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# newsletter

EUROPEAN FUSION DEVELOPMENT AGREEMENT

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## ITER project gets go ahead



The signatories of the ITER Agreement: Vladimir Travin (Deputy head of the Federal Atomic Energy Agency (Rosatom), Russian Federation), Takeshi Iwaya (Vice-Minister for Foreign Affairs, Japan), Xu Guanhua (Minister of Science and Technology, People's Republic of China), José Manuel Barroso (President of the European Commission, EU), Jacques Chirac (President of the French Republic), Woo Sik Kim (Vice Prime-Minister, Ministry of Science and Technology, Korea), Anil Kakodhar (Secretary to the Government of India, Department of Atomic Energy), Raymond Orbach (Under Secretary for Science, Department of Energy, U.S.A.), and Janez Potočnik (European Commissioner for Science and Research).

### "Exceptional in every way"

No doubt, the 21st of November 2006 was a memorable moment in the history of science. On that day at the Elysée Palace in Paris, the ITER Agreement was signed by the Ministers of the seven ITER-Parties, the European Union, China, India, Japan, the Russian Federation, the United States of America and the Republic of Korea.

"With this signature, we take a new step on an adventure that is exceptional in every way", the President of the French Republic and host of the signing ceremony, Jacques Chirac, said. "Exceptional for its scientific ambition: to harness the sun's power to take up the challenge of ecological energy. And exceptional for its international scale: the unprecedented association of seven major partners from the North to the South. It is the hand held out to future generations, in the name of solidarity and responsibility", Chirac said in his opening speech.

Also present at the ceremony was the President of the European Commission, José Manuel Durão Barroso, who stressed Europe's determination to assume its responsibilities in this project. "Celebrating ITER's birthday demonstrates the strength of a united Europe", Barroso said. And with regard to the remorselessly growing energy demand and the climate change accelerating dangerously, the President of the EU-Commission added: "The stakes are high - not to say vital for our planet".

With the signature of the Agreement and the first ITER Council meeting the same day, the ITER Organization can start its operation on a provisional basis pending the entry into force of the agreement which is expected in the course of 2007. In a personal statement, ITER Director General Nominee Kaname Ikeda added: "With the accomplishment of today's meeting, the ITER Organization is able to embark on its mission, as a worldwide international cooperation, to help create a new source of energy for humankind".

Read all the speeches at [www.iter.org](http://www.iter.org)

## Agenda for the future

On the 27th of October, the EFDA Steering Committee convened in Padova, Italy, to discuss the agenda for the near future. Among the topics discussed was the revision of the EFDA Agreement which shall accompany the setting-up of the new Joint Undertaking for ITER in Barcelona. EFDA will increase its role in coordinating activities in associations. According to the EFDA Leader Jérôme Pamela, a draft of the new agreement should be ready by March 2007. Also, decisions were made regarding the 2007 workprogramme JET and the EU's involvement in the ITER design review. It was also agreed that JET hosts the next "Science on stage" 2008 in Oxford.

## Materials Workshop Greifswald

The lecture hall in the Max Planck Institute in Greifswald was crowded like never before. Instead of the usual 80 participants, more than 155 researchers from 23 countries wanted to participate in the 11th International Workshop on Plasma-Facing Materials and Components for Fusion Applications. Over the following three days, 64 posters were presented and 24 oral presentations given on the latest results in the field of materials for fusion applications, such as tritium retention and requirements for removal techniques, transient heat loads in current fusion experiments, R & D improvements on tungsten materials and the manufacture of beryllium coatings.

Guy Matthews, responsible for the ITER-like Wall Project at JET, stressed the importance of the workshop: "We understand the problems better now. There is lot of good work presented here. Work on new materials, bonding, fatigue - all the related technology issues. The scale of it shows how relevant the topic is, now that ITER construction is imminent. It has grown by about a factor two since the last workshop and I think it puts emphasis on the fact that when building a big machine like ITER, all the technology issues become much more important than in the past, when people were more interested in plasma physics problems. Now we are really going to build the machine. The whole reliability of the first wall, the water cooling, are first and foremost in everyone's mind. Certainly, it is these things that will determine more than anything else whether ITER is successful or not. Maintainability and reliability is going to be decisive if ITER is going to be a success."

