Fusion News

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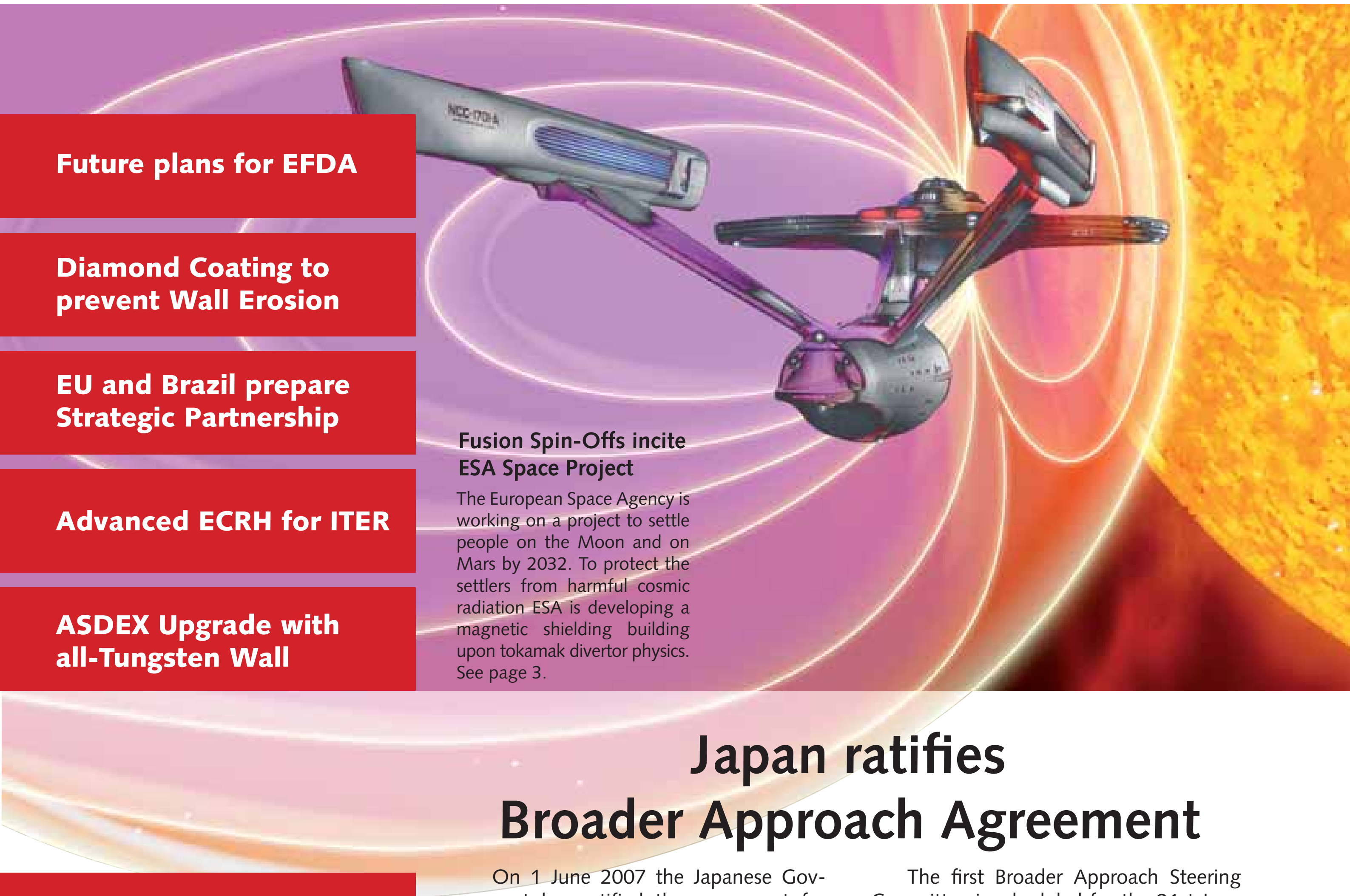

Future plans for EFDA

Diamond Coating to prevent Wall Erosion

EU and Brazil prepare Strategic Partnership

Advanced ECRH for ITER

ASDEX Upgrade with all-Tungsten Wall

Fusion Spin-Offs incite ESA Space Project

The European Space Agency is working on a project to settle people on the Moon and on Mars by 2032. To protect the settlers from harmful cosmic radiation ESA is developing a magnetic shielding building upon tokamak divertor physics. See page 3.

"No Silver Bullet Solution"

Andris Piebalgs, EU-Commissioner for Energy, explains what the European Strategic Energy Technology Plan holds in detail.

Japan ratifies Broader Approach Agreement

On 1 June 2007 the Japanese Government has ratified the agreement for the "Joint Implementation of the Broader Approach Activities in the Field of Fusion". The agreement commonly known as "Broader Approach" was signed by both Parties in Tokyo on 5 February 2007. This co-operation aims at complementing the ITER Project and at an early realisation of fusion energy for peaceful purposes, by carrying out R&D and developing some advanced technologies for the future demonstration power reactor (DEMO). The co-operation consists of three main projects (JT60-SA, IFMIF and IFERC) to be carried out in Japan. While the EU internal procedure for the Agreement to enter into force was completed with the signature, the ratification process in Japan involved the approval of the lower and the upper house of Diet.

