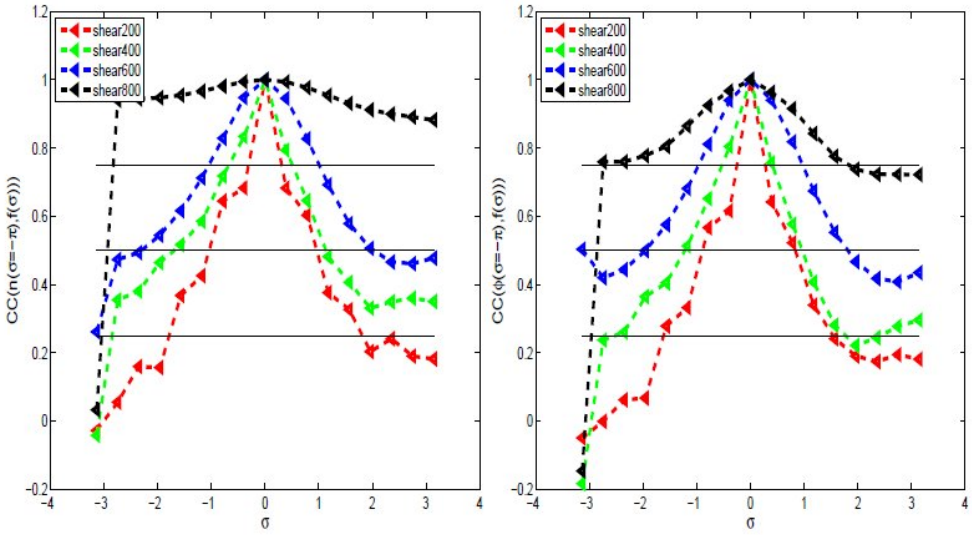
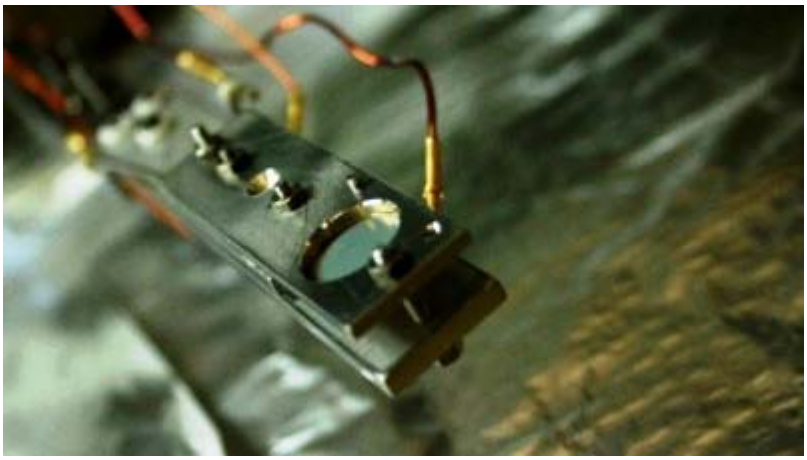
Association EURATOM-ÖAW

ANNUAL REPORT 2010



(a) $L_{CC,\chi}$ (b) $L_{CC,\eta}$

Austrian Fusion RTD Activities



Cover page

Top: Modelling studies of multi-scale mechanisms in the presence of imposed electric fields and resonant q using the code ATTEMPT: Radial (left) and poloidal (right) cross-correlation of density fluctuations for several imposed ExB flow shear strengths with fixed flow speed: stronger shear enhances correlations.

Graph: Institute of Ion Physics and Applied Physics, University of Innsbruck

Bottom: A quartz crystal mounted on a sample holder in an ultra-high vacuum (UHV) chamber enables the monitoring of sputtering and deposition processes in situ and with high accuracy. The eigenfrequency change of the crystal is directly linked to a mass increase or decrease respectively.