## Fusion Community meets in China

*Prof. Hartmut Zohm*

Every two years, the international fusion community comes together to discuss its latest scientific and technical results. This year, from 16-22 October, the IAEA Fusion Energy Conference was held in Chengdu, China. The timing was fortunate, as the new chinese superconducting tokamak EAST had just produced its first plasmas a few days prior to the conference. All together, 68 contributions on ITER design and technologies were presented, another 67 on fusion technology in general. The general impression was that the design and R&D activities in preparation to the ITER construction as well as reactor technology R&D in the field of Test Blanket Modules have been steadily progressing, providing good confidence for their realization in ITER.

In Fusion Technology, there were papers related to the overall status of new machines (11), reactor design (11), materials (10), blanket and neutronics (14) and plasma facing components (7). The new machines in construction or commissioning phase are four superconducting tokamaks in Asia: EAST in China, SST-1 in India (construction and assembly completed), KSTAR in Korea (commissioning will start in the middle of 2007) and JT-60SA in Japan (construction will start in 2007); and two stellarators Wendelstein 7-X in Germany and NCSX in the USA which are both in the construction phase.

In the physics area, several highlights were discussed. Understanding of turbulent transport has gained considerably from joint progress in theory and experiment, with clear evidence for zonal flows and Geodesic Acoustic Modes being a highlight of results presented at the conference. The retention of hydrogenic fuel is now a focal point of plasma wall interaction studies and the assessment of alternative wall materials and detritiation techniques is ongoing. Bursty scrape-off layer transport is another important area, being observed in L-mode, H-mode and during edge localized modes (ELMs). In the area of fast particle physics, many new diagnostic techniques were shown and a focus is now the study of the redistribution of fast particles by magneto-hydrodynamic (MHD) modes and turbulence, since this may not only affect alpha-heating, but also current drive by neutral beam injection.



11th International Workshop on Plasma-Facing Materials and Components for Fusion Applications at the IPP Greifswald



Dr. Wolfgang Jacob, organizer of the workshop, climbing the Stellarator-Mock-Up at the IPP.

tion. A very interesting result on MHD stability was the observation that resistive wall modes can be rotationally stabilised at much lower rotation than found previously if the ambient error field is minimised carefully. Last but not least, increasingly sophisticated control systems are profiting from the advances made in the different fields by integrating them into operational scenarii that promise higher performance than the standard ELMy H-mode.

Also during the conference, TC Luce *et al.* were awarded the inaugural 'Nuclear Fusion' award for their paper *Stationary high-performance discharges in the DIII-D tokamak* (Nuclear Fusion 43 (5), pp. 321-329).

**EU and Russian Federation intensify their collaboration**

On 17 October 2006, an informal meeting took place between representatives of the Commission services and representatives of the fusion programme in the Russian Federation. Valentin Smirnov, head of the Magnetic Fusion Institute in the Kurchatov Research Centre, informed the Commission about recent developments in the Russian fusion programme. Following the successful conclusion of the ITER negotiations and in view of the construction of ITER, the Russian fusion community is presenting to their authorities a proposal to recreate a Russian fusion programme to accompany ITER construction. The indications are that such a programme could be in place in 2008. The two partners would welcome a closer cooperation in areas such as participating in the exploitation of JET, sharing ITER tasks, and collaboration in technology and DEMO related activities. The next meeting will take place in St. Petersburg in spring 2007. ■