The first Broader Approach Steering Committee is scheduled for the 21st June in Tokyo. At this meeting the proposed project leaders will be nominated: They are Mr Pascal GARIN for IFMIF, Mr Shinishi ISHIDA for JT60-SA and Mr Masanori ARAKI for IFERC. Also in this meeting the members of the Project Teams, the Project Committees and their Chairs will be appointed.

The Broader Approach activities will be financed in equal parts by EURATOM and Japan. On the EURATOM side, apart from a contribution from Community funds, the projects will be implemented with voluntary contributions from France, Italy, Spain, Germany, and Switzerland. Belgium is currently studying the possibility of making a voluntary contribution as well. Contributions will be made in the form of in-kind equipment, studies and by seconding staff for projects in Japan.

EFDA
EUROPEAN FUSION DEVELOPMENT AGREEMENT

News

Paving the way for European Fusion Research: The EFDA Steering Committee at its March Meeting in Aachen, Germany.

European Master in Nuclear Fusion Science

Last year a group of European universities together with Erasmus Mundus have set up a programme to encourage young scientists to engage in fusion research. The aim of the European Master in Nuclear Fusion Science and Engineering Physics (FUSION-EP) programme is to provide a high-level multinational research-oriented education in fusion-related engineering physics, in close relation with the research activities of the partners, and with a well-integrated language and cultural experience. Erasmus Mundus is a co-operation and mobility programme in the field of higher education which promotes the European Union as a centre of excellence in learning around the world. Therefore the students will have the opportunity to study at three of the participating Universities and by this to experience different languages and cultures.

The programme applies to all nationalities, though for students from Non-European countries the deadline has already expired to allow for visa and scholarship processing. The FUSION-EP is open to all students who have a Bachelor's degree or a recognized equivalent academic degree of minimum 3 years study in physics. Applicants with another degree but with experience or knowledge in this field can be admitted on decision by the FUSION-EP Managing Board on the basis of CV and other evidence. English language skills must be proved by a TOEFL test. Application deadline is August 1, 2007. www.em-master-fusion.org/

Welding specialists are among the most wanted in fusion research.

Germany´s Industry prepares for ITER

On the 8th of May 2007 the German ITER Industry Forum was founded in Karlsruhe. The aim of this initiative who´s logo says "The energy for the future. We do participate" is to support Germany´s contribution in the ITER project and any further international fusion research projects, to optimize the transfer of technology between the research institutes and industry and finally to inform the wider public. So far, members of the forum are Accel Instruments, AREVA NP, Astrium, Babcock Noell, C-Con, EAS, Kradftanlagen Nukleartechnik, Linde, STEAG and the Bundesverband Deutscher Industrie. www.diif.de

Future plans for EFDA

At its latest meeting held in Otaniemi, Finland on 4-5 June 2007, the EFDA Steering Committee addressed a number of important matters. Key points on the very busy agenda were the outcome of the 2006 EFDA work programmes monitoring which was fairly positive, with significant progress in a number of areas and very fruitful campaigns on JET, exploiting new equipment recently installed. Also urgent activities in support of ITER construction have been approved to be performed using the existing EFDA instruments, pending the entry into force of the new Joint Undertaking "Fusion for Energy". New Task Force Leaders and Deputies have been appointed for the 2008 JET Experimental Campaigns. Concerning the new EFDA, which is expected to enter into force after summer, the EFDA Steering Committee has approved the Work-Plan for 2007-2011 as well as several elements of the 2008 EFDA Work Programme. Furthermore, the way advice will be organised to the EFDA Steering Committee has been approved, including the setting-up of a new Scientific and Technical Advisory Committee (STAC), with new terms of reference in line regarding the new missions of EFDA. A report of the Expert Group on high performance computing has been presented and should pave the way for future decisions in this area, with the aim of developing joint European modelling capabilities in support of fusion research. In preparation of future EFDA activities, the EFDA Steering Committee decided to set-up Ad Hoc Groups on socio-economics and on the assessment of risks related to the JET enhancement programme. Finally, the Steering Committee endorsed a proposal from the EFDA Leader on the organisation of the EFDA programmatic input to a review of facilities, to be launched by Euratom by the turn of the year.

Fusion spin offs help Star Trek "plasma shields" become a reality

*Dr Ruth Bamford**

The pursuit of fusion will provide society with more than just an endless supply of eco-friendly energy for the generations to come. The technical know-how needed to achieve magnetically confined fusion may be the only way that future astronauts will be able to survive in the harsh environment in space.