Photo: Institute of Applied Physics, Vienna University of Technology

Association EURATOM-ÖAW

ANNUAL REPORT 2010

Austrian Fusion RTD Activities

Vienna
May 2011

The Annual Report 2010 of the Association EURATOM-ÖAW covers the period
1 January to 31 December 2010

Compiled by Monika Fischer

This work, supported by the European Commission under the
Contract of Association between EURATOM and ÖAW, was carried out within the framework of the European Fusion Development Agreement (EFDA). The views and opinions expressed herein do not necessarily reflect those of the European Commission.

This brochure presents the introduction and the executive summary of the Annual Report 2010 of the Association EURATOM-ÖAW. It also includes a summary of the management structure, financial data and contact details of the Association. The full report is available on the enclosed CD-Rom and can be viewed on the webpage http://www.oeaw.ac.at/euratom.

Supported by

BMWF

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CONTENTS OF THE SHORT VERSION

INTRODUCTION

On behalf of the Association EURATOM-ÖAW, I am pleased to present the Annual Report 2010 on Austrian Fusion Research and Development activities.

The most important event of the year 2010 was undoubtedly the final approval of the ITER baseline (scope, schedule and costs) during the ITER Council meeting in July, where a new strategy for cost savings and cost containment was implemented by all seven ITER Parties. At the same time, major organizational changes both at the ITER Organization as well as at the European Agency Fusion for Energy (F4E) were made in order to guarantee swift progress of the construction of ITER.

With reference to the ITER project, information of industry is of particular importance. In this respect, valuable support has been provided by the Industrial Liaison Officer at the Austrian Chamber of Commerce who circulates information about calls, specialized meetings for industry to all companies qualified for specific services and organizes trips of industrial delegations to participate in specialized meetings.

In the framework of the Contract of Association and in close cooperation with EFDA, research groups from the Vienna University of Technology, the University of Innsbruck, the Graz University of Technology and the Austrian Academy of Sciences contributed to several tasks in Plasma Physics and Emerging Technology. One small contribution was made to Socio-Economic Research on Fusion (SERF) by Research Studios Austria FG.

In 2010, two former staff members of the Association Euratom-ÖAW continued their employment at the ITER Organization in Cadarache (France), one person joined F4E in July 2010. One junior scientist (post-doc) from the Association continued his secondment at the Culham Centre for Fusion Energy (CCFE). Since 2008, the Commission for the Coordination of Fusion Research in Austria at ÖAW (KKKÖ) has been offering support to keep young researchers in the programme and to encourage graduates to apply for employment with Fusion for Energy or the ITER Organization.

Based on the expertise developed in the framework of specialized contracts under the previous EFDA between 1999 and 2007, one research group of the Association continued its involvement in a specialized ITER contract, and one new F4E grant was acquired.

