France	Japan	Russia	Ukraine
Angola	China	Georgia	Korea	Saudi Arabia	USA
Austria	Colombia	Germany	Netherlands	Spain	Venezuela
Australia	Croatia	Greece	Norway	Taiwan	
Belgium	Czech Republic	India	Poland	UA Emirates	
Brazil	Egypt	Italy	Romania	UK	

10. Report submitted by: Ahmed Abdel Hady, Cairo University
Place and date: Cairo, Egypt, 5 May 2006

11. Summary of the scientific highlights of IAU Symposium No. 233

The organization of IAU Symposium No. 233 in Cairo, Egypt, was intimately stimulated by the total solar eclipse event taking place on March 29, 2006, visible at the borderline between Egypt and Libya for about four minutes. Total eclipses provide the unique opportunity to observe, if weather conditions are favorable, the solar corona from its innermost part out to a couple of solar radii distance from the Sun's limb, thus complementing space-based observations like those from the SoHO telescopes which image the corona from about 2 to 30 solar radii.

The Sun's corona is structured by the underlying photospheric magnetic field which is changing in the course of the $\sim$11-yr long activity cycle as seen from the changing number of sunspots. Simultaneous photospheric and coronal observations from space like those from *SoHO* and *TRACE* have revealed that the magnetic

flux in the photosphere and hence the structure of the overlying corona are always changing on various spatial and time-scales even at times when no sunspots are present. The view of the corona as a quasi-static, gravitationally stratified medium has changed to that of a complex, highly time-variable system - the most dramatic events taking place as solar flares and coronal mass ejections (CMEs). CMEs are the prime driver of space storms and they cause the most dramatic space weather effects. It is thus of crucial importance to further our understanding of the origin of the variability of the solar magnetic field and the coupling processes with the overlying corona and the consequences in interplanetary space. Most recent symposia focused on specific research topics rather than to trying combine the various fields, ranging from the solar interior, coupling of the photosphere with the upper atmospheric layers, coronal dynamics, space and ground-based observations and space weather to new mission and instrumentation developments. The main focus of IAU Symposium No. 233 *Solar Activity and its Magnetic Origin*, from March 31 to April 4, 2006, was to provide overviews on the different research subjects, to review the latest research results and to educate young national and international astronomers.

The Symposium consisted of seven sessions:
1) Generation and Transport of Solar Magnetic Fields,
2) Magnetic Fields and Coupling Processes in the Solar Atmosphere,
3) Coronal Heating and Small-Scale Dynamics,
4) Large-Scale Coronal Structure as Inferred from Space and Ground-Based Observations,
5) Solar Wind – Origin and Evolution,
6) Eruptive Processes and Space Weather Consequences - Flares, CMEs and SEPs,
7) New Instrumentation and Missions for the Sun and Heliosphere.

Each session included contributions by leading scientists in the form of tutorial and research reviews as well as presentations of new results. The additional eighth session "Training courses for young national and international astronomers" complemented the symposium scope. The highlights of the meeting were the excellent invited tutorial and forefront research presentations - see meeting program for names and topics - providing the audience a splendid opportunity to gain insights into the different fields of research, and especially also to the local attendees.

A further prime goal of the Symposium was to encourage world-wide participation of the scientific community. The symposium was attended by 223 participants, including national students, from 31 countries all over the world: Algeria, Angola, Australia, Austria, Belgium, Brazil, Bulgaria, China, Colombia, Croatia, Czech Republik, Egypt, France, Germany, Greece, India, Italy, Japan, Korea, Norway, Poland, Romania, Russia, Saudi-Arabia, Spain, Taiwan, UK, Ukraine, United Arab Emirates, USA, Venezuela. There were roughly 40 invited speakers, 30 contributed talks and 150 poster contributions.

From the response of the participants we feel confident that the Symposium was one of the most remarkable ones held during the past years and that it will leave unforgettable memories.

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Proceedings:
V. Bothmer, A.A. Hady & M.A.M. Shaltout (eds.), 2006,
Solar Activity and its Magnetic Origin,
Proc. IAU Symp. No. 233, Cairo, Egypt, 31 March - 3 April 2006,
(Cambridge:CUP) ISBN: 0-521-86343-0, due October 2006.
e-book: http://journals.cambridge.org/action/displayJournal?jid=IAU

IAU SYMPOSIUM No. 234, POST MEETING REPORT

1. IAU Symposium No.: 234

2. Title of meeting: Planetary Nebulae in our Galaxy and Beyond

3. Dedicated to: --

4. Location: Waikoloa Beach, HI, USA

5. Dates of meeting: 3-7 April 2006

6. Scientific Organizing Committee:

Agenes Acker	(France)
Michael J. Barlow	(co-Chair, UK)
You-Hua Chu	(USA)
Shuji Deguchi	(Japan)
George H. Jacoby	(USA)
Sun Kwok	(Taiwan/Canada)
J. Alberto Lopez	(Mexico)
Walter J. Maciel	(Brazil)
Arturo T. Manchado	(Spain)
Roberto H. Mendez	(co-Chair, USA)
Mario Perinotto	(Italy)
Stuart R. Pottasch	(the Netherlands)
Detlef Schoenberner	(Germany)
Silvia Torres-Peimbert	(IAU ex officio, Mexico)
Romuald Tylenda	(Poland)
Peter R. Wood	(Australia)

7. Local Organizing Committee:
Laurie Clark
Louise Good
Roberto H. Mendez (Chair)
Karen Rehbock
Diane Sakamoto
Karen Teramura
Richard J. Wainscoat
C. Gareth Wynn-Williams
all at University of Hawaii's Institute for Astronomy

8. Number of participants: 149

9. Countries represented: 18

Australia	Chile	India	Poland	USA
Brazil	France	Italy	Spain	Venezuela
China Nanjing	Germany	Japan	Sweden	
China Taipei	Greece	Mexico	UK	

10. Report submitted by: M.J. Barlow
Place and date: London, UK, 5 September 2006

11. Summary of the scientific highlights of IAU Symposium No. 234

Planetary Nebulae represent the brief transition between Asymptotic Giant Branch stars and White Dwarfs and play a key role as multi-wavelength laboratories for developing our understanding of atomic, molecular, dust and plasma processes in diverse astrophysical environments; the means by which their wonderfully

diverse morphologies are obtained, including hydrodynamical shaping mechanisms and the role of binarity, magnetic fields and rotation; their influence on the interstellar media of galaxies, including chemical enrichment, and the ever growing use of their narrow high luminosity emission lines to probe the dynamics and mass distributions of galaxies and the intergalactic media of clusters of galaxies.

Researchers working in the planetary nebula (PN) field have had a history of very successful IAU symposia, beginning with IAU Symposium No. 34 in Tatranska Lomnica, Czechoslovakia in 1967, followed by IAU Symposium No. 76 in Ithaca, N.Y., U.S.A. in 1977, IAU Symposium No. 103 in London, England in 1982, IAU Symposium No. 131 in Mexico City, Mexico in 1987, IAU Symposium No. 155 in Innsbruck, Austria in 1992, IAU Symposium No. 180 in Groningen, Netherlands in 1996 and IAU Symposium No. 209 in Canberra, Australia in 2001. The IAU Working Group on Planetary Nebulae held a meeting during IAU Symposium No. 209 in November 2001 and, in response to an invitation from Prof. *R.P. Kudritzki* of the Institute for Astronomy, Hawaii, voted unanimously in favor of Hawaii, U.S.A., as the site of the proposed next IAU Symposium on planetary nebulae. This recognized the very significant contributions made by U.S. astronomers to the field of PN research and the fact that an IAU Symposium on planetary nebulae had not been held in the U.S.A. since 1977. Since then, Mauna Kea Observatory, Hawaii, has become the single most important astronomical observatory site in the world.