Following NASA's lead, the European Space Agency (ESA) has set an objective with its AURORA programme, to put people on the Moon and then onto Mars by 2032. This will take astronauts beyond near Earth orbit for the first time since the Apollo programme. It is well known that Space Weather, in the form of energetic particles from solar storms, regularly causes problems with satellites and communications around the Earth. Many of these storms would be fatal to humans in space craft. Heavy shielded compartments are impractical on long duration space flights and for those living on Moon and Mars bases, since the 'drip-drip' of cosmic radiation has been determined to be just as damaging to the health of the astronauts as large solar storms.

The writers of Star Trek correctly realised that any spacecraft containing humans would need protection from the hazardous effects of cosmic radiation. However the concept of a 'deflector shield' to protect the space craft is not just science fiction. The Earth would not be habitable if it were not for the magnetic field that creates a plasma barrier at the magnetopause. The supersonic plasma from the Sun hits the Earth's magnetic field, creating a plasma transport barrier. The majority of the hazardous solar energetic particles are deflected around the Earth's magnetosphere, skipping off towards interplanetary space behind the Earth.

A laboratory experiment is being built jointly between the Space Science Department at the Rutherford Appleton Laboratory and University of York in the UK to test the viability of creating a mini-magnetosphere around a "space craft" to expel the hazardous "solar wind" plasma and cosmic radiation, creating a plasma barrier or plasma shield. The experiment will build upon equipment originally intended to study tokamak divertor physics.

The concept has much in common with magnetically confined fusion. In fusion the aim is to hold a plasma away from a vacuum vessel wall that is essentially at room temperature. In essence the magnetic fields hold a plasma in, conversely the mini-magnetosphere uses a plasma transport barrier the other way around to keep the solar wind plasma out, away from the humans in a space craft.

Thus the UK team hopes to make use of the huge database of knowledge on plasma confinement and control to aid the next "small step for man" onto other worlds, illustrating that the pursuit of fusion will be paying dividends to society even before the first reactor is built.

**Dr Ruth Bamford works at the Space Plasmas Group, Space Science & Technology Dept, Rutherford Appleton Laboratory (RAL), Chilton, Didcot, U.K. She did her PhD at Culham and then worked as a post-doc research assistant on Reverse Field Pinch HBTX, COMPASS, START and JET. Her colleague, Professor Robert Bingham, is a plasma physics theoretician who also worked on magnetic confinement fusion at JET. Other members of the "Star Trek" research group are Tom Todd, Chief Engineer at JET and now working part time on a consultancy contract for RAL, Dr. Kieran Gibson, a PhD from JET and Professor Howard Wilson, a former UKAEA scientist who is now building up the plasma physics group at York University.*

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Awaking the passion for science

Do you know how to produce electricity from fruit tea? Why does toast always fall butter side down? How do you make a robot rock? For five days in April, more than 500 science teachers from all 27 European countries and beyond had gathered in Grenoble´s Congress Centre to compete in the „Science on Stage Festival". A championship with the one and only goal: To „awake the dormant passion" for scientific innovation and discovery.

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Read the full story at www.efda.org

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Diamonds might become fusion scientists´ best friends

Researchers from two UK universities currently aim to test a diamond lining to solve the problem of wall erosion in fusion reactors. The plasma materials group at Heriot-Watt University and materials modelers at University College London have developed methods of growing diamond film at relatively low pressure and temperature, using gases to lay down the material in a plasma.

The group is led by Professor Phil John and Professor John Wilson. "In prototype fusion reactors the internal walls are lined with carbon composite tiles similar to those found on the edges of space shuttle's wings or the brakes of jet aircraft", Professor Phil John explains. "Even this material may not be sufficient to withstand the enormously hot plasmas envisaged for the next generation of fusion reactors, and erosion of the tiles would mean frequent close-downs to replace eroded tiles. To prevent this, we intend to coat the tiles with diamonds, a material unique in its ability to withstand high temperatures, be resistant to radiation and maintain chemical stability in the presence of hydrogen plasmas. This would allow the prototype reactor to operate for longer periods before it would need to be shut-down for maintenance."

At Heriot-Watt-University, Diamond film research began in the late 1980's, when the first UK plasma chemical vapour deposition (CVD) growth system was established. The CVD process generally uses energy, traditionally thermal, to drive a reaction in a gaseous medium, producing reactive species that can form a deposit on any adjacent surface. "We use a plasma discharge to provide the energy, which allows a lower temperature for the gas, because the reaction is driven by energetic electrons." The surface is usually heated as well, to ensure the species have some mobility when they arrive on it, and so can make a dense deposit, and also sometimes to drive off any unwanted by-products. The gas may be at low pressure or atmospheric pressure.

"We went on to study deposition on a range of materials for applications in optics and electronics", John Wilson explains. "Of course, the synthetic route that uses microwave plasma to decompose a hydrocarbon gas mixture uses the inverse process of hydrogen erosion that occurs in fusion plasma experiments. The plasma in this CVD process provides energetic electrons that dissociate both the hydrocarbon gas (typically methane) and the predominant hydrogen in the mixture: atomic hydrogen is an excellent etchant for any non-diamond component, thus leaving a pure diamond film on the heated substrates. Although it is known that diamond etches far more slowly than graphite in hydrogen plasma we don't know what additional effects will arise in the more energetic plasma of a tokamak device. Carbon is of course a more preferred plasma facing component than heavy metals, if it can be prevented from eroding. It should then cause less contamination of the plasma. We believe that Carbon Fibre reinforced Carbon (CFC) is the best carbon-based material available at the moment, but diamond may extend its performance."