**The Stern Review**

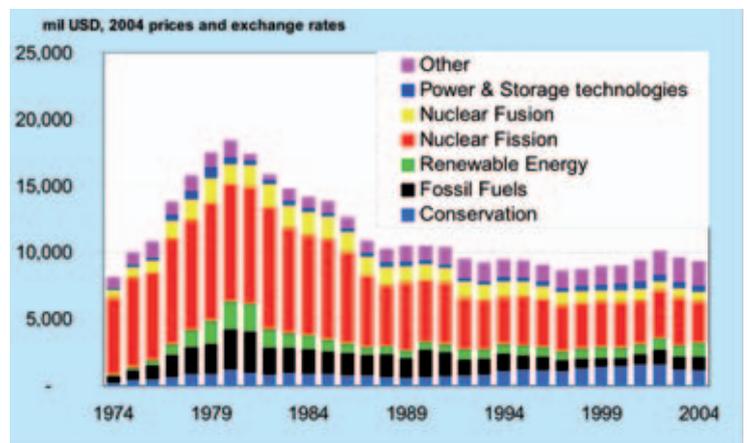


His message is as simple as alarming:  
Sir Nicholas Stern

On the 1st of November 2006, a man stepped forward in a press room in London and addressed the gathered journalists. His message was as simple as alarming: "If society fails to reduce carbon emissions now, damage will become irreversible and its effects disastrous for any life on this planet."

In his 700-page report commissioned by the British Government, Sir Nicholas Stern, former chief economist at the World Bank, stresses that it would not only save lives, but that it would also make "good economic sense" to tackle global warming immediately. If mankind continued to pump up the atmosphere, the economic impacts could cost more than 5,5 trillion Euros, Stern stressed. But the task is manageable, the author says. "We can grow and be green."

Read the full report at [http://www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/stern\\_review\\_report.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm)



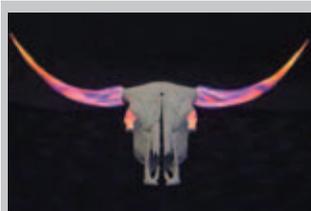
Public energy R&D in IEA countries (fig 16.8 from the Stern Report)



Highlighting Austria's contribution to the field of fusion: Fusion Expo in Innsbruck.

### Fusion Expo Innsbruck

For the first time, the Fusion Expo has been shown in Austria. On the 3rd of November, the exhibition opened in the ICT-Technology Campus at Innsbruck University. More than 6000 visitors, among them more than 50 school classes, took the chance and walked through the exhibition. Guided tours were offered through the interactive presentations giving an overview of fusion research in general and the ITER project. The exhibition also stressed the Austrian contribution to the field of fusion. A most welcome highlight was the "flight through a fusion reactor" and the presentation of another very special exhibition, "Plasma Glass – Light in motion". The Institut für Ionen- und Plasmaphysik at the Leopold Franzens University in Innsbruck has a long tradition in plasma research. In the late 50ies, the young Professor Ferdinand Cap built up a working group on plasma and fusion research, which still represents a pillar of the University's scientific programme.



### Plasma and Art

An artistic view of "plasma facing materials".  
[www.glass-gallery.at](http://www.glass-gallery.at)

### Summer School in Poland

*Jef Ongena*

As in the past years, the International Workshop and School "Towards Fusion Energy – Plasma Physics, Diagnostics, Spin-Offs" was held in charming Kudowa Zdrój (formerly Bad Kudowa). This summer school is organized by the Association EURATOM/Institute of Plasma Physics and Laser Microfusion, Warsaw, and the International Centre for Dense Magnetised Plasmas together with its Czech Branch in Prague.

This time, the venue for the Summer School was the Hotel Bristol in Kudowa Zdrój. A total of 14 invited speakers from fusion research laboratories across Europe, from the European Commission and from leading Plasma Physics Research groups at Institutes and Universities in Europe gave lectures on plasma physics and controlled thermonuclear fusion. In addition, students attending the school gave oral presentations on their own work, covering research results from PF-1000 (Plasma Focus 1000, International Centre for Dense Magnetised Plasmas, Warsaw, Poland), Uran U-3M torsatron (Kharkov Institute of Physics and Technology, Kharkov, Ukraine), gas dynamic trap (GDT, Budker Institute, Academy of Sciences, Novosibirsk), CASTOR tokamak (Institute of Plasma Physics, Prague).