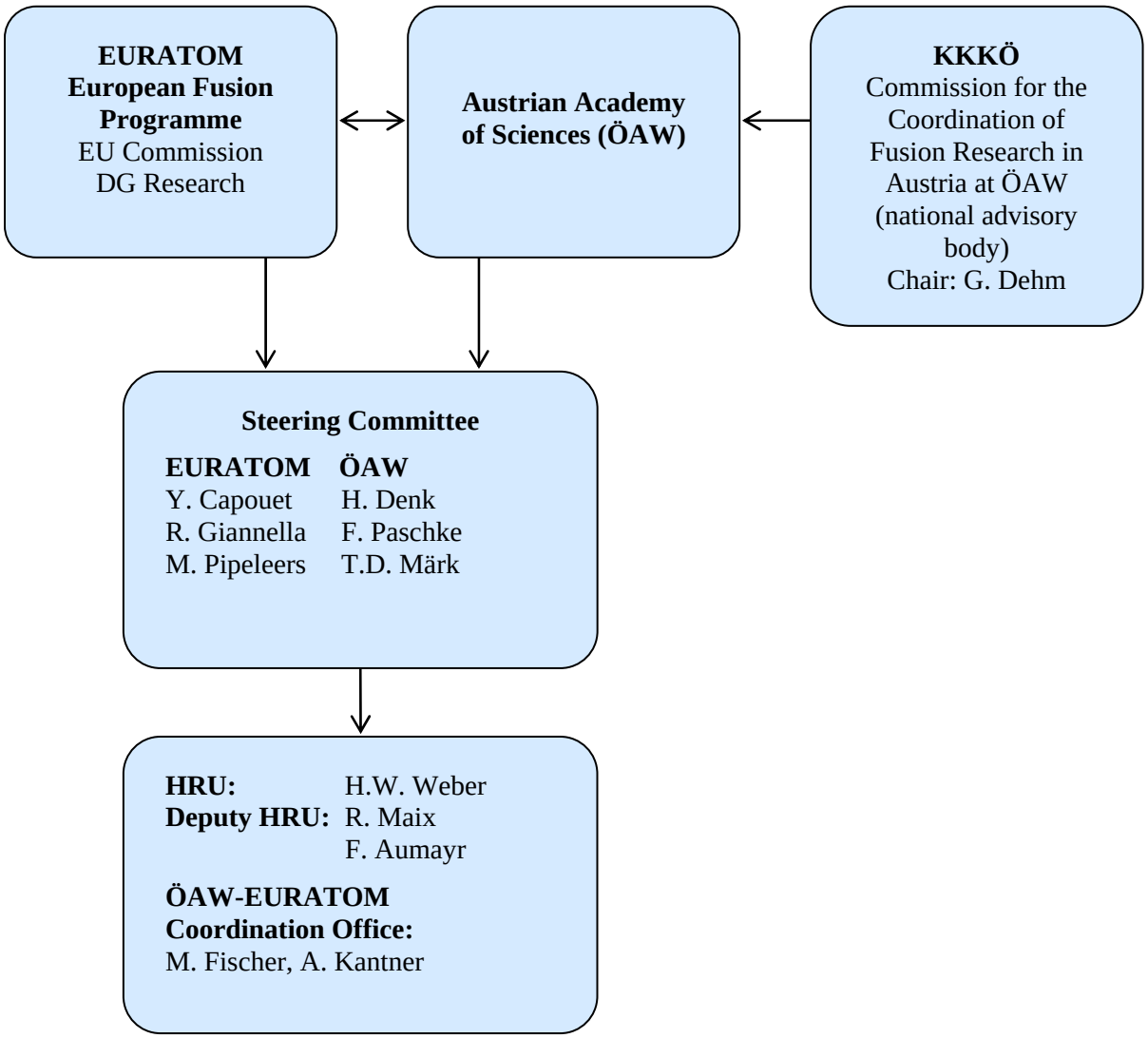
Despite the continuing difficult framework conditions, the Association EURATOM-ÖAW is well equipped to continue its participation in the European fusion programme and to maintain the acquired expertise. Scientists involved in the Austrian Fusion Programme and other interested parties are regularly informed about ongoing developments within the European Fusion Programme, including fellowships and job opportunities at ITER and F4E.

I wish to thank all individuals and institutions who have continuously supported us since the foundation of the Association in 1996:

the Austrian Minister for Science and Research and her representatives,
the President, Presiding Committee and staff of ÖAW,
the Austrian Commission for the Coordination of Fusion Research at ÖAW,
the responsible officers of the European fusion programme,
the EU and ÖAW delegates of the Association Steering Committee,
the staff of the ÖAW-EURATOM Co-ordination Office and, last but not least,
all scientists and technicians actively participating in Austrian fusion RTD.

Vienna, May 2011 (Harald W. Weber, Head of Research Unit)

ASSOCIATION EURATOM-ÖAW: MANAGEMENT STRUCTURE IN 2010



Scientific Programme in 2010:
Physics (6 EFDA Task Agreements)
Emerging Technologies (1 EFDA Task Agreement)
Participation in JET (1 order)

Meetings

25th Association Day: Austrian Academy of Sciences, 30 June 2010

Meetings of the Steering Committee:

29 June 2010, Austrian Academy of Sciences

19 November 2010, Austrian Academy of Sciences

FUSION TECHNOLOGY FOR FUTURE ENERGY GENERATION

ITER Baseline approved

At its meeting of 12 July 2010, the Council of the European Union mandated the Commission to support the adoption of the ITER baseline (project scope, schedule and costs) and capped the costs for the EU contribution to the ITER project during the construction phase (2007-2020) at € 6.6 billion (€ 600M less than the estimate by F4E in March 2010). The ITER baseline was approved at the extraordinary ITER Council on 28 July 2010, with a new strategy for cost savings and cost containment. The project entered the construction phase immediately after approval of the ITER Baseline in July 2010. A number of high-tech manufacturing contracts were placed at all ITER parties, including the vacuum vessel and the toroidal field coils.