A microwave plasma is activating the gas mixture to deposit a diamond coating on to a substrate below.

The researchers will spend the next three years putting their materials under the gun of high-flux laser beams and high-flux ion and electron beams to separate and determine the different effects on diamond. They will also be given time to test their material within MAST at Culham. "The reason we are interested in diamond is because we know it erodes far more slowly than graphite in hydrogen plasmas", John Wilson added. "What we don't know is, given the extreme conditions in the tokamak with all sorts of other fluxes of particles and ions and charges and temperatures, whether that difference will be maintained."

JET

It´s Shutdown time

Duarte Borba

After the very successful experimental campaigns C15 to C19, JET has now entered the 2007 "Shutdown" period. During the next months, a number of new systems that will significantly improve JET's capabilities will be installed. These include a new "ITER-like" Ion Cyclotron Resonant Heating (ICRH) antenna. The installation follows a variety of tests carried out in the test bed. The antenna features a new design aiming at optimising the power coupled to the plasma in a variety of conditions minimising the power reflected, therefore, making the heating more efficient. The experiments to be carried out with the "ITER-like" ICRH antenna constitutes an important validation of the design and it will provide valuable input into the use of similar heating techniques in ITER. Another JET enhancement is the installation of a high frequency pellet injection system, which is capable of shooting small cubes of deuterium ice into the plasma. The motivation for doing this is to have a direct fuelling method for the plasma core and to mitigate instabilities located in the plasma edge (Edge Localised Modes). Additionally, many refurbishments will be carried out, with more than 3000 individual tasks in total. These include also interventions in the Neutral Beam Injection (NBI) systems, correcting faults that occurred during the past experimental campaigns and preparing it in view of further enhancements of the NBI system, aiming at increasing the total heating power. In this Shutdown all in-vessel activities will be performed by remote handling. The preparation for the remote handling activities is well under way, with the required enclosures installed in the torus hall. In addition, a number of tasks related to the upgrade of the diagnostic systems are also being carried out. In particular, the second antenna for the Alfven Eigenmodes Active Excitation System will be installed during this shutdown.

All in-vessel activities will be performed using remote handling tools. Here you see the boom at a teststand.

EFDA Fusion News

EU and Brazil aim for Strategic Partnership

The European Commission has proposed to launch a Strategic Partnership with Brazil. "The Commission suggests establishing an agreement between Brazil and Euratom, the European Atomic Energy Community, along the lines of agreements already in place with other countries", says a Cordis Press Release. The proposal identifies "a wide spectrum of sectors and activities" in which the EU has a major interest in strengthening co-operation and developing a deeper dialogue with Brazil – with fusion being one of them. As Cordis puts it, "the agreement could either focus on the specific field of fusion, promoting Brazil's accession to the ITER project, or on broader areas of nuclear research. "Brazil is an important partner for the EU", the President of the Commission, Manuel José Barroso said in a press conference following the announcement. "We not only share close historic and cultural ties, values and a strong commitment to multilateral institutions, we also share a capacity to make a difference in addressing many global challenges such as climate change, poverty, multilateralism, human rights and others. By proposing stronger ties, we are acknowledging Brazil's qualification as a "key player" to join the restricted club of our strategic partners." More news are expected from the Brazil-EU-Summit-Meeting scheduled for the beginning of July.

"Fairy tales might become true there in Europe"

Chile is not part of Europe, it is not even close. But modern communication tools easily bridge the gap between the old and the new world – and so does news about fusion research in Europe. A little while ago, Ignacio Íñiguez, a journalist from a Chilean Government Office called CONICYT (Comisión Nacional de Investigación Científica y Tecnológica) contacted us. He explained that he was engaged in the Explora programme, dedicated to communicate between science and technology and school students. Having announced the year 2007 as "The Year of Energy", he planned to focus on "informing our children about fusion energy and the ITER Initiative" as there was "a rising debate" in his country on how to face the future energy challenges. Asking us for information material and posters, we did our best to please this keen ambassador. "A few days ago we had a meeting with reputed Chilean scientists planning the further activities of the year. One of them, a convinced apologist of solar energy, said that fusion was a fairy tale he was listening to since he started with engineering. After reading your material on ITER I think fairy tales might become true there in Europe… "

