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FIRST STAFF ARRIVALS AT THE CADARACHE JOINT WORK SITE

On 30 January 2006 the first staff began working at the Cadarache Joint Work Site (JWS).

Among the first arrivals are members of the Safety, Environment and Health Group, who are charged to prepare the necessary license applications in close cooperation with the host. Other arrivals include members of the Nuclear Technology Division and Site Buildings and Assembly Group charged with the preparations for initial construction work. A branch of the Configuration Management Group, Design Integration Division, has also been installed at Cadarache. The acting Head of the JWS is Eisuke Tada who was previously acting Head at Naka, where Neil Mitchell has taken over the position.

As the year goes on there will be new recruits to the project as well as colleagues of other areas from the JWSs in Garching and Naka. Nominee Director-General Kaname Ikeda expects to start work on-site on 12 March.

J-P. Girard, E. Tada, A. Maas, J. How, A. Annicchiarico, J. Sovka and T. Nagahama on their first day at the ITER Cadarache Joint Work Site

IAEA ACTIVITIES IN 2005 IN SUPPORT OF FUSION AND ITER

by Drs. A. Malaquias, G. Mank, both Physics Section, and R. Clark, Nuclear Data Section

Since the late fifties the Agency has been engaged in enhancing international collaboration in plasma physics and fusion research by facilitating technical information exchange, promoting new applications, and helping developing Member States strengthen their fusion research programmes. Since the late eighties, the Agency has provided the necessary administrative support for the ITER project and actively collaborated in the different phases of development (CDA, EDA, CTA and ITA) through: i) publication support, including the ITER Newsletter and the ITER Documentation Series; ii) providing common ground and moderation for ITER high level meetings, iii) sponsoring the establishment of the Expert Groups and later the ITPA Topical Groups, actions advised by the IAEA International Fusion Research Council (IFRC) and iv) through various Technical Meetings and implementation of a number of Coordinated Research Projects on fusion.

On 28 June 2005, nuclear fusion energy research took a major step forward towards the future use of fusion energy, with the signing of the joint declaration by all parties to the ITER negotiations. The ITER Joint Work Site in Cadarache was inaugurated on Thursday 15 December 2005. At this ceremony, Dr. W. Burkart, Deputy Director General of the IAEA, spoke of an historic event, in an historic year for the IAEA, and expressed his satisfaction at the progress in the ITER project.

Therefore, it is a timely opportunity to summarize the activities the Agency has been engaged in during 2005 in support of Member States' fusion programmes for magnetic as well as inertial confinement approaches.

Technical Meetings

Technical Meetings (TM) serve several proposes: i) opportunities for the exchange of expertise and for discussions on specific research topics to an extent and detail not covered by other meetings ii) support of the involvement of developing member states and their contributions to main stream fusion research iii) promotion and consolidation of the exchange of information between scientists supported through the Coordinated Research Projects, as well as other scientists working in related topics, and iv) dissemination of scientific information through publication of TM proceedings. TMs are organized on the basis of contributed and invited papers that have been evaluated by an International Advisory Committee of recognized experts on the topics of the meeting. Twelve TMs were organized during 2005, and the list of meetings is given in Table I.

In addition to the TM proceedings edited by the IAEA, many of the contributed papers are revised and submitted to a refereed journal, ensuring high scientific levels of distributed material. A summary is prepared for most of the TMs by the Chair of the IAC to be submitted to the journal *Nuclear Fusion*, in which the present status of each research topic presented at the meeting is summarized. The importance of the TMs is visible by the attendance levels, over 650 scientists from more than 35 countries in 2005. Many participants in Coordinated Research Projects (CRP) also contribute to the TMs with research work that is supported by the Agency, and represents an important input stream to fusion research.

Coordinated Research Projects

Seven CRPs related to fusion research were active in 2005:

i) "Research Using Small Tokamaks";
ii) "Dense Magnetized Plasmas";
iii) "Data for Molecular Processes in Edge Plasmas" was concluded in 2005;
iv) "Atomic and Molecular Data for Fusion Plasma Diagnostics" was concluded in 2005;
v) "Atomic and Molecular Data for Plasma Modeling" was initiated in 2005;
vi) "Atomic Data for Heavy Element Impurities in Fusion Reactors" was initiated in 2005;
vii) "Tritium Inventory in Fusion Reactors" continues through 2006.