Following endorsement and sponsorship by IAU Commissions and Divisions and approval by the IAU Executive Committee in April 2005, IAU Symposium No. 234 was publicised and speakers were invited. The SOC early on made a decision that no SOC member could give an invited review and this helped bring about a meeting that had an emphasis on youthful speakers. Following the January 31st deadline for poster abstracts, the SOC voted by email on which ones should be selected for the 22 oral presentation slots. Many participants in fact preferred to present their results as posters and the extended poster sessions provided the venue for many fruitful discussions during the meeting.

IAU Symposium No. 234 took place from April 3-7 2006 at Waikoloa Beach on the Big Island of Hawaii. One hundred and fifty participants from 18 countries interacted and discussed the many different aspects and facets of the field. The meeting included 32 invited review papers (25+5 minutes), 22 oral contributions (20+5 minutes) and 120 poster presentations. A well-attended and enjoyable reception took place on the evening of Sunday April 2nd in the Waikoloa Beach Marriott, the venue for the Symposium, while an open-air conference banquet took place on the evening of Thursday April 6th. The Local Organising Committee, consisting of *Laurie Clark, Louise Good, Roberto Mendez* (chair), *Karen Rehbock, Diane Sakamoto, Karen Teramura, Richard Wainscoat* and *Gareth Wynn-Williams*, aided by *Benjamin Granett, Nathan Huisman, Mark Pitts, Jeffrey Rich* and *Karen Toyama*, provided a very efficient operation that was warmly received by all participants.

The broad meeting themes included galactic and extraglactic surveys for planetary nebulae; the relationships between AGB stars, post-AGB objects, PNs and white dwarfs; nucleosynthesis and the properties of central stars, including the role of binarity; multiwavelength properties of the nebulae; atomic processes and nebular chemical abundances; the mechanisms for the formation of nebular structures, including the role of magnetic fields; and the properties and applications of extragalactic planetary nebulae, which are now being observed out to Coma Cluster distances. Particularly intense debate centred on three topics: (a) Are all PN central stars binaries and, if so, what are the implications for our understanding of AGb and post-AGB evolution and the origin of the white dwarf population? (b) Do magnetic fields play a dominant role in the origin of observed planetary nebula structures? In contrast to prevous meetings, there seemed a near-consensus that MHD models were essential to explain the origin of some observed structures, including bipolarity. Recent direct measurements of magnetic field strengths in the envelopes of AGB stars have helped catalyze this debate. (c) Deep nebular spectra reveal a host of heavy element optical recombination lines (ORLs), which yield systematically higher ionic abundances than do the forbidden lines from the same ions that have classically been used to estimate abundances. Is this effect due to temperature fluctuations, so that the ORLs give the 'correct' abundances, or do the ORLs originate from 'cold' plasma inclusions in the nebula, so that the forbidden lines give the 'correct' abundances?

N.B.
The capping of the Symposium registration fee at just US250($which included US75$ for a copy of the Proceedings) made the organisation of the meeting particularly difficult. Luckily, significant financial contributions were obtained from the University of Hawaii, the US National Science Foundation and the California Institute of Technology, without which the meeting could not have gone ahead. For any future meetings, we

recommend that the Symposium registration fee should be US$ 250-300, exclusive of the cost of a copy of the Proceedings. Meetings could then be guaranteed to be finacially viable.

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Proceedings:
M.J. Barlow & R.H. Mendez (eds.), 2006,
Planetary Nebulae in our Galaxy and Beyond,
Proc. IAU Symp. No. 234, Waikoloa Beach, HI, USA, 3-7 April 2006,
(Cambridge:CUP) ISBN: 0-521-86343-0, due October 2006.
e-book: `http://journals.cambridge.org/action/displayJournal?jid=IAU`

IAU SYMPOSIUM No. 235, POST MEETING REPORT

1. IAU Symposium No.: 235

2. Title of meeting: Evolution of Galaxies across the Hubble Time

3. Dedication of meeting: -

4. Location: Praha, Czech Republic

5. Dates of meeting: 14-17 August 2006

6. Scientific Organizing Committee:

Roberto Abraham	(Canada)
Ronald J. Buta	(USA)
Catherine J. Cesarsky	(IAU ex officio, Germany)
Franoise Combes	(France, co-Chair)
Mark Dickinson	(USA)
Michael A. Dopita	(Australia)
Marijn Franx	(the Netherlands)
Kenneth C. Freeman	(Australia)
Uta Fritze-von Alvensleben	(Germany)
Masataka Fukugita	(Japan)
Gerhard Hensler	(Austria)
Simon J. Lilly	(Switzerland)
Jan Palous	(Czech Republic, co-Chair)
Ian Smail	(UK)
Roberto J. Terlevich	(Mexico)

7. Local Organizing Committee:
Cyril Ron (Chair)

8. Number of participants: 808

9. Countries represented (53):

Argentina	Denmark	Italy	Nigeria	Switzerland
Armenia	Estonia	Japan	Peru	Turkey
Australia	Finland	Kazakhstan	Poland	UK
Austria	France	Korea, South	Portugal	Ukraine
Belgium	Germany	Lithuania	Romania	USA
Brazil	Greece	Latvia	Russia	Uzbekistan
Canada	Hungary	Macedonia	Serbia	Vatican City State
Chile	India	Mexico	Slovakia	Venezuela
China Nanjing	Indonesia	Nepal	South Africa	Vietnam
China Taipei	Iran	Netherlands	Spain	
Czech Republic	Israel	New Zealand	Sweden	

10. Report submitted by:
Place and date: Prague, 18 September 2006

11. Summary of the scientific highlights of the IAU Symposium No. 235

In the last quarter of the XXth century we have achieved a profound understanding of large-scale structure formation in the expanding Universe. The WMAP and COBE satellites have verified the intellectual accomplishment of a generation of astronomers in the most dramatic and convincing way. The Universe appears to resemble a soap opera, with voids and filaments everywhere, and with dark matter halos preparing the grounds for subsequent fireworks – here we are in complete agreement with the Old Testament which claims

that the first light came after a long night. While clouds which have been noticed on the physics horizon by Lord Kelvin some hundred years ago are still visible even today, in the shape of dark force and quantum gravity, people have become accustomed to an occasional rain. The current effort has switched to understanding the structure formation on sub-halo scales – the origin of the luminous parts of galaxies, disks and ellipticals, stellar bulges, bars and the central supermassive black holes, all require a substantial effort from the next generation of scientists.

With this in mind, the IAU Symposium No. 235 on *Evolution of Galaxies Across the Hubble Time* has been conceived. The goals of this meeting formulated by the Scientific Organizing Committee have succeeded in attracting a full audience. The present scientific efforts to make sense of the seemingly intricate evolutionary path taken by galaxies in this Universe require, as a first stage, the data collection on never before attempted quantitative and qualitative levels. Numerous surveys involving large teams of scientists start to deliver fruits from the so far forbidden garden. Other large collaborations are currently engaged in state-of-the-art numerical simulations, in the attempt to convert astronomy from being an observational science to becoming a designer laboratory, albeit virtual so far. A new word has become part of our astronomical vocabulary: "downsizing", which refers to the observation that luminous (massive?) galaxies form early in the Universe while only small galaxies form stars today. Indeed, massive early-type galaxies look "red and dead" during most of the second half of the age of the Universe.

In an interesting development, many presentations at this Symposium require that the process of galaxy formation and their subsequent evolution on the scales of tens of kiloparsecs is correlated with processes on dramatically smaller spatial scales of individual star formation and scales related to fueling of accretion processes onto the central black holes. Are galaxies assembled gradually as required in the hierarchical clustering scenario, or rather in one avalanche? There are clear hints that nature likes both roads. Why is it that we still have plentiful amounts of gas in disk galaxies – despite vigorous starbursting events? To what extent is this regulated by the energy released by the growing black holes in the galactic centers? What quenches the star formation? Are all elliptical galaxies parented by spirals? While this Symposium will not answer all these questions, hopefully it will provide a small but necessary step in the right direction.