On 28 July 2010, the ITER Council appointed Professor Osamu Motojima (Japan), Director-General of the ITER Organization. O. Motojima followed the ITER project since its inception and was a member of the ITER Council since 2007. He succeeded Kaname Ikeda, who had led the project since his nomination in November 2005.

Built to enable the production of ITER's largest components, the Poloidal Field Coil Winding Facility is 45 m wide and 17 m high. The finished coils will exit the building through the large door on the left.

Photo: F4E
Source: http://www.iter.org/

Fusion for Energy (F4E) - managing Europe's contribution to ITER

F4E is responsible for providing Europe's contribution to ITER, a world-wide scientific partnership that aims to demonstrate fusion as a viable and sustainable source of energy. ITER brings together seven parties that represent half of the world's population – the EU, Russia, Japan, China, India, South Korea and the United States.

In 2010, F4E signed a number of major procurement contracts, such as the Architect Engineer and Health and Safety contracts, the contract for the ITER Winding Packs and the contract for the vacuum vessel, ITER's biggest component. F4E also funds R & D actions in support of F4E tasks through F4E grants. Information on procurements, grants, open calls and other information can be found on the website http://fusionforenergy.europa.eu/.

To ensure cost containment as demanded by the Council of the European Union and to enhance efficiency of the organization, a new organization structure based on project teams was elaborated by the Director, Dr. Frank Briscoe, and approved by the F4E Governing Board.

Information for Austrian Industry

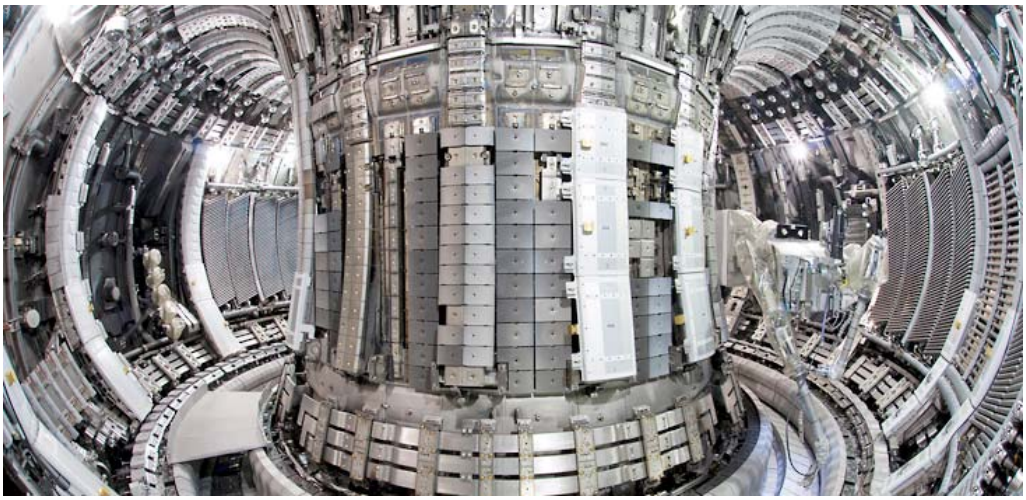
The Austrian Federal Chamber of Commerce acts as a contact forum for Austrian companies in the framework of a programme in support of international technology co-operation. The Austrian Liaison Officer (ILO) participated in all four ILO meetings which were organized by Fusion for Energy in Barcelona on 2 February, 22 April, 12 July and 19 October 2010. A small delegation of Austrian industry participated in the *F4E Second Information Meeting on Buildings for ITER* in Cadarache on 22 November 2010.