HSX Stellerator - Quasisymmetry at work

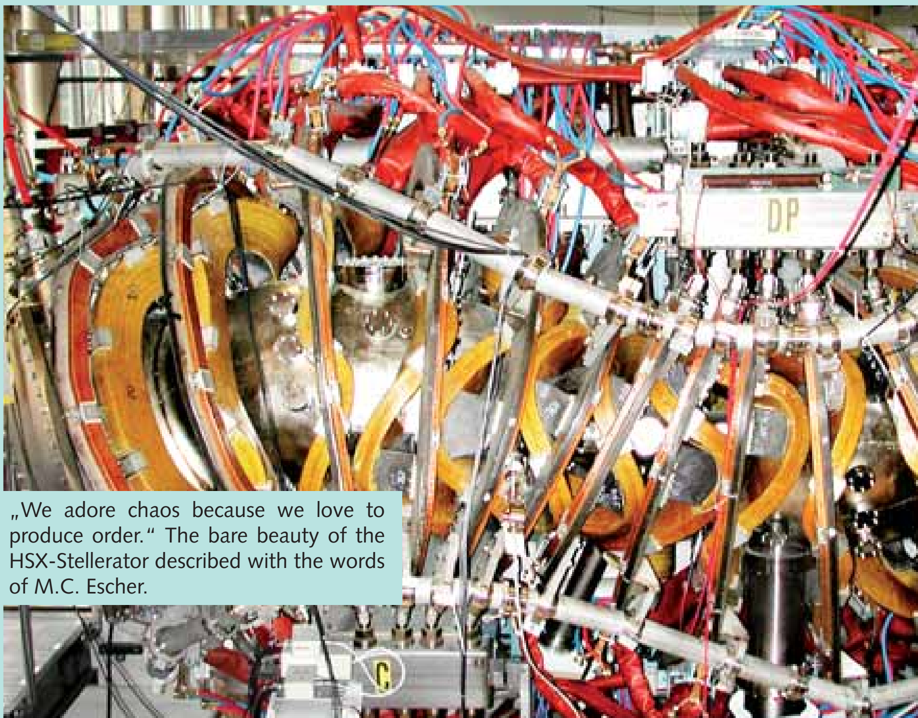
New results from the Helically Symmetric eXperiment (HSX) at the University of Wisconsin-Madison, USA, published in a recent issue of Physical Review Letters (PRL 98, 085002 (2007)) show that due to the unique design of the HSX, this device in fact loses less energy and by that overcomes a major barrier in stellarator research. „These results demonstrate for the first time reduced particle and heat transport due to low neoclassical transport with quasisymmetry", the authors (among them Professor David Anderson and research assistant John Canik) summarize their paper.

In a stellarator, currents flowing in external conductors produce the confining magnetic fields. This makes the stellarator an attractive candidate for a fusion reactor, as the lack of large externally driven plasma currents lends itself to steady state, disruption-free operation. However, conventional stellarators have suffered from high neoclassical transport due to asymmetry in the magnetic field, caused by the combination of toroidal and helical curvatures. Following theoretical research at the Max-Planck-Institut für Plasmaphysik, currently three lines of devices overcoming this deficiency are being developed and realized: quasi-helical symmetry (HSX), quasi-axisymmetry (NCSX at Princeton Plasma Physics Laboratories PPPL, under construction) and quasi-isodynamicity (W7-X at Max-Planck-Institut für Plasmaphysik (IPP) in Greifswald, under construction).

The HSX is the first operating stellarator to use a quasi-symmetric magnetic field. While the magnetic field strength is usually a two-dimensional function on the magnetic surfaces traced out by the field lines, quasi-symmetry is achieved by making it one-dimensional in so-called magnetic coordinates. For quasi-helical symmetry this means that the plasma particles experience the device as if it were helically symmetric instead of forming a torus. The HSX main magnetic field is generated by a set of 48 non-planar, modular coils, arranged in four field periods.

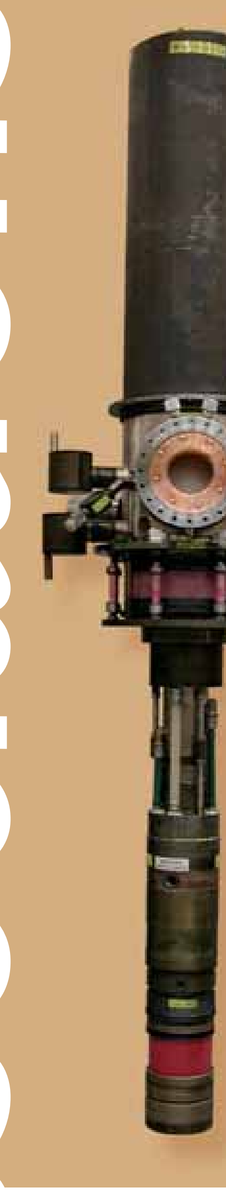
This picture shows a quasi-helically symmetric stellarator with four periods. Shown is the field strength B (blue is low field and yellow is high field) on the plasma boundary. Note the helical structure of B overriding the effect of toroidal curvature. Reflected particles drift helically. (This drawing is taken from an article on "Quasi-Symmetries in Toroidal Confinement" written by Prof. Jürgen Nührenberg from IPP, the "father" of quasi-symmetry research in fusion plasmas. His discovery of quasi-helically symmetric configurations in 1988 provided the first possibility of building a stellerator with collisionless particle confinement. A discovery that finally led to the experimental realisation of the HSX at the University of Wisconsin, USA.