In addition talks were given on the reinstallation of the COMPASS tokamak from UKAEA-Culham to IPP Prague, research results from the X-ray crystal spectrometer at JET, theoretical studies in plasma physics at the University of Szczecin and studies on capillary discharges and laser generated pulsed plasmas.

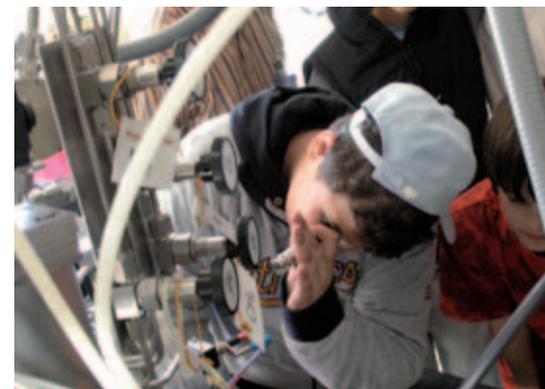
Participants of the 6th Kudowa Summer School



Not only for boys: Young female students at the Fusion Expo in Wrocław.

### Fusion Expo in Wrocław

The opening of the Fusion Expo on 12 September in the New Electricity Department building of the Wrocław University of Technology doubled as the opening of the Lower Silesian Science Festival. Over the two-week period of the expo more than 3,200 people came to see it, including a large number of high school students. This demonstrates the high value of the expo as a tool for public information. In the last 4 years it has been exhibited in five Polish cities (Gdansk, Poznan, Krakow, Warsaw, and Wrocław). The science festival was coordinated by Andrzej Zaleski, who leads a research group which has been carrying out EFDA technology tasks in the superconducting magnet area. The growing success of the festival demonstrates the emphasis placed on science in the region.



### Fusion through the keyhole

On 15 October, the Institut für Plasmaphysik (IPP) in Garching, together with other institutes on the campus, opened its doors to the public. More than 4000 visitors took the chance to have a look into the labs and into ASDEX Upgrade. Special programmes took care of the very young guests, who could participate in various experiments or join in one of the tours and get a first glimpse of a plasma.

### In Memoriam

Prof. Dr. Hannspeter Winter, Director of the Institut für Allgemeine Physik of the Vienna University for Technology and Head of Research Unit of the Association EURATOM-ÖAW, died suddenly and unexpectedly on 8 November 2006.



Prof. Hannspeter Winter was born in 1941 in Wels, Austria. He was a highly respected scientist and a science manager with international reputation. His academic fields of

work were plasma physics, thermonuclear fusion, atomic and molecular collisions and spectroscopy, ion physics and surface physics. He was a member of a large number of committees dealing with university management and quality assurance and an expert for EU research programmes. He published more than 270 articles in international refereed scientific journals and was invited as a lecturer to many research institutes and international conferences.

In 1996, Prof. Hannspeter Winter was appointed Head of Research Unit of the then newly established Association EURATOM-ÖAW. He supported all participating research groups with his strong commitment and guided the researchers of the Association EURATOM-ÖAW to internationally acknowledged results. The Association EURATOM-ÖAW has lost not only its Head of Research Unit, but also a highly respected leader, colleague and teacher. His expertise, constructive ideas and his optimistic and charismatic personality will be greatly missed.

Professor Harald W. Weber from the Atominstitut in Vienna has been designated to take over as Head of Research Unit.

### Dr. Barry Green retires

After 40 years of working in fusion research and development, from the University of Sydney, the Plasma Physics Laboratory of the Princeton University, the Max-Planck Institute for Plasmaphysik in Garching, the JET Design Team, the JET Joint Undertaking, the ITER Design Team of the Engineering Design Activities and now DG Research in the Unit "Contracts of Fusion Associations" in Brussels, Barry Green has reached the compulsory age of retirement. Barry and his wife will return to Australia. But, he promised "to keep a close eye on the exciting developments in the fusion programme both international and EURATOM", for which he has worked as a Commission employee for more than 28 years.



Over the past few years, Barry has played a key role in developing the fusion activities among the new EU member states and involving their institutes in our programme. The

EFDA Leaders and the EFDA staff thank him for his cooperation and wish him all the best for the future.