For example, *Annette Ferguson* described the structure of galaxies at faint light levels. She argued that in the Lamda-CDM paradigm, structure grows in a hierarchical manner, and that if small satellites have stellar components, the signatures of this growth would be in the form of tidal debris and diffuse stellar halos. This is dramatically shown in a deep image of the Andromeda Galaxy M 31, where faint filaments and structures seen in the outer regions are likely due to ancient accretion events that heated the disk. *Filippo Fraternali* described the detection of gaseous, neutral hydrogen halos around nearby edge-on spirals (NGC 891). He argued such halos are made of low angular momentum material and that gas accretion from an intergalactic medium might play a role in their formation. A milestone in the study of high redshift galaxies was presented by *Linda Tacconi*, who showed new observations of the kinematics of $z \sim 2$ galaxies, revealing that disks in rotation were already current at this epoch. One of the best examples was obtained with adaptive optics due to a nearby guiding star, but laser guide stars are now coming to the forefront and such observations will be extended considerably in the future.

Isaac Shlosman, Ron Buta, Françoise Combes

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Proceedings:
F. Combes & Jan Palous (eds.), 2007,
Evolution of Galaxies across the Hubble Time,
Proc. IAU Symp. No. 235, Praha, Czech Republic, 14-17 August 2006,
(Cambridge:CUP) ISBN: 0-521-86344-9, due February 2007.
e-book: `http://journals.cambridge.org/action/displayJournal?jid=IAU`

IAU SYMPOSIUM No. 236, POST MEETING REPORT

1. IAU Symposium No.: 236

2. Title of meeting: Near Earth Objects, our Celestial Neighbors: Opportunity and Risk

3. Dedication of meeting: -

4. Location: Praha, Czech Republic

5. Dates of meeting: 14-18 August 2006

6. Scientific Organizing Committee:

Guy J. Consolmagno	(Vatican City State)
Syuzo Isobe	(Japan)
Zoran Knezevic	(Serbia & Montenegro)
Ingrid Mann	(Germany)
Andrea Milani	(co-Chair, Italia)
David Morrison	(USA)
Petr Pravec	(Czech Republic)
Hans Rickman	(IAU ex officio, Sweden)
Hans Scholl	(France)
Timothy B. Spahr	(USA)
Edward F. Tedesco	(USA)
Giovanni B. Valsecchi	(co-Chair, Italia)
David Vokrouhlicky	(co-Chair, Czech Republic)
Iwan P. Williams	(UK)
Donald K. Yeomans	(USA)
Jin Zhu	(China, Nanjing)

7. Local Organizing Committee:
Cyril Ron (Chair)

8. Number of participants: 396

9. Countries represented: 56

Algeria	Denmark	Japan	Philippines	Turkey
Australia	Estonia	Kazakhstan	Poland	Ukraine
Austria	Finland	Korea Seoul	Portugal	UK
Belgium	France	Latvia	Romania	Uruguay
Brazil	Germany	Macedonia	Russia	USA
Canada	Greece	Mexico	Serbia & Montenegro	Uzbekistan
Chile	Hungary	Nepal	Slovakia	Vatican
China Nanjing	India	Netherlands	South Africa	Venezuela
China Taipei	Indonesia	New Zealand	Spain	
Colombia	Iran	Nigeria	Sweden	
Cuba	Israel	Norway	Switzerland	
Czech Republic	Italy	Peru	Tajikistan	

10. Report submitted by: Giovanni B. Valsecchi
Place and date: Roma, Italy, 22 December 2006

11. Summary of the scientific highlights of IAU Symposium No. 236

Near Earth Objects (NEO) science started in 1770 (236 years before the Symposium that, curiously, holds the same number) when *Messier* discovered a comet that passed exceptionally close to the Earth. Lots of

researches and passionate scientific discussions were caused by that event, but later on NEO astronomy fell into a relative oblivion, from which it has started to escape relatively recently.

The fact that NEOs are the closest neighbors of the Earth-Moon system allows research which is not yet possible on more distant small bodies. The Symposium has concentrated on the specific techniques of observation and modeling which are effective for NEOs, including radar, in situ exploration by spacecraft, and measurement of very subtle dynamical effects such as non-gravitational perturbations.

The 14 sessions of the Symposium covered a variety of topics; in each of them there was a mix of invited (30 minutes) and contributed (15 minutes) talks, as follows:
Transport from source populations (2 invited [I], 1 contributed talk [C]),
Population models (2I, 2C),
Rotation and non-gravitational forces (2I),
Current and Future surveys (2I, 3C),
Shapes and internal structure (2I, 3C),
Surfaces, composition (2I, 2C),
Rotation, observations (2I, 2C),
Binaries (2I, 2C),
Databases and data mining (2I, 2C),
Current missions to NEOs (2I, 4C),
Impact rate and risk estimates (1I, 2C),
The meteor/asteroid impact transition (2I, 2C),
Impact monitoring (1I, 4C),
The IAU role on the NEO problem (1I, 2C).

As it is clear from the titles, all the sessions — except the last one — have covered the various aspects of current NEO science, taking advantage of the wealth of data produced by the first generation surveys dedicated to the discovery of NEOs, started in the last decade. These surveys have led to detailed studies of NEO orbital evolution, evidencing the importance of subtle nongravitational effects, the abundant presence of binary objects and of objects with unusual shapes.

Emphasis has also been put on next generation surveys, that will begin operations in the next few years, and that will lead to a hundred-fold increase in the discovery rate, as well as to more accurate astrometry, raising expectations for even more interesting new accomplishments. As the Symposium has evidenced, we now start to understand how NEOs formed and how they evolve, both dynamically and physically; this opens a window on collisions, a universal astrophysical phenomenon that has left clear markings both on NEOs and on the surfaces of planets, including our one.

This last issue brings us to an aspect that was emphasized in the title of Symposium, and that has also been the subject of the last session and of the interesting discussion that during it has taken place. NEO impacts represent a threat over very long time scales. To deal with this, mankind has to put in place a global system in which NEO astronomy, both from the ground and from space, is the first link of the chain of actions needed to prevent and/or mitigate the effects of a collision. The other links involve civil protection, disaster management, international laws and, above all, political actions. Once in place, this global system will run essentially forever, like the earthquake, volcano and tsunami alert systems nowadays in operation. Astronomers have started to put in place their link of the chain, by discovering the potentially hazardous objects and putting in operation impact monitoring software robots that allow us to predict the possibilities of collisions with the Earth many decades in advance; space missions are under study that will lead to the development of realistic mitigation strategies. As emphasized in the discussion of the last session of this timely Symposium, it is now time for the other communities to start putting in place their links of the chain.

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Proceedings:
A. Milani, G.B. Valsecchi & D.Vokrouhlicky (eds.), 2007,
Near Earth Objects, our Celestial Neighbors: Opportunity and Risk,
Proc. IAU Symp. No. 236, Praha, Czech Republic, 14-18 August 2006,
(Cambridge:CUP) ISBN: 0-521-86345-7, due February 2007).
e-book: `http://journals.cambridge.org/action/displayJournal?jid=IAU`

IAU SYMPOSIUM No. 237, POST MEETING REPORT

1. IAU Symposium No.: 237

2. Title of meeting: Triggered Star Formation in a Turbulent ISM

3. Dedication of meeting: --

4. Location: Praha, Czech Republic

5. Dates of meeting: 14-18 August 2006

6. Scientific Organizing Committee:

Philippe Andre	(France)
Leo Blitz	(USA)
Bruce G. Elmegreen	(co-Chair, USA)
Yasuo Fukui	(Japan)
Pavel Kroupa	(Germany)
Sally Oey	(USA)
Eve C. Ostriker	(USA)
Jan Palous	(co-Chair, Czech Republic)
Monica Rubio	(Chile)
Steve Shore	(Italy)
Guillermo Tenorio-Tagle	(Mexico)
Anthony P. Whitworth	(UK)
Robert E. Williams	(IAU ex officio, USA)
Hans Zinnecker	(Germany)