The team built the HSX with the motivation that quasisymmetry would reduce transport. And obviously that's exactly what it does: The reductions in neoclassical thermodiffusivity and heat conductivity cause the density profile to be centrally peaked and the electron thermal transport to be reduced. „This is the first demonstration that quasisymmetry works, and you can actually measure the reduction in transport that you get," Canik is cited on the HSX website.



„We adore chaos because we love to produce order." The bare beauty of the HSX-Stellerator described with the words of M.C. Escher.

Associations



2 frequency gyrotron manufactured by GYCOM, Russia, used for ASDEX Upgrade. Photo: IPP, Garching

Virtual Institute to build multiple flexible ECRH

Aiming to develop solutions that can lead to a more flexible Electron Cyclotron Resonance Heating (ECRH) for ITER, an international network named "Advanced ECRH for ITER" has been formed. The "virtual institute" is funded with 900.000 Euros for 3 years by the German Helmholtz Society and is headed by the Max-Planck-Institut für Plasmaphysik (IPP) in Garching, Germany. Network partners are the Forschungszentrum Karlsruhe (FZK), the Universities of Stuttgart and Karlsruhe, as well as the Institute of Applied Physics of the Russian Academy of Science in Nizhny Novgorod and the Instituto di Fisica del Plasma in Milano.

The network has two main goals, one of them is to improve the frequency range of the gyrotron heating system. Within ITER, a single frequency gyrotron operating at 170 Gigahertz is foreseen. "But a single frequency gyrotron reduces the operational margins, especially regarding the toroidal magnetic field", explains Prof. Hartmut Zohm, speaker of the new virtual institute. "If we had the opportunity to operate the gyrotron at multiple frequencies, we could reach any region of the plasma and for example fight the Neoclassical Tearing Modes (NTMs) much more effectively. "NTMs are instabilities driven by the pressure of the hot plasma in a fusion machine. As such they are a major concern for ITER and any tokamak as they spoil the confinement and cause disruptions."

But how to tell a gyrotron to work at various frequencies? "ITER has decided not to face this challenge at present as a more flexible source means more complications for the project as a whole", Zohm says. "So this option was not considered in the ITER Design. Though we all agree that it would be nice to have such a tool heating ITER." For an independent network like the virtual institute, the task is easier to solve. In a first step, a two-frequency gyrotron was implemented in the ASDEX Upgrade tokamak, working at 105 and 140 Gigahertz. The experiments delivered a maximum pulse of close to 1 Megawatt and 10 seconds duration. Within the course of 2007, IPP expects to implement a new four-frequency gyrotron operating at the intermediate frequencies of 115 GHz and 127 GHz as well.

So what would be the benefit of these experiments for ITER? How would a multiple-frequency gyrotron have to look like to fit into the ITER machine?

"Talking about the physics, we know that it would help a lot to control the NTMs, but the profit of course has to be quantified in experiments first. Regarding design issues, the ITER launchers or antennas should be compatible for different frequencies, the same holds for the transmission lines. Whether the optical mirrors can cope with multiple frequencies still has to be proven."

When would it be possible to implement this new system on ITER? "As the lifetime of a gyrotron usually is around 5 to 6 years, a new multi-frequency gyrotron could be implemented thereafter, in the second round of the experiment."

The second aim of the network is to improve the modulation scheme for NTM stabilisation. From experiments on ASDEX Ugrade, it looks like injecting phased ECCD (Electron-Cyclotron Current Drive) into the NTM islands will have a clear benefit in terms of power requirements for stabilisation. Since NTMs usually rotate with respect to the ECCD launching antenna, the former approach meant to switch the gyrotrons on whenever an NTM passes by and to switch it off when it has passed. But under these circumstances the gyrotrons would only operate with 50 percent duty cycle. The new approach reads as follows: If one had a fast switch to send the ECCD power to several antennae distributed around the torus, the gyrotron could operate with 100 percent efficiency. But since ITER expects mode rotation frequencies above 1 kHz, a mechanical switch is out of question. A solution to this problem could be the use of a diplexer based on interference in conjunction with a slight frequency

First results of ASDEX Upgrade with an all-Tungsten wall

During its last maintenance shutdown, the interior of the ASDEX Upgrade tokamak located at IPP Garching has been fully equipped with tungsten-coated plasma facing components (PFCs) including the divertor target plates. Since studies indicate that tungsten (W) is at present the only viable material for the first wall of a fusion reactor, the start-up of ASDEX Upgrade with the all-tungsten wall, the first of its kind worldwide, has received special attention. Following discussions with colleagues from all over the world, the ASDEX Upgrade team decided to start up the machine without any additional coating of the plasma facing components. In particular, no boronisation was applied, which is usually done to bind (getter) oxygen and to reduce impurities released from the PFCs, mainly helping the production of the hydrogen (deuterium) plasma.