EFDA – a European scientific network in support of fusion research and development

On 26 March 2010 the EFDA Steering Committee appointed Francesco Romanelli as EFDA Leader for 18 months, succeeding Jerome Pamela, who had held the position of EFDA Leader for four years. Francesco Romanelli at the same time continued his assignment as EFDA Associated Leader for JET. The EFDA Steering Committee, which has the overall responsibility for the EFDA activities and ensures collaboration among the contracting Parties, asked the new EFDA Leader to propose a new structure for the EFDA top management. The new EFDA organization, which was approved at the beginning of 2011, features a re-reorganization of the EFDA Close Support Unit Culham into four departments (including Administration and Public Information) and the EFDA Close Support Unit Garching into two departments (ITER Physics Department and Power Plant Physics and Technology Department). Research and development promoted and coordinated by EFDA supports the creation of a knowledge base for ITER. R&D activities for DEMO, the demonstration plant planned to succeed ITER, is intended to be focused under the new Power Plant Physics and Technology Department. Information on EFDA, its mission and structure can be found on the website http://www.erda.org.

JET-shutdown completed

"Shutdown" in JET terms means to interrupt the experiments periodically to maintain and upgrade the fusion device. After this shutdown experiments will be performed leading to a better understanding of specific features of JET′s successor ITER. The current shutdown started on 26 October 2009. During the shutdown 86,000 components are changed inside the JET torus. The upgrade of the JET machine is expected to be completed in April 2011. The next experimental campaigns C28 and C29 will start in August 2011.



This picture was taken in February 2011 and shows the inside of the JET experiment. Almost all divertor tiles on the bottom of the machine have been installed remotely.

Photo: http://www.jet.efda.org/

The role of the Association EURATOM-ÖAW

The Association EURATOM-ÖAW acts as the Austrian research unit on fusion RTD, coordinating activities performed at the Vienna University of Technology, the University of Innsbruck, the Graz University of Technology, the Erich Schmid Institute of Materials Science at ÖAW in Leoben and the Research Studio Salzburg. It is also responsible for the dissemination of up-to-date information from the European collaborative network (R & D news, open calls, vacancies etc.) to all interested groups and individuals. General information on fusion energy, events, open calls, vacancies etc. can be found on the homepage http://www.oeaw.ac.at/euratom/.

Association EURATOM-ÖAW – Annual Report 2010 - Austrian Fusion RTD

EXECUTIVE SUMMARY

Research activities in 2010

I. PLASMA PHYSICS

I.1. Modelling and simulation of plasma phenomena

Control of plasma instabilities such as edge localized modes (ELMs) is of vital importance in fusion plasma research in order to reduce heat loads to the divertor target and plasma-facing components. ***D. Tskhakaya, S. Kuhn et al***. have developed the fully kinetic massively parallel code BIT1 for studying parallel transport in the ELMy and ELM-free SOLs. This particle-in-cell (PIC) code incorporates 1D plasma, 2D neutral and quasi-2D impurity models and includes plasma recycling and impurity sputtering. BIT1 thus represents a powerful kinetic tool for self-consistent modelling of the tokamak scrape-off layer (SOL).

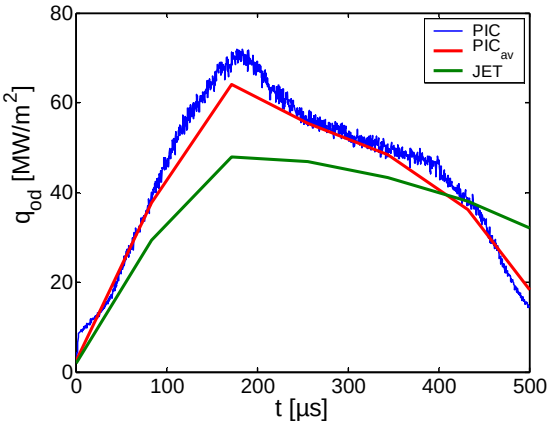


Figure 1. Power loads to the JET outer divertor during the ELM. Shot #74380. "PIC" and "PIC$_{av}$" denote direct and averaged over ~80 μs PIC simulation results. (D. Tskhakaya jun., S. Kuhn et al.)