7. Local Organizing Committee:
Cyril Ron (Chair)

8. Number of participants: 490

9. Countries represented (43):

Argentina	China Taipei	Hungary	Korea, S.	Russia	USA
Armenia	Colombia	India	Mexico	Serbia	Uzbekistan
Australia	Czech Rep.	Indonesia	Nepal	South Africa	Venezuela
Austria	Denmark	Iran	Netherlands	Spain	
Belgium	Estonia	Ireland	New Zealand	Sweden	
Brazil	Finland	Israel	Nigeria	Switzerland	
Canada	France	Italy	Poland	Thailand	
Chile	Germany	Japan	Portugal	UK	
China Nanjing	Greece	Kazakhstan	Romania	Uruguay	

10. Report submitted by: Bruce Elmegreen, Jan Palous
Place and date: Yorktown Hts, NY 10598, USA

11. Summary of the scientific highlights of IAU Symposium No. 237

IAU Symposium No. 237 in Prague brought together 490 scientists from 48 countries for 67 talks and several hundred posters in 3.5 days from the 14th to the 18th of August. The presented work included observations, analysis, and computational modeling of turbulence and star formation triggered in various environments, including turbulent cloud cores, HII regions, supernova bubbles and superbubbles, spiral density waves, and interacting galaxies. There was a lot of interesting discussion and many new friends were made. The following describes in general terms the modern field of triggered star formation.

Stars form in the dense cores of molecular clouds, but the formation process of these stars, like the formation process of the cores themselves, is not simply a gravitational collapse and fragmentation of ambient interstel-

lar matter (ISM). The ISM is far too chaotic and turbulent for that. Galactic gravity alone tends to make spirals, either the long and symmetric type from self-gravity in the stars, or the short and flocculent type from self-gravity in the gas. The motion that results stirs the gas further, causing shocks and compressed regions on smaller scales. Supernovae and other stellar disturbances also shock and compress the gas, as does the continued force from self-gravity. On the comparatively small scale of molecular clouds, and especially in the cores of these clouds, all of these stirring motions blend together to make a random turbulent mixture. This mixture creates its own shocks and intersecting shocks, ultimately forming dense sheets, filaments, and clumps down to scales that are so small they cannot usually be observed.

The dense molecular clumps that are midway in this range of scales, too small for internal motions to shock and fragment further and yet large enough for self-gravity to overcome the thermal pressure, are believed to be formation sites of individual and binary stars. Magnetic diffusion and turbulent energy dissipation leads them to higher and higher densities on timescales of ten to one hundred thousand years. Because the turbulence and self-gravity that made them is scale-free, they usually cluster together in a hierarchical fashion, forming clusters within clusters of young stars. The densest of these clusters can end up gravitationally bound, like the Pleiades, while on larger scales, the lower density parts are almost always unbound, like the OB associations and star complexes that highlight the original density wave spiral arms and flocculent spiral arms.

The formation of massive stars has severe repercussions in this chain of events. The ionization, winds, and eventually supernovae from these stars compress and move the dense gas again, creating new dense cores and more star formation. Over time the disturbance spreads outward, compressing even the low density ISM into a giant shell or outflow from the galaxy. Stellar triggering like this is observed on many scales, from tiny globules in the "pillars of creation" part of the M16 nebula to whole molecular clouds in Lindblad's expanding ring around the Sun.

Whole galaxies can be triggered into forming stars as well. Interactions lead to spiral arm torques and gas inflows, which make the ISM denser and more strongly self-gravitating than it was before. Peripheral gas around galaxies can form long tidal tails, which collapse into knots that form their own clusters. Some of these knots may be ejected from the galaxies altogether, forming small stellar systems that resemble Dwarf Irregulars.

The ISM is an active environment with a variety of energy sources that can push it around and make it highly turbulent. Yet is it very cold from a lack of strong thermal heat sources and rapid collisional dissipation. The result is a pervasive network of supersonic expansions and turbulent motions that compress it in multiple steps and eventually trigger star formation. Many stages in the process can be observed directly, and much of it can be modelled numerically. The current limitations of both techniques will make star formation in a turbulent ISM an active topic of research for many years to come.

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Proceedings:
B.G. Elmegreen & J. Palous (eds.), 2007,
Triggered Star Formation in a Turbulent ISM ,
Proc. IAU Symp. No. 237, Praha, Czech Republic, 14-18 August 2006,
(Cambridge:CUP) ISBN: 0-521-86346-5, due February 2007.
e-book: `http://journals.cambridge.org/action/displayJournal?jid=IAU`

IAU SYMPOSIUM No. 238, POST MEETING REPORT

1. IAU Symposium No.: 238

2. Title of meeting: Black Holes: from Stars to Galaxies - across the Range of Masses

3. Dedication of meeting: -

4. Location: Praha, Czech Republic

5. Dates of meeting: 21-25 August 2006

6. Scientific Organizing Committee:
Roger D. Blandford (USA)
Annalisa Celotti (Italy)
Philip A. Charles (South Africa)
Bozena Czerny (Poland)
Andrew C. Fabian (UK)
Reinhard Genzel (Germany)
Gnther Hasinger (Germany)
Vladimir Karas (co-Chair, Czech Republic)
Kazuo Makishima (Japan)
Giorgio Matt (co-Chair, Italia)
I. Felix Mirabel (Chile)
Kenneth A. Pounds (IAU ex officio, UK)
Martin J. Rees (UK)
Jean H. Swank (USA)
Tahir Yaqoob (USA)
Shuang Nan Zhang (China, Nanjing)

7. Local Organizing Committee:
Cyril Ron (Chair)

8. Number of participants: 175

9. Countries represented (22):

Australia	Czech Republic	Japan	Serbia	UK
Brasil	France	Mexico	Spain	USA
Canada	Germany	Netherlands	Sweden	
Chile	India	Poland	Switzerland	
China	Italy	South Africa	Russia	

10. Report submitted by: Vladimir Karas & Giorgio Matt
Place and date: Prague, Cech Republic and Roma, Italy, 19 December 2006

11. Summary of the scientific highlights of IAU Symposium No. 238

The main motivations for IAU S238 were to bring together observers and theoreticians working on Black Hole astrophysics across the range of mass - from the stellar Black Holes to the supermassive ones at the centre of Galaxies, including the Milky Way - with the aim of highlighting and discussing similarities in the physics involved. The symposium was divided in 14 sessions, summarized below.

Sessions I and II were devoted to Stellar-mass black holes. Reviews on "Observational evidence for stellar-mass black holes" and on "Matter accretion and ejection in black-hole systems" were given by *J. Casares* and *A. King*, respectively, while the contributed talks were: X-ray energy spectra of low and high-frequency quasi-periodic oscillations in accreting black holes, by *P.T. Zycki*; Microquasars: disk-jet coupling in stellar-mass black holes, by *F. Mirabel*; Suzaku observation of the black hole transient 4U1630-472, by *A. Kubota*; Formation of rapidly rotating black holes in massive binary stellar systems, by *P.C. Joss*; Sawtooth-like

oscillations of black hole accretion disks, by *R. Matsumoto*; On the origin of the black hole in the X-ray binary XTE J1118+480, by *J.I. Gonzalez Hernandez*.

Sessions III and IV were dedicated to the Formation and evolution of massive black holes. Reviews on "Massive black holes" and on "Formation and evolution of supermassive black holes, black-hole binary merging" were given by *M.J. Rees* and *P. Madau*, respectively. Contributed talks were: The cosmic evolution of black hole accretion, by *G. Hasinger*; X-ray emission properties of the broad-line AGN in the XMM-2dF Wide Angle Survey, by *S. Mateos*; Cosmological growth of supermassive black holes: the kinetic luminosity function of AGN, by *A. Merloni*; Quasar evolution: black hole mass and accretion rate determination, by *D. Dultzin-Hacyan*; X-ray spectral evolution of quasars, by *G. Chartas*; Black hole growth in the local universe, by *J.E. Greene*.