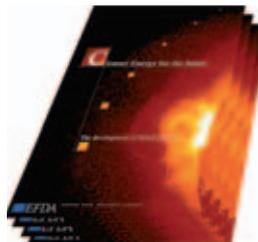
### Jobs at the EU Domestic Agency for ITER

The second call for expressions of interest for the "European Joint Undertaking for ITER and the Development of Fusion Energy", the EU Domestic Agency for ITER, has been published for various profiles.

For further information see <http://ec.europa.eu/research/fusion-for-energy.html>

### More Cleaner Energy

Already available in English, German and Polish, the Cleaner Energy Brochure is now also available in Czech. Within 2007, more versions will become available in Dutch, French, Finnish, Hungarian, Italian, Latvian, Slovenian, Portuguese, Spanish and Catalan.



Outstanding scientists: Klaus Hallatschek (right) with other EURYI Award Winners.

### Young Investigator Award to IPP scientist

*Isabella Milch*

Physicist Dr. Klaus Hallatschek of the Max Planck Institute for Plasma Physics (IPP) in Garching is one of 24 outstanding young scientists from eleven European countries that have been honored with the European Young Investigator Award (EURYI Award) worth about one million euros each. The EURYI Award is intended to give young scientists the opportunity to set up their own groups of young investigators at European research institutions of their choice. Klaus Hallatschek (born in Augsburg in 1970) works on the theory of plasma turbulence. In fusion experiments it is possible to observe turbulent plasma states in which extensive shear flows, so-called zonal flows, develop from small disorderly eddies. Klaus Hallatschek has succeeded in describing such effects by means of powerful computers. From the determination of their dynamic properties he hopes to clarify their long-term behavior and the associated state changes of the turbulence. ■

### Three New Associations

Barry J. Green, DG Research, EC

From 1 January 2007, Bulgaria, Lithuania and Slovakia will become new members of the EURATOM fusion programme, raising the total number of European fusion Associations up to 27.

In July 2006, the CCE-FU recommended that the Commission pursue negotiations with the appropriate partners in Bulgaria, Lithuania and Slovakia, with a view to placing Contracts of Association with them. The new Associations are the Institute of Nuclear Research and Nuclear Energy (Bulgarian Academy of Sciences) or INRNE in Sofia, Bulgaria, the Lithuanian Energy Institute (LEI) in Kaunas, Lithuania, and the Comenius University (CU) in Bratislava, Slovakia. The Contracts will come into effect on 1 January 2007. Then, as soon as the trans-national research units in Cyprus, Estonia and Malta are integrated in the existing Associations with the Hellenic Republic, TEKES and ENEA respectively, all the 27 member states of the EU and Switzerland will be formally involved in the EURATOM fusion programme. Although these three new Associations do not yet formally exist, "kick-off" meetings were held in November.

#### Bulgaria

November 10 in Bulgaria is a date that is of great significance for Bulgaria because 17 years ago (1989) this was the day that democracy replaced the previous totalitarian system. On the same date in 2006 there was also a new beginning, this time for Bulgarian researchers who wish to participate in the EURATOM fusion programme. The "kick-off" meeting of the new Association EURATOM/Institute of Nuclear Research and Nuclear Energy (Bulgarian Academy of Sciences (BAS)), the INRNE, took place in the institute in Sofia, where the Director of the INRNE, Dr. Stamenov, signed the Contract of Association.

During the meeting, the steering committee members of the Association and the Commission have been nominated and the work programme and mobility plan



Writing history: M. Mateev (University of Sofia), E. Vitkova (Deputy Minister, Ministry of Education and Science), N. Sabotinov (Vice President of the Bulgarian Academy of Sciences), J. Stamenov (Director of the INRNE), T. Troev (INRNE), B. Green (EC, obscured), S. Booth (EC), Y. Capouet (EC), E. Rille (EC), from left to right.

for 2007 were discussed. This contract will now be signed in December by the European Commission so that the Association will formally exist as from 1 January 2007.