A new CRP on "Pathways to Energy from Inertial Fusion – an integrated approach" is also planned for initiation in 2006.

Table I – List of Agency TMs held in 2005 - some publications are under revision/editing process.

Title	**Date**	**Place**	**participants**	**countries**	**publication of contributions**
4th IAEA TM on Steady State Operation of Fusion Devices	(1-5)/2	Gandhinagar	88	9	Nuclear Fusion
2nd IAEA TM on Theory of Plasmas Instabilities: Transport, Stability and their interaction	(2-4)/3	Trieste	49	20	IAEA proceedings, Physics of Plasmas
3rd IAEA TM on ERCH Physics and Technology for ITER	(2-4)/5	Como	64	16	Journal of Physics: Conference Series
4th IAEA TM on Negative Ion Beam Neutral beam Injection	(9-11)/5	Padova	58	7	Nuclear Fusion, IAEA proceedings
Assess Data Relevant to Spectral Analysis for Fusion Plasmas	(13-14)/6	Vienna	12	8	INDC(NDS) Summary Report
1st IAEA TM on “First Generation of Fusion Power Plant - Design and Technology”	(5-7)/7	Vienna	43	17	IAEA proceedings
5th IAEA TM on Control, Data Acquisition and Remote participation for Fusion Research	(11-13)/7	Budapest	88	18	Fusion Engineering and Design
10th IAEA TM on H-mode Physics and Transport Barriers	(28-30)/9	St. Petersburg	98	15	Plasma Physics and Controlled Fusion
3rd IAEA TM on Spherical Tori	(3-5)/10	St. Petersburg	55	7	Nuclear Fusion, IAEA Proceedings
9th IAEA TM on Energetic Particles in Magnetic Confinement Systems	(9-11)/11	Takayama	60	10	Nuclear Fusion, IAEA Proceedings
2nd IAEA TM on Innovative Concepts and Theory of Stellarators	(10-11)/11	Madrid	27	10	Unpublished CD compilation
16th IAEA TM on Research Using of Small Fusion Devices	30/11-2/12	Mexico City	34	15	AIP Conference Proceedings Series

A Research Coordination Meeting (RCM) for the CRP on "Dense Magnetized Plasmas" was held in June at Kudova Zdroj, in Poland. This meeting served to review the CRP progress over the last 3.5 years and plan future networking activities aimed at encouraging joint publication of research results. Contributions to the meeting were submitted to the refereed journal *Nukleonika* for publication as a special issue. The support of the Agency in the pursuit of this research topic in a coordinated way has helped to attain some visible outcomes in the international community, for example the creation of a Plasma Focus laboratory at the International Center for Theoretical Physics (ICTP) for education purposes and information exchange, the award of a Technical Cooperation project to one of the CRP participants and the establishment of new collaborations with other public and private entities.

Under the CRP on "Research Using Small Tokamaks" a Joint Experiment was coordinated by the IAEA, sponsored by the ICTP, and hosted by the IPP, Prague. Over a two-week period, 25 scientists from ten countries developed research plans to study topics of plasma edge turbulence and plasma confinement, benefiting from the exchange of international expertise. An additional goal was the development of tools for remote participation and data exchange. Three papers are under preparation for submission to a refereed journal. The CRP web page (www.fusion.org.uk/iaeacrp) is being developed to facilitate experimental data exchange, including data from this Joint Experiment and one planned for 2006 at the Kurchatov Institute, Moscow (T-10).

The CRPs on "Data for Molecular Processes in Edge Plasmas" and "Atomic and Molecular Data for Fusion Plasma Diagnostics" concluded in 2005. Each CRP added significant basic atomic and molecular data relevant to fusion energy research. The data have been incorporated into complex modeling codes for fusion research. In addition, each CRP will result in an issue of the journal *Atomic and Plasma-Material Interaction Data for Fusion* (APID) summarizing the work of the CRPs.