Sessions V and VI concerned Active galactic nuclei. A Review on "Supermassive black holes: accretion and outflows" was given by *M.C. Begelman*. Contributed talks were: Hard X-ray spectra of AGN observed with Suzaku, by *H. Kunieda*; Mapping the circumnuclear dust in nearby AGN with the mid-infrared interferometric instrument MIDI, by *K.R.W. Tristram*; X-ray variability in AGN: implications of magnetic flares, by *R.W. Goosmann*; Cumulative effects of outflows on the X-ray spectra of AGN, by *K.A. Pounds*; Uncertainties on the black hole masses in AGN and consequences on the Eddington ratios, by *S. Collin*; Warped disks and the Unified Scheme, by *A. Lawrence*; An accretion disk laboratory in the Seyfert galaxy NGC 2992, by *T. Yaqoob*; Cosmological evolution of active galactic nuclei X-ray luminosity function, *Y. Ueda*.

Session VII and part of Session VIII were devoted to the Physical processes near black holes. A review on "Strong-gravity effects: X-ray spectra, timing, polarimetry" was given by *A.C. Fabian*. Contributed talks were: GRS 1915+105: a near-extreme Kerr black hole, by *R. Narayan*; Black holes and magnetic fields, by *J. Bicak*; Constraining jet physics in weakly accreting black holes, *S.B. Markoff*; Black hole accretion: theoretical limits and observational implications, by *D. Heinzeller*; Search for the event horizon evidences by means of optical observations with high temporal resolution, by *G. Beskin*; Dynamics of radiatively inefficient flows accreting onto radiatively efficient black hole objects, by *D. Proga*.

Part of Session VIII and Session IX were devoted to The Galactic Center. *R. Genzel* gave a review talk on this topic. Contributed talks were: The simultaneous radio to X-ray observations and polarized NIR emission from Sagittarius A*, by *A. Eckart*; The structure of the nuclear stellar cluster of the Milky Way, by *R. Schoedel*; Variable accretion of stellar winds onto Sagittarius A*, by *J. Cuadra*; The character of the short-term variability of Sagittarius A* from the radio to the near-infrared by *M.R. Morris*; Stellar dynamics with Kozai's resonance in Sagittarius A*, by *L. Subr*.

Sessions X and XI were on Ultraluminous X-ray sources. *K. Makishima* gave a review talk on "Observational evidence for intermediate-mass black holes", while contributed talks were: SS433-type X-ray binaries and the nature of ULXs, *P.A. Charles*; The supercritical accretion disk in SS433 and ultraluminous X-ray sources, *S.N. Fabrika*; The optical counterpart of an ultraluminous X-ray source NGC 6946 X-1, by *P. Abolmasov*; Recipes for ULX formation: necessary ingredients and garnishments, by *R. Soria*; Explosion of very massive stars and the origin of intermediate mass black holes, by *S. Tsuruta*; Ultraluminous X-ray sources: X-ray binaries in a high/hard state?, by *Z. Kuncic*; On the nature of ultraluminous X-ray sources from optical/IR measurements, by *M. Cropper*; Variability of ultraluminous X-ray sources in the Cartwheel Ring, by *A. Wolter*.

Sessions XII and XIII were devoted to Supermassive black holes and their galaxies. A review talk on "The inner workings of early-type galaxies: supermassive black holes and stellar nuclei" was given by *L. Ferrarese*. Contributed talks were: Imaging compact binary black holes with VLBI, by *G.B. Taylor*; Radiatively inefficient accretion disks in low-luminosity active galactic nuclei, by *F.D. Macchetto*; The central 80x200 parsecs of M83, how many black holes and how massive are they?, by *H.A. Dottori*; Inward bound: following the gas flow from nuclear spirals to the accretion disc, by *T. Storchi-Bergmann*; Probing the coevolution of supermassive black holes and galaxies out to $z \sim 4.5$ using gravitational lensing, by *C.Y. Peng*; The smallest black holes in nearby active galactic nuclei, by *A.J. Barth*; The evolution of supermassive black holes and galaxies in the COSMOS survey, by *C.D. Impey*; Cosmic evolution of black holes and galaxies to $z = 0.4$, by *J. Woo*.

The final session was on Black holes across the mass spectrum, with *R. Mushotzky* giving a review on "Black holes across the mass spectrum – from stellar-mass black holes to ultra-luminous X-ray sources and active galactic nuclei". Contributed talks were: The disc instability model for dwarf novae in the AGN context,

by *J.M. Hameury*; Radiation hydrodynamic simulations of super-Eddington accretion flows, by *K. Ohsuga*; Synchrotron outbursts in galactic and extra-galactic jets, any difference?, by *M. Tuerler*.

Finally, closing remarks on "Present status and future developments of black holes across the range of masses" were given by *F. Mirabel*.

Presentations of all review talks as well as contributed talks were collected from the authors and they are now available from the Symposium website, ¡http://astro.cas.cz/iaus238¿. In addition to oral lectures, about 120 posters were displayed during the conference and several public lectures were organized for general audience.

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Proceedings:
V. Karas & G. Matt (eds.), 2007,
Black Holes: from Stars to Galaxies - across the Range of Masses,
Proc. IAU Symp. No. 238, Praha, Czech Republic, 21-25 August 2006,
(Cambridge:CUP) ISBN: 0-521-86347-3, due February 2007.
e-book: `http://journals.cambridge.org/action/displayJournal?jid=IAU`

IAU SYMPOSIUM No. 239, POST MEETING REPORT

1. IAU Symposium No.: 239

2. Title of the meeting: Convection in Astrophysics

3. Dedication of meeting: -

4. Location: Praha, Czech Republic

5. Dates of the meeting: 21-25 August 2006

6. Scientific Organizing Committee:

Beatriz Barbuy	(IAU ex officio, Brasil)
Kwing Lam Chan	(China, Nanjing)
Francesca D'Antona	(Italy)
Thomas L. Duvall	(USA)
Andrew P. Ingersoll	(USA)
Jiri Kubat	(Czech Republic)
Friedrich Kupka	(co-Chair, Germany)
Aake Nordlund	(Denmark)
Ian W. Roxburgh	(co-Chair, UK)
Barry Smalley	(UK)
Sami K. Solanki	(Germany)
Juri Toomre	(USA)
Sylvie D. Vauclair	(France)

7. Local Organizing Committee:
Cyril Ron (Chair)

8. Number of participants: 300

9. Countries represented: 43

Argentina	Chile	Finland	India	Korea South	Poland	Sweden
Australia	China Nanjing	France	Indonesia	Lithuania	Romania	Switzerland
Austria	China Taipei	Egypt	Iran	Mexico	Russia	UK
Belgium	Czech Rep	Germany	Israel	Netherlands	Serbia	Ukraine
Brazil	Denmark	Greece	Italy	Nigeria	South Africa	USA
Canada	Estonia	Hungary	Japan	Norway	Spain	Uzbekistan
						Vatican State

10. Report submitted by: Ian W. Roxburgh
Place and date: London, 6 October 2006

11. Summary of the scientific highlights of IAU Symposium No. 239

The symposium was held during the second week of the IAU General Assembly in Prague. There were exactly 300 attendees from 43 countries. There were 40 oral presentations and 53 poster papers.

Convection is ubiquitous throughout the Universe. Its main physical consequences are heat transport, mixing, interaction with mean flow and magnetic fields and the dynamo generation of magnetic fields. The goal of the meeting was to bring together astronomers working in different disciplines: solar physics, stellar physics, planetary physics and accretion discs, to report on the current state of the art in these fields and to encourage interdisciplinary cooperation. This goal was met. The (oral) feedback from the participants was that the meeting had been a success and that colleagues had learned much from work in other disciplines.