Bulgaria has been associated with the EURATOM fusion programme since 2000, contributing by means of cost-sharing actions (limited duration contracts for specific work). Since that time Bulgarian researchers have had eight such cost-sharing actions, four in the EFDA technology programme (three involving neutronics, calculations for the ITER and DEMO blankets, and one assessing the technique of positron lifetime diagnosis of neutron irradiation damage in materials) and four in physics (two related to the production of negative ions in relation to the source for the ITER neutral beams, one involving PIC calculations of ELM-produced particle and energy pulses and their effect on the SOL, and one carrying out improved numerical modeling of gyrotron operation).

#### Lithuania

On November 15, the Lithuanian Energy Institute (LEI) became a new EURATOM Association. In the institute in Kaunas, the Director Dr. E. Uspuras signed the Contract of Association. Before its accession to the European Union in May 2004, Lithuania was not associated with EURATOM. However, from this time Lithuanian researchers have been active and in 2005 they managed to be successful in three EFDA technology calls for proposals so that they now participate by means of cost-sharing actions. These involve a safety study, the



The Lithuanian participants: L. Pranevicius (Vytautas Magnus University), Z. Rudzikas (President of the Lithuanian Academy of Sciences), Y. Capouet (European Commission), B. Green (European Commission), E. Uspuras (Director of the LEI), A. Zalys (Ministry of Education and Science), S. Rimkevicius (LEI).

design and analysis of the inboard rail of the ITER divertor cassette, and the characterisation of W-coatings for fusion applications. Physics tasks (calculation of the cross-sections of atomic processes useful for plasma diagnostics) were delayed until the start of the new Association.

#### Slovakia

The third "kick-off" meeting of the new Association EURATOM/Comenius University (CU) took place on November 13 in the Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava. Before its accession to the European Union in May 2004, Slovakia had been associated with EURATOM, and Slovakian researchers have participated in the fusion programme since 2000 by means of cost-sharing actions. Three of these were in physics in the area of plasma-wall interaction, and seven technology contracts in the fields of superconductor testing and development, studies on the radiation damage of materials using positron annihilation techniques and neutronics analysis of the diagnostic equatorial and upper plug blanket modules for ITER. The work programme 2007 will build on this expertise in plasma-wall interaction studies, superconductor development, the study of radiation damage of materials and neutronics. ■



The Slovakian „Kick-Off“ Meeting: Standing from left to right; J. Skalny (CU), F. Gömöry (IEE), G. Farkas (SUT), P. Ballo (SUT), J. Breza (Faculty of Electrical Engineering and Information Technology, SUT), V. Slugen (SUT), P. Mach (CU), S. Booth (European Commission), B. Ecker (VUJE), F. Dubeck (IEE), E. Rille (European Commission). Seated from left to right; J. Masarik (Vice-Dean for Research and Foreign Affairs, Faculty of Mathematics, Physics and Informatics, CU), Mrs. M. Cimbakova (Ministry of Education), B. Green (European Commission), Y. Capouet (European Commission), S. Matejčík (CU), J. Bahna (VUJE)

## Government committee recommends Australian participation to ITER

On Monday, 4 December 2006, the Australian House Standing Committee of the Australian Parliament on Industry and Resources tabled its report on the Parliamentary Inquiry into developing the nation's non-fossil fuel energy industry. "Finally, the Committee is persuaded of the immense potential benefit that fusion energy represents for the world and, specifically, the potential benefits for Australian science and industry from involvement in the ITER project", it says in the report. "The Committee believes that involvement in this experimentation is simply too important for the nation to miss, even if the introduction of fusion power is indeed many decades off. Accordingly, the Committee recommends that Australia secure formal involvement in the ITER project and seek to better coordinate its research for fusion energy across the various fields and disciplines in Australia". EFDA spoke to David Campbell, Australia born ITER Assistant Deputy Director General, about the country's fusion programme.