The CRP on "Tritium Inventory in Fusion Reactors" has been extended through 2006 with a final RCM planned for September 2006. A number of very active collaborations have arisen in this CRP with exchange of materials among different laboratories for measurements of tritium content and efficiencies of detritiation methods. Final results from the 2006 RCM will be published in an issue of the APID.

Two new CRPs were initiated in 2005 on the topics of "Atomic and Molecular Data for Plasma Modeling" and "Atomic Data for Heavy Element Impurities in Fusion Reactors". Initial RCMs were held for these CRPs in 2005, at which reviews of existing data were carried out. Priorities for generation of new data were set and detailed work plans formulated for carrying out the goals of the CRPs.

During 2005, CRPs have gathered 67 Institutions from 28 Member States.

Consultancies
Two fusion Consultancy Meetings were held at the IAEA headquarters, one on "Q.A. Issues for Superconducting Magnet Manufacture" and one on the "Pathways to Energy from Inertial Fusion – an integrated approach", the later in support of the plan for the new CRP on the topic of Inertial Fusion.

Technical Cooperation
A Technical Cooperation (TC) project in Poland, "Laboratory for material testing based on plasma-focus", was initiated in 2005 and is planned to continue for a period of two years. The Agency support is mainly towards human resources build-up and exchange of expertise. Two workshops, a joint experiment and two scientific visits have been successfully organized under the framework of this activity, and two fellowships have been implemented in Italy and Germany as host countries. The follow-up of these activities resulted in strong international links and a consortium was established among five countries for material testing and exploring facilities to carry out comparative investigations of different materials subject to heavy plasma and radiation exposure. It is expected that such investigations will allow a more complete picture of the effects of such loads on materials' properties relevant to applications in a fusion reactor.

International Fusion Research Council
The International Fusion Research Council (IFRC), an advisory body to the IAEA, meets yearly to recommend and approve the plans of fusion TMs. This year the meeting was held at the Agency Headquarters in June

and the plan of technical meetings for 2006-07 was approved. This list comprises a total of 9 TMs. The FEC2006 topics arrangement was also reviewed to reflect the latest developments on ITER.

A "Status Report on Fusion Research" including the most prominent achievements in controlled nuclear fusion research was prepared by the IFRC and its Chair and published in the Nuclear Fusion Journal in 2005 (*Nuclear Fusion **45*** (2005) A1-A28). This report summarizes the progress in fusion research during the last decade framed in the future energy needs for mankind to be satisfied through an environmentally friendly fusion based approach.

A Subcommittee of the IFRC on Atomic and Molecular (A+M) Data for Fusion meets every two years. The Subcommittee recommends CRPs and TMs for the Atomic and Molecular Data Unit of the Nuclear Data Section. The next meeting will take place in April 2006.

Collaborations and other events
ICTP Collaboration on fusion activities during 2005 included co-organization of the 2nd TM on Theory of Plasma Instabilities, the Joint Experiment at CASTOR (Prague) and the Workshop on Plasma Physics "Capacity Building in Plasma Applications and Diagnostic Techniques". 126 participants from 38 countries were included in these activities.

Collaboration with the International Energy Agency continues at a high level through membership in the Fusion Power Coordination Committee of the IEA.

The Agency sponsored the Second International Conference on the Frontiers of Plasma Physics and Technology held in Goa last February. This conference gathered about 75 participants from the fields of magnetic confinement, inertial confinement, dense plasmas and specialists from the plasma physics community in general. It was seen as a multidisciplinary forum that would foster the exchange of ideas among scientists on different applications of plasma physics.

The World Year of Physics was celebrated at the Scientific Forum during the Agency General Conference. This forum gathered eminent personalities on Physics who addressed the trends and progress on Nuclear Science. Fusion was visibly included in the programme in a Keynote contribution: "Fusion: Key Issues".

About 800 scientists from about 40 countries have been involved in the Agency fusion activities during 2005. It is recognized that fusion has the potential to play a key role in pursuing the path of peaceful nuclear energy for mankind.

Nobel Peace Price 2005
In pursuing its mandate, the Agency has been recognized in 2005 by the award of the Nobel Peace Price to its Director General, Mohamed ElBaradei and to its Staff.

The Physics Section website can be accessed in: http://www-naweb.iaea.org/napc/physics/ps/index.htm

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