The meeting was organised into seven sessions covering different areas and different techniques (observational, analytical and numerical simulation) and each session was followed by a round table discussion. The sessions were:

a) Modeling convection and radiative transfer
b) Observational probes of convection
c) Convection in planets and brown dwarfs
d) Stellar evolution, nucleosynthesis and mixing
e) Oscillations, mass loss and convection
f) Convection and rotation
g) MHD convection and dynamos

The meeting was set off to a good start by invited reviews on Theoretical Modeling (*V. Canuto*) and Numerical Simulation (*F. Cattaneo*), followed by reports from *M. Steffen, J. Trujillo Bueno, S. Wedemeyer-Bohm* and *F. Rincon* and a lively round table discussion.

This was followed by J. Landstreet on observing atmospheric convection in stars and by *A. Kosovichev* on helioseismic inferences on subsurface solar convection, the latter talk covering the exciting advances in recent years through the use of local helioseis mology in probing the dynamics of the outer layers of the Sun. This was followed by a report by *M. Asplund* on the recent re-determination of the solar abundances using the results of 3-D hydrodynamic simulations of the solar surface layers, the new determinations differing considerably from the previously estimated values.

G. Glatzmaeir reported on recent developments in simulation of convection and in particular gravity waves in planets, and *A. Ingersol* on observations of convection in the giant planets from space missions, and by the results of detailed 3-D simulations of onvection in brown dwarfs by *H.-G. Ludwig*.
Moving on to convection in stars *C. Chiosi* reviewed the role of convection and convective overshooting in stellar evolution and *D. Arnett* presented their impressive results on time dependent convection in the later stages of stellar evolution. *D. Xiong* and *L. Deng* presented recent work on supersonic convection in red giants and *P. Eggleton* described a new composition gradient driven instability that can lead to mixing in stars.

The role of convection in exciting oscillations in stars was covered by *R. Stein* and *R. Samadi* described recent work on the use of the amplitudes of such oscillations as a probe of turbulent convection. *F. Robinson* reported on numerical simulations of convection in Procyon A.

The interaction of convection and rotation is an important area of research and *J. Christensen-Dalsgaard* presented the current sate of knowledge of the rotation of the solar convective zone as derived from helioseismology, *H. Klahr* on convection in discs, and *N. Brummel* on recent simulations of convection of a rotating layer and it interaction with magnetic fields. *A. Brandenburg* and *F. Busse* further covered the role of rotation in the generation of magnetic fields by dynamo action in review talks, and the results of recent simulations were presented by *S. Brun*.

The meeting was brought to a close with a summary by *J.-P. Zahn*, who was co-organiser of the previous IAU meeting on convection held in Nice in 1976, almost exactly 30 years ago. There was a general feeling that we should not wait this long for the next such meeting.

There were some problems in the scheduling of the meeting and clashes with other Symposia (particularly that on binary stars) and Joint Discussions (particularly JD17 on Helio- and Astero-seismology). The clash with JD17 was particularly strong as can be seen from the number of contributions to our symposium that drew on results from this area of research, the number of speakers who were also speakers at JD17, and that the chairman (Roxburgh) gave two presentations to JD17. If such potential clashes could be identified at an early stage in the planning of future General Assemblies then it would be easier to avoid such clashes when drawing up the programme.

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Proceedings:
F. Kupka, I.W. Roxburgh & Kwing Lam Chan (eds.), 2007,
Convection in Astrophysics,
Proc. IAU Symp No. 239, Praha, Czech Republic, 21-25 August 2006,
(Cambridge:CUP) ISBN: 0-521-86349-X, due February 2007.
e-book: `http://journals.cambridge.org/action/displayJournal?jid=IAU`

IAU SYMPOSIUM No. 240, POST MEETING REPORT

1. IAU Symposium No.: 240

2. Meeting Title: Binary Stars as Critical Tools and Tests in Contemporary Astrophysics

3. Dedication of meeting: Mirek J. Plavec and Charles E. Worley

4. Location: Praha, Czech Republic

5. Dates of the meeting: 22-25 August 2006

6. Scientific Organizing Committee:

Christine Allen	(Mexico)
Dmitrij V. Bisikalo	(Russia)
John Davis	(Australia)
Edward F. Guinan	(co-Chair, USA)
Petr Harmanec	(co-Chair, Czech Republic)
William I. Hartkopf	(co-Chair, USA)
Patricia Lampens	(Belgium)
Josefina F. Ling	(Spain)
Katalin Olah	(Hungary)
Terry D. Oswalt	(USA)
Kresimir Pavlovski	(Croatia)
Geraldine J. Peters	(USA)
Slavek M. Rucinski	(Canada)
Colin D. Scarfe	(Canada)
Brian Warner	(IAU ex officio, South Africa)
Marek Wolf	(Czech Republic)
Hans Zinnecker	(Germany)

7. Local Organizing Committee:
Cyril Ron (Chair)

8. Number of participants: 498

9. Countries represented : 54

Argentina	Croatia	India	Netherlands	Slovakia	USA
Armenia	Czech Rep.	Indonesia	New Zealand	Slovenia	Uzbekistan
Australia	Denmark	Iran	Nigeria	South Africa	Vatican City State
Austria	Egypt	Ireland	Norway	Spain	Venezuela
Belgium	Estonia	Israel	Peru	Sweden	
Brazil	Finland	Italy	Philippines	Switzerland	
Canada	France	Japan	Poland	Thailand	
Chile	Germany	Korea, S.	Romania	Turkey	
China Nanjing	Greece	Latvia	Russian Fed.	Ukraine	
China Taipei	Hungary	Mexico	Serbia	United Kingdom	

10. Report submitted by: William I. Hartkopf
Place and date: U.S. Naval Observatory, Washington D.C., USA, 14 December 2006

11. Summary of the scientific highlights of IAU Symposium No. 240

IAU Symposium 240, "Binary Stars as Critical Tools and Tests in Contemporary Astrophysics", was held

22-25 August 2006 during the the XXVI IAU General Assembly in Prague, and highlighted many of the new and exciting developments taking place in binary and multiple star studies.

This symposium was the result of a merger of two binary star symposia proposals developed for the General Assembly, one originating from Commission 26 (Binary and Multiple Stars) and focused mainly on wider systems, the other organized by Commission 42 (Close Binaries) and focused primarily on close/interacting systems. Upon the recommendation of the IAU Executive Committee these proposals were merged, and the resulting program benefited greatly from the infusion of new ideas and differing perspectives from the two binary star communities, which resulted in a broader and more comprehensive discussion and most of all a more vibrant and interesting meeting.

The first such joint major meeting in recent memory, this symposium brought together 500 astronomers from 54 countries who are involved in all aspects of binary and multiple star research, from very long period, common proper motion pairs and other "fragile" binaries to short-period contact binaries, short-period binaries with degenerate components, as well as star/brown-dwarf/planet systems, with the aim of exploring interests common to all binary star researchers. Both the observational and theoretical aspects of binary and multiple star research were represented, but the main themes of the program were the new information and physical insights gleamed from the recent advances in instrumentation and techniques. The meeting also attracted those interested in the observational and theoretical aspects of modern stellar astrophysics that depend very strongly on the fundamental properties of stars found primarily from binary and multiple stars.

The format for the symposium was a mix of invited oral review presentations and more narrowly-focused topical presentations. There were also over twenty short oral/poster presentations, selected by the SOC from over 180 submitted posters.