So far, this start-up seems to be successful. After three weeks of conditioning, discharges are now possible that meet the ITER requirements of good confinement (H=1) and stability (β_N=2) at high density. The main aim of the present campaign will be to characterise fully the compatibility of ITER operational scenarios with the all-tungsten wall.

tuning of the gyrotron. The diplexer would send the ECCD power to the wanted antenna, depending on the frequency shift. First results obtained with such a scheme at IPP Greifswald are very promising and the network will study conceptually how to implement such a system in the ITER ECRH system, potentially doubling its NTM stabilisation capability.

Dutch government funds ITER-NL

Niek Lopes Cardozo, Tony Donné

To optimize the participation of both Dutch scientists and Dutch industry in ITER, FOM has formed a partnership with the National Technology Organisation (TNO), the Nuclear Research and Consultancy Group (NRG) and the Dutch Industry. This consortium, ITER-NL, covers the entire range of competences needed for ITER, from the scientific design to the industrial implementation, while leaving the competences with the partners for whom it is core-business. FOM brings in its scientific knowledge of tokamak physics, ECRH and diagnostics, NRG consults on nuclear and material aspects, while project control, risk assessment and Quality Assurance (QA), and knowledge transfer are areas of particular strength of the TNO organisation, which has a broad experience with space programmes. By bringing the various research institutes and industry together a real knowledge transfer is realised.

On 19 September 2006 the Dutch government provisionally granted 15 M€ to ITER-NL, and in March 2007 the detailed work plan of the ITER-NL consortium has been approved. The broadening of the fusion activities to parties outside the research laboratories constitutes a breakthrough for fusion in the Netherlands, only possible thanks to the very positive image of ITER. The programme will also be extended to university groups – student participation in fusion classes is hitting record values in the Netherlands. The separate funding and creation of ITER-NL effectively mean a 50% increase of the Dutch fusion programme. In one step, it brings a large number of professionals into the fusion system. With a balance between experienced professionals, younger engineers and PhD students, an effective contribution to the new fusion generation is aimed at.

The spearheads of the project are two advanced scientific instruments, the ECRH upper launcher system and the CXRS diagnostic. Both are being developed within European collaborations, presently coordinated by EFDA. Next to these two scientific instruments, the prime interest of FOM, ITER-NL aims at contributing to a broad spectrum of ITER procurement packages.

A letter from Prague

Jan Rosen, Prague, March 2007

Grandfather Josef together with grandson Josef engulfed by the concept of fusion energy.

"My grandfather Josef, born 1920, is very interested in fusion. He saw an educational programme on TV and he has been talking about it since then. He believes that this way of energy production is the only environmentally pure source of energy. One day he asked me if I could find some more information on the Internet. I started to search and found the web pages of EFDA. There was a list of information materials available in the Czech language and a contact to Aline, your secretary. I wrote her an e-mail and asked for several materials. She contacted Mr. Ripa from the Institute of Plasma Physics in Prague and we made an appointment. Mr. Ripa was very kind and gave me a lot of materials. Moreover he is a big fan of cross-country running and so am I. I prepared these materials as a present for our „name-day" party as both my grandfather's and my brother's name is Josef. So on the 19th of March we celebrated a big party and this year almost all members of our family participated. We gave Josef, the elder, our presents, the main present being the fusion material. We had a lot of fun and now every time I see my grandpa we are talking about fusion."

Danish industry network focuses on Fusion

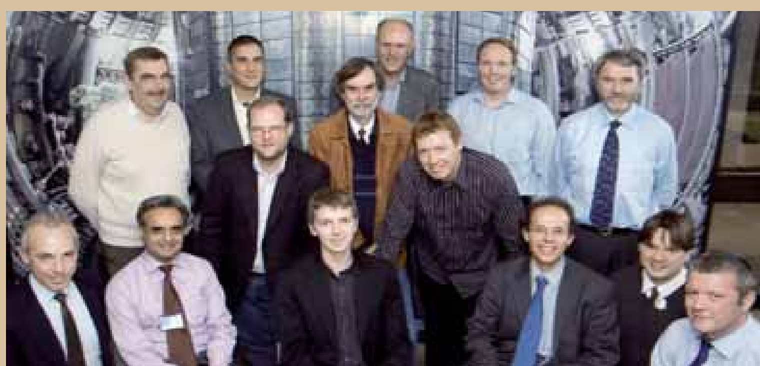
Charlotte Sørensen, International Project Coordinator, Grundfos Management A/S

Wishing to participate in the forefront of the technological development, some ten Danish companies have created a network group. The network was created a couple of years ago with the support of the Association EURATOM-Risø. Its defined goal is to seek and share information about the possibilities for Danish companies to be involved in ITER construction. The group consists of market leading companies, representing some of the finest qualifications within Danish industry concerning engineering, plant system design, automation, water pumps, remote handling, vision, accelerator and magnet technology.

The creation of joint ventures between companies may be necessary in order to comply with the conditions in procurements packages. Therefore the Danish network is also intended as a nursing room for such joint ventures. In late 2006 the network spent a full day at JET in Oxford, in order to further understand the complexity and the needs of a fusion experiment. The visit was a success, giving all participants a broader understanding of the technology in a fusion plant.