**As someone who grew up in Australia, could you please explain the history of fusion research Down Under?**

"The origins of the fusion programme in Australia lie in the work carried out at Sydney University and the Australian National University (ANU) in Canberra in the 1960s. The ANU then had one of the first tokamaks outside of the Soviet Union, the LT device. During the 1970s and 1980s an extensive programme developed, involving a range of institutions across the country. However, in recent decades, to a significant extent due to limitations in funding, much of the activity has evolved towards low temperature plasma physics with the emphasis on materials processing, surface preparation etc. The focus of the Australian fusion activity is now the H-1 Helic (a type of stellarator), situated at the National Plasma Fusion Research Facility at the ANU. Overall, Australia retains world-class expertise in stellarator physics, plasma diagnostics, fusion theory, plasma-

surface interactions, materials research and in project management.

**So there is a focus on stellarator physics?**

"In the early 1980s it became clear that with the construction of large facilities such as JET, the tokamak programme was taking in a direction in which Australia would be unable to remain competitive due to financial constraints. At the ANU it was therefore decided to explore alternative magnetic configurations which could open up new aspects of fusion research at modest cost. And the heliac variant of the stellarator looked to offer interesting possibilities.

**Why is Australia not an ITER partner?**

"I think that there are two major reasons for this. Firstly there is the "entry fee" for prospective members. It corresponds to about 50 Million Euro per year, or about \$A 80 Million, which is substantially greater than the current annual budget for all plasma physics research in Australia. So full membership was never a realistic option.

**"It's too important for the nation to miss"**

In addition, Australia is blessed with vast natural resources. So the recent urgency to respond to the need for alternative sources of energy and the threat of global warming has not generated the same political resonance in Australia as in many of the ITER members. Nevertheless, concern about climate change has been growing in Australia and this has been a key driver of the Australian Prime Minister's Uranium, Mining, Processing and Nuclear Energy Review. Although this review focuses principally on fission, it recognizes ITER and Generation IV as next step nuclear technologies.

**Which, would you say, are the main issues for a possible Australian involvement in ITER?**

"Firstly, the Australian research community, industry and government have to agree on what level of involvement would be appropriate to an economy of Australia's size. Secondly, they have to agree on the sort of hardware or activities Australia would like to contribute to ITER and the level of resources that is appropriate. Thirdly, they need to establish an internal framework that would support an involvement in ITER. Although the H-1 experiment has National Facility status, Australia does not at present have an integrated fusion programme: in Europe the fusion programme is integrated under Euratom, in the US it is integrated under the DoE,

and so on. The Australian research community is spread across a range of institutions, with a variety of funding mechanisms. In order to support involvement in a major international project such as ITER, a new framework would have to be established that tied the researchers in these institutions together in a suitable management structure and that provided a reliable source of funding to support the sort of long term commitment inherent in the ITER project. I understand that the Australian fusion community is embarking on a strategic planning process for an ITER engagement, which aims to address these issues. Finally, at an international level, the formal basis for the "third party" agreements foreseen within ITER Joint Implementing Agreement will need to be established and the Australian community will need to be satisfied that such an agreement adequately reflects their ambitions for their involvement in ITER.

**What is the position of the Australian government on this issue?**

"The Australian government is listening to the arguments, but is, naturally, sceptical: it recognizes that ITER is one of the world's major science and technology research projects, but it needs to be convinced of the benefits to Australia of becoming directly involved. Given the political considerations which I outlined previously, it's clear that there isn't the same level of political perception of ITER as a major energy R&D project as there is in the ITER members. And there is competition for resources: Australia is now essentially in a head-to-head competition with South Africa for the right to host the Square Kilometre Array, a major new research facility for radioastronomy and an important international research collaboration in its own right.

**In which way could the ITER project profit from an Australian input?**

"ITER could benefit in several ways. Firstly, and most obviously, we would have a new pool of high quality researchers. Depending on Australia's interests, this might allow, for example, some additional auxiliary systems foreseen as later upgrades in the original planning to be incorporated during the construction phase. Finally, once the basis of the "third party" agreement is established and other countries can understand the procedure for establishing formal links to the project, it may well encourage other potential partners to sign up." ■



In July 2006, Dr. Francesco Romanelli became EFDA-Associate Leader for JET.