Impacts on binary and multiple star studies from new technologies, techniques, instruments, missions and theory were highlighted. It is crucial to study binary and multiple stars because the vast majority of stars (¿60stars, but of double and multiple star systems. To understand galaxies we need to understand stars, but since most are members of binary and multiple star systems, we need to study and understand binary stars. The major advances in technology, instrumentation, computers, and theory have revolutionized what we know (and also don't know) about binary and multiple star systems. Data now available from interferometry (with milliarcsecond and sub-mas precisions), high-precision radial velocities (1-2 m/s) and high precision photometry (<1-2 milli-mag) as well as the wealth of new data that are pouring in from panoramic optical and infrared surveys (e.g., >10,000 new binaries found since 1995), have led to a renaissance in binary star and multiple star studies. For example, advances have lead to the discovery of new classes of binary systems with planet and brown dwarf components (over 200 systems). Also, extremely valuable data about binary stars are available across the entire electromagnetic spectrum - from gamma-ray to IR space missions and from the ground using increasingly more powerful and plentiful optical and radio telescopes as well as robotic telescopes. In the immediate future, spectral coverage could even be extended beyond the radio to the first detection of gravity waves from interacting close binaries. Also, both the quality and quantity of data now available on binary and multiple stars are making it possible to gain unprecedented new insights into the structure, and formation and evolution of binary stars, as well as providing valuable astrophysical information (like precise stellar masses, radii, ages, luminosities and distances) to test and constrain current astrophysical theory. These major advances permit tests of current theories and ideas in stellar astrophysics and provide the foundations for the next steps in modeling and improvements in theory to be taken.

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Proceedings:
W.I. Hartkopf, P. Harmanec & E.F. Guinan (eds.), 2007,
Binary Stars as Critical Tools and Tests in Contemporary Astrophysics,
Proc. IAU Symp. No. 240, Praha, Czech Republic, 22-25 August 2006,
(Cambridge:CUP) ISBN: 0-521-86348-1, due February 2007.
e-book: `http://journals.cambridge.org/action/displayJournal?jid=IAU`

IAU SYMPOSIUM No. 241, POST MEETING REPORT

1. IAU Symposium No.: 241

2. Meeting Title: Stellar Populations as Building Blocks of Galaxies

3. Dedication of meeting: --

4. Location: La Palma, Canary Islands, Spain

5. Dates of the meeting: 11-15 December 2006

6. Scientific Organizing Committee:

Antonio Aparicio	(IAC, Spain)
Nobuo Arimoto	(NAOJ, Japan)
Beatriz Barbuy	(IAG-USP, Brasil)
Alessandro Bressan	(Obs. Astron. Padova, Italy)
Gustavo A. Bruzual	(CIDA, Venezuela)
Roger L. Davies	(Univ. Oxford, UK)
Javier Gorgas	(Univ. Complutense Madrid, Spain)
Timothy M. Heckman	(Johns Hopkins Univ., USA)
Guinevere Kauffmann	(MPA Garching, Germany)
Reynier F. Peletier	(co-Chair, Kapteyn Inst., the Netherlands)
James A. Rose	(Univ. North Carolina at Chapel Hill, USA)
Donald A. Vandenberg	(Univ. Victoria, Canada)
Alexandre Vazdekis	(co-Chair, IAC, Spain)

7. Local Organizing Committee:

Judith de Araoz	Carme Gallart
Marc Balcells	Artemio Herrero
Michael Beasley	Conrado Carretero
John E. Beckman	Tanja Karthaus
Eva Bejarano	Noelia Nol
Nicola Caon	Jorge A. Prez Prieto
Jose Luis Cervantes	Alexandre Vazdekis (Chair)
Adriana de Lorenzo-Cceres	

8. Number of participants: 180

9. Countries represented (24) :

Argentina	Chile	Hungary	Mexico	Switzerland
Australia	China	India	Netherlands	United Kingdom
Brazil	Denmark	Italy	Russia	USA
Bulgaria	France	Japan	Spain	Venezuela
Canada	Germany	Korea, South	Sweden	

10. Report submitted by: Alexandre Vazdekis (SOC co-chair)
Place and date: La Laguna, Tenerife, Canary Islands, Spain, 8 January 2007

11. Summary of the scientific highlights of IAU Symposium No. 241

General: the conference was attended both modelers (in stellar evolution and stellar populations) and observers. A limited number of reviews (about 12) were given, as well as about 50 contributed talks. There were about 150 poster papers, and 5 poster sessions of 20 minutes each, in which these posters were highlighted. We organized two challenges, where scientists from the community participating in the conference were asked to model a number of pre-defined problems. The solutions were discussed, and by comparing them the audience could get a good idea of the differences between (I) various stellar evolution

models and (II) different stellar population models. Finally, we also organised two sets of three parallel discussion sessions, where in smaller groups people could discuss a number of important problems in the field. There were three main topics: Stellar Model Ingredients, Stellar Population Models, and Stellar Populations in Galaxies (the Milky Way, Resolved Stellar Populations in Nearby Galaxies, Unresolved Stellar Populations in Nearby Galaxies and Unresolved Stellar Populations at Higher Redshift). Here we briefly report on the scientific highlights of each of these topics.

I. Stellar Models and Atmospheres.
There were invited reviews by *Cassisi* about low mass stars, and *Meynet* about high mass stars. A stellar evolution challenge was held, led by *Weiss*, where participants were asked to calculate the evolution of a number of low mass stars with different compositions, while it was assured that the same physics was used. The specifications of the models to be calculated had been defined in June 2006 during a workshop at the Lorentz Center in Leiden, which was attended by about 60 participants, 40 of which also attened IAU Symposium No. 241. The conclusion from the challenge was that the various stellar evolution models available in the literature did not differ very much until the beginning of the AGB Phase. However in this symposium it has been shown a significant improvement in the modeling of the Thermally Pulsing AGB regime, leading to a better agreement between different modeling approaches.
For high mass stars the situation is very different. Here *Meynet* showed that including rotation into the models changes considerably the properties of stars in the HR Diagram. The Geneva group will come with a new version of their model calculations in the year 2007.
There was also considerable discussion about theoretical spectra. By now theoretical spectra are much better than before due to our improved knowledge of stellar atmosphere physics, faster computers and larger opacity tables. A review was given by *Gustafsson*, who advertised the MARCS models that are available from Uppsala. In some ranges of the spectrum these theoretical spectra can reproduce observed ones. *Gustafsson* indicated for what analyses of stellar populations in galaxies the new theoretical spectra can be used, and when they should be avoided. New theoretical stellar libraries taking into account non solar element abundance ratios were presented (e.g., *Martins*). Finally a number of empirical stellar libraries at moderately high spectral resolution were presented as well (e.g., *Prugniel*). These libraries have been constructed specifically to feed stellar population synthesis models. Stellar spectra from the bulge and bulge-like stars, with non solar element ratios, were also shown during the symposium (e.g., *Zoccali, Pompeia, Barbuy*).

II. Stellar Population Models.
There has been a stellar population challenge, led by *Trager*, to test whether modern, off-the-shelf stellar population model ingredients (stellar evolution models, stellar atmosphere models and observations) could be combined to accurately reproduce colour-magnitude diagrams and low-resolution spectra of well-studied local objects. The results here were more discrepant than for the stellar evolution challenge, mainly as a result of the age-metallicity degeneracy. Also, the population synthesis method used biases the results, unless the observations cover a large range in wavelength. The results of this challenge, as well as the ones from the stellar evolution challenge, will be published in the proceedings, and possibly also in a refereed journal.
It was clear that the stellar population models have improved significantly mainly due to the availability of new empirical high-quality libraries such as e.g., MILES or ELODIE. In the near future new high spectral resolution libraries will be available, such as UVES and near-infrared libraries. Various models (e.g., *Bruzual & Charlot*) will include theoretical stellar libraries as well. An important aspect, which has been extensively discussed, is how to obtain accurate abundances from the integrated light of galaxies. It has been reported significant progress in building-up stellar population synthesis models with variable abundance ratios, but we are still quite far away from achieving self-consistent predictions. A discussion session was dedicated to this topic. The inclusion in the models of an accurate AGB phase is an important step, especially for the near-IR. This stellar evolution stage is particularly difficult to model, given the uncertain mass loss in this phase. New observations of asymptotic giant branc h stars within Local Group galaxies like the Magellanic Clouds, NGC 6822, M33 and SagDIG can be used to constrain these models, as well as new theoretical efforts such as the one of the Padova group. One of the discussion session was dedicated to this topic.
Finally, it is worth noting that is encouraging to see that calibrating these models against simple stellar populations, which are represented by stellar clusters, is becoming a common practice.