Currently the network - with assistance from the Danish Embassy in Barcelona - is planning a trip to the new Joint Undertaking "Fusion for Energy" in Barcelona, enabling the network members to familiarize themselves further with the ITER procurement system. The network is not exclusive to the current members. New members can join anytime. Also the network would very much like to form liaison with companies having interest in ITER in other European countries. For further information, please refer to www.risoe.dk/iter or contact the network facilitator Søren B. Korsholm, at RISØ, email: soeren.korsholm@risoe.dk

Danish industry representatives visiting the JET facility.



Interview

EFDA Fusion News

"There is no silver bullet solution to the energy challenge"

Andris Piebalgs

EU-Commissioner for Energy

Climate change is gaining more and more importance, also within the EU´s daily agenda. Business as usual is no longer an option. Thus the European Commission has outlined a package tackling the issues of energy and climate change, including a "European Strategic Energy Technology Plan" to boost research on energy efficient technologies. Andris Piebalgs, EU-Commissioner for Energy, explains what that plan holds in detail.

Mr. Piebalgs, could you please explain the draft outline of the EU´s new energy road map and why it is so important to come up with a new strategy now?

The comprehensive Energy Policy adopted by the Commission in January 2007 tackles the huge challenges that Europe and the world are facing: climate change, security of supply and competitiveness. So yes, we can not continue business as usual. We are therefore working on a European Strategic Energy Technology Plan (SET-Plan), which will be to identify targeted large-scale initiatives for specific technologies for which the European Union needs to work together to accelerate their pathway to the market. Current trends show that we are not meeting our current Kyoto and renewables targets. Transforming the energy system will take decades but we need to transform the energy technology research and innovation system to deliver the technologies that meet our policy goals now. In addition, there is no „silver bullet" solution to the energy challenge. We need a broad portfolio of efficient and low carbon technologies that one Member State or one company can not develop in isolation. We can only make a difference if we join efforts at a European level.

What is the role of fusion technology within the EU´s strategy plan?

Electricity produced by fusion is a low carbon technology. The fusion technology, which reproduces the process that powers the sun and makes all life on earth possible, has the potential to provide a sustainable solution to global energy needs but it requires large scale development and implementation. Global energy demand is expected to double by the year 2050, mainly because people in developing countries become wealthier. Securing long-term energy supply is a major challenge not only for Europe but for the world.

Therefore, the international community has joined its efforts to give a global response to a global problem by launching an international collaboration for an experimental fusion facility called ITER, as a necessary step ahead to continue past European activities with the aim of further developing fusion technology. The important European contribution for hosting and funding ITER comes from the Community's Euratom Research Framework Programmeme (FP7 foresees €1947 million for the 2007-2011 period) and national funds from the Members States, showing the interest and the efforts of the EU for accelerating the development on a commercial scale of this promising energy source for the future.

What are - in your eyes - the prospects offered by fusion energy?

The Commission has recently proposed an energy policy for Europe that includes a package of integrated measures to accelerate the transition from the current large dependence on hydrocarbon sources to national energy mix options based on larger use of renewable and low carbon energy sources. Fusion is part thereof. The long term priority goal of fusion power development is to achieve a reliable and economically viable production of electricity, with minimum environmental impact. However, considering the period necessary for constructing and operating the ITER reactor and the need of a subsequent scaling-up stage for large scale demonstration of the technology (construction of the so called DEMO facility foreseen in some 30 years), the deployment of commercial fusion reactors cannot be expected before the second half of the century.

In a recent speech you made a criticism that Europe missed its opportunity to take the lead in the multi-billion euro market for low carbon and energy efficient technologies. How could we profit from dealing with climate change?

Since 1990 the EU has been engaged in an ambitious and successful plan to become the world leader in renewable energies and energy efficiency. The EU's renewable energy market has an annual turnover of €15 billion (half of the world market) and employs some 300.000 people and it is a major exporter. With oil prices rising, and carbon having a price, the market for low carbon and energy efficient technologies is going to boom. Companies around the world have realised this and there are important investments in research all around the globe. We should use the opportunity of our commitments to put the EU in the leading position not only in the use of these technologies but also in its development, and this can only be done with an ambitious RTD programme. This is what the Commission is going to present at the end of the year with its Strategic European energy Technology Plan.

On your website you write that an individual member state cannot tackle today's energy challenges on its own. So, beyond all technological aspects, do you think the joint European Fusion Community – and further more ITER - could serve as good examples?

This is certainly the case of many European projects of which ITER is certainly the biggest in scale and it involves not only the European efforts but also at international level. The efforts in ITER will pave the way for the energy of the future in the long term. In the short term, we should devote big efforts to make Carbon Capture and Storage (CSS) technologies available, develop second generation biofuels or make renewable sources of energy competitive. The potential of these technologies are so huge, that we cannot allow the EU to miss this opportunity.

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