### Dr. Romanelli, how did you become a fusion scientist?

"I was born in Florence, Italy, 50 years ago. As I have been attracted to physics since my childhood days, I guess it was only logical that I signed in for Physics at the University of Florence. There I met my wife Paola, who also works as a physicist, for the ENEA in Frascati. Then, after my PhD, I joined the fusion community as a theoretical physicist. In the meantime, after more than 25 years in the business, I learned a lot about the complexity of the topic. I have worked in various labs around the world, in Princeton and Frascati for example, and I have been working at JET before. That was in 1983 after the first discharge. From 1996 until I joined JET once again as EFDA Associate-Leader I was responsible for the research done on the physics of magnetic confinement at ENEA.

### Fusion seems to be very much part of your family life?

"Yes, indeed. We very much believe in the potential of fusion energy. And that includes not only my wife and me, but also our son Giovanni. He is 20 years of age and studying – guess what – physics. And there is a nice story that only happened recently that I have to tell you. Driving in his car Giovanni listened to a radio programme about the world energy crisis and the undisputable climate change. Facts, that the radio speaker commented with the words that we will most probably need a new world by 2050. My son heard this remark, stopped the car and called the radio station. They should not worry, he told the commentator and the listeners life on air. „By 2050 we'll have energy from fusion."

### Being the new EFDA associate leader for JET, what would you say is your role within the fusion programme?

"It is my task to bring JET to its top level. JET is a first class machine and until now the biggest fusion experiment in the world, with plasma parameters closest to ITER. It is our job to increase the level of scientific collaboration of all the ITER partners.

### What will be the main issues of the future work programme?

"Since the end of September, JET is back in operation and we already gained some very interesting results. We had four discharges with heating powers above 30 MW. In the past only a couple of discharges have reached that number. This, I think, is a good signal. The JET systems have been brought to a good state following recent enhancements.

### And what do we have to expect for the near future?

"The present campaigns end in March 2007. Then we want to improve the capability of JET by inserting a new antenna. In 2008 we plan a further upgrade for the neutral beam. The goal is to reach approximately 42 MW of total integrated power, which would mean a forty percent increase to what we have seen so far. Also in 2008, the plasma facing materials (Carbon Fibre Composite tiles at present) will be replaced by Beryllium tiles and, in the divertor, with Tungsten. So, JET will have an ITER-like wall and higher heating power, which will allow unique experiments with plasma and first wall conditions close to ITER.

### New brooms sweep clean, they say. Any comment on that?

"We have to continue to focus on JET contribution to ITER. There are many projects being launched with well defined goals, such as the ITER like wall and auxiliary heating upgrade. We have to ensure that the whole scientific programme in support of ITER is successful. It is my main philosophy and the essential part of my job to shape all the people involved as one single team. Whether we succeed will very much depend on the right atmosphere.

### Few days ago we saw the official birth of the ITER organization. What are your personal thoughts concerning this historic moment?

"I think I am speaking for all of us who have worked in the fusion field and followed the developments within the last 30

years since the meeting between Gorbachov and Reagan, when I say that ITER constitutes a unique chance. Now, we should all work for this enterprise and make sure that young scientists get attracted. This is also particularly relevant for the European Fusion programme. Therefore we do have to develop and provide adequate training programmes now.

### What is your impression, is there an increasing interest among students or young engineers in fusion?

"During the past years I have given many lectures at the University of Rome and I sensed a large interest among the young listeners. And now with the news of the ITER project spread I am convinced that we'll see even more interested students entering the fusion campus - in Europe but most certainly in the eastern countries.

### One last word regarding the private person Francesco Romanelli. What do you prefer to do, when you are not in your office or on the way to the next meeting?

"In my spare time I prefer to stroll through my garden near Frascati. It is the most beautiful garden I can imagine and I regret that I don't have more time to enjoy it."

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For more information see the websites:

<http://www.efda.org>

<http://www.jet.efda.org>

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