III. Observations
A large fraction of the meeting was dedicated to new observational results, coming from large ground and space-based telescopes. A number of talks (*Reddy, Holmberg, Zoccali, Tolstoy*) presented new results on abundance ratios of stars, in the Milky Way and in Local Group Galaxies. Since the abundance ratio

distribution is mainly determined by the evolution of a galaxy, they offer a very powerful way to derive the star formation history of galaxies, and to distinguish different groups of stars with different abundance patterns. In fact a very interesting result from this meeting is the identification of at least 5 or 6 stellar populations in our Galaxy. Theoretically, though, the abundance patterns are not fully understood, for example why [O/Mg] decreases with metallicity for high metallicity stars.
One can see progress in all subfields. Better tools are available to analyse colour-magnitude diagrams of Local Group galaxies (*Grebel, Aparicio, Lee, Gallart, Skillman*), which themselves are better than ever. All the results shown here have shown that the haloes of the Milky Way and M31 are significantly different. Another interesting result is the finding of many substructures (e.g., clumps, tails). For nearby elliptical galaxies is interesting to mention the result of *Bressan*'s group, who shows that a combination of optical spectra and *Spitzer* photometry or spectroscopy can break the age-metallicity degeneracy that hampers the analysis of the optical spectra. Another result is that is becoming unambiguously clear that age and metallicity are correlated, both increasing with galaxy mass. Various groups are starting to find that there are also clear trends in abundance ratios as a function of galaxy e nvironment, mass, etc.
There was a session devoted to extragalactic globular cluster systems, showing that most of these clusters were significantly old. New abundance ratios such as C and N were presented as well. For spiral galaxies there are two results that are interesting to mention. In the first place the ubiquity of inner disks in spiral galaxies (Falcón-Barroso), that can be seen very well in SAURON integral field spectroscopy. There were several talks about this topic, also about inner components in elliptical galaxies. The second result is the fact that nuclear star clusters in the center of spiral galaxies are so common (*van der Marel*). It is likely that the presence of a central black hole is somehow related to this central star cluster.
The last session included a talk by *Gallazzi*, who showed, from the analysis of tens of thousands of galaxies from the SDSS spectroscopic survey, that large elliptical galaxies form before their smaller counterparts, an effect called downsizing. This effect, seemingly in contradiction with standard CDM theory, is now well-established observationally, and needs to be addressed carefully in galaxy formation models. The conference was closed with three excellent talks: by *Bland-Hawthorn*, mainly about future instrumentation that would be beneficiary for stellar population studies, a status report by *Rodriguez-Espinosa* about the GTC 10.4m telescope, which will see first light in early 2007 on La Palma, and the conference summary, where *Renzini* gave an excellent report of what had been discussed from 10-14 December during the IAU Symposium No. 241.

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Proceedings:
A. Vazdekis & R.F. Peletier (eds.), 2007,
Stellar Populations as Building Blocks of Galaxies,
Proc. IAU Symp. No. 241, La Palma, Canary Islands, Spain, 10-14 December 2006,
(Cambridge:CUP) ISBN: 0-521-86350-3, due June 2007.
e-book: `http://journals.cambridge.org/action/displayJournal?jid=IAU`

Table 1: **2006 IAU MEETING STATISTICS**

IAU meeting	number of participants	from countries	total grant awarded (CHF)	number of recipients	from countries
S233	223	33	25 000.–	64	19
S234	149	18	25 000.–	31	13
S235	808	53	25 000.–		
S236	396	56	25 000.–		
S237	490	43	25 000.–		
S238	175	22	25 000.–		
S239	300	43	25 000.–		
S240	498	54	25 000.–		
S241	180	24	25 000.–	46	18
total	3219		225 000.–		

IAU	**S233**	**S234**	**GA XXVI**	**S241**	**TOTAL**	DUES	G/D
Host	Egypt	USA	Czech Rep.	Spain		2006	
Albania			650		650	-	
Algeria	735		1958		2693	-	
Argentina			18335	1630	19965	7160	2.8
Armenia			4950		4950	3580	1.4
Australia		1630	8680	375	10685	21480	0.5
Austria			3660		3660	3580	1.0
Azerbaijan			1500		1500	-	
Belaruss			915		915	-	
Belgium	740		3540		4280	21480	0.2
Bolivia					-	1790	
Bosnia & H.			1800		1800	-	
Brazil	1210	815	22650	3561	28236	7160	3.9
Bulgaria	470		2215	1062	3747	3580	1.0
Canada			7215	375	7590	35800	0.2
Chile		2445	2570	750	5765	3580	1.6
China Nanjing	4370		19940	2499	26809	35800	0.7
China Taipei		1630	900		2530	3580	0.7
Colombia			1280		1280	-	
Costa Rica					-	-	
Croatia	470		1880		2350	3580	0.7
Cuba (Susp.)			5400		5400	1790	3.0
Czech Rep.	470		2980		3450	7160	0.5
Denmark			2215		2215	14320	0.2
Egypt	3910		650		4560	14320	0.3
Estonia			2980		2980	3580	0.8
Finland			1715		1715	7160	0.2
France	805		19050	375	20230	71600	0.3
Georgia	270		2200		2470	-	
Germany	810	1223	26160	750	28943	71600	0.4
Greece			7980		7980	14320	0.6
Honduras			3000		3000	-	
Hungaria			1300		1300	7160	0.2
Iceland					-	3580	
India	670	2038	22360	2061	27129	21480	1.3
Indonesia			2270		2270	3580	0.6
Iran			3480		3480	3580	1.0
Ireland					-	3580	
Israel			4550		4550	7160	0.6
Italy		2174	23610	5373	31157	35800	0.9

(cont'd)

IAU	**S233**	**S234**	**GA XXVI**	**S241**	**TOTAL**	DUES	G/D
Host	Egypt	USA	Czech Rep.	Spain		2006	
Japan			4700		4700	71600	0.1
Jordan					-	-	
Kenia			3700		3700	-	
Latvia			3135		3135	3580	0.9
Lithuania			400		400	3580	0.1
Macedonia, FRY			1900		1900	-	
Malaysia			915		915	1790	0.5
Mexico		1630	7565		9195	7160	1.3
Morocco			1830		1830	1790	1.0
Nepal			2715		2715	-	
Netherlands			8990		8990	21480	0.4
New Zealand			7150		7150	3580	2.0
Nigeria					-	3580	
Peru			4825		4825	1790	2.7
Philippines			1400		1400	1790	0.8
Poland	740	815	3980		5535	14320	0.4
Portugal			3865		3865	7160	0.5
Romania	470		2715		3185	3580	0.9
Russian Fed.	5775		70600	1749	78124	35800	2.2
Serbia & M.			9475		9475	3580	2.6
Slovakia			3295		3295	3580	0.9
South Africa			3215	687	3902	14320	0.3
South Korea			2480	1374	3854	3580	1.1
Spain		3669	8745	375	12789	21480	0.6
Sweden			6286		6286	14320	0.4
Switzerland					-	14320	
Tajikistan					-	3580	
Thailand			1500		1500	-	
Turkey			4150		4150	3580	1.2
UK	1010	3260	20412		24682	71600	0.3
Ukraine	735		30655		31390	7160	4.4
Uruguay (Susp.)			4660		4660	3580	1.3
USA	740	2853	50190	375	54158	125300	0.4
Uzbekistan			3900		3900	-	
Vatiacan C.S.					-	3580	
Venezuela	670	815	5430	1630	8545	3580	2.4
VietNam			5000		5000	-	
TOTAL	25 000	25 000	526 316	25 000	601 316	923 640	0.7