The recently developed linear kinetic trace ion module TRACE for the Monte Carlo code EIRENE (***J. Seebacher, A. Kendl*** in cooperation with D. Reiter, FZ Jülich) has been applied to experimental situations in ASDEX Upgrade and JET. The module can treat impurity ions, e.g. tungsten W1-74+, on a kinetic level. Major features are neoclassical drift effects and a full Fokker Planck collision operator.

The magnetic activity (fluctuations of the vector potential and zonal fields) and zonal flows around rational magnetic surfaces for parameters typical in the edge of tokamaks have been further analyzed and statistically characterized by ATTEMPT simulations.

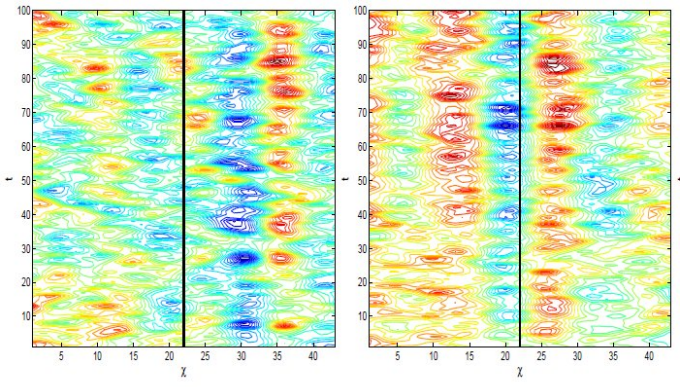


Figure 2. Poloidal density transport $G_y(x,t)$ induced by zonal flows in a radial-temporal domain: the flow structures show maxima around the localization of the q=3 resonant surface (A. Kendl, J. Seebacher et al.)

K. Schöpf et al. (University of Innsbruck) model fast-ion behaviour in tokamak plasmas to explain specific transport mechanisms as well as loss measurements of charged fusion products and injected ions in JET. In 2010, extensive work to couple the codes FIDIT and HAGIS was started. This combination will be suitable for investigating the non-linear interaction of MHD-modes with fast-ion distributions.

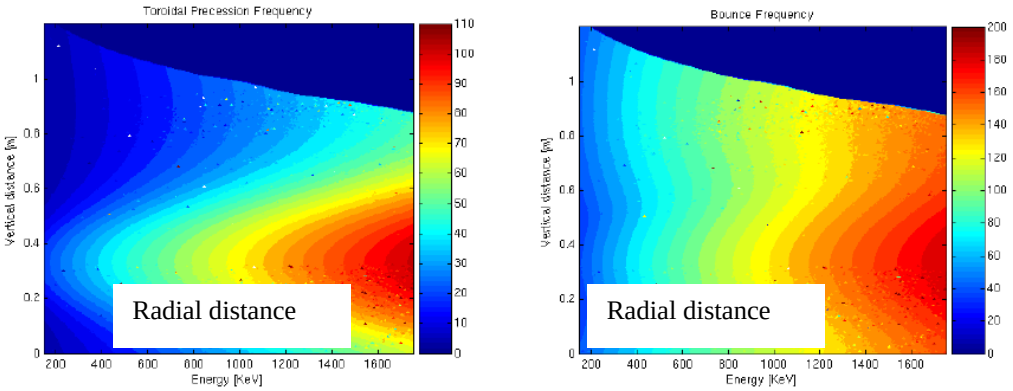


Figure 3. Contour plot of the poloidal precession frequency (left) and the bounce frequency (right) in dependence on the starting position of deuterons in the reduced {E, Z} phase space. Frequencies are in kHz. Particles with starting positions distributed over the reduced space were followed by HAGIS, and their toroidal precession frequencies ω_{ϕ} and poloidal bounce frequency ω_{Θ} were calculated as functions of energy E and ΔZ .

In the framework of scientific and technical tasks, ***F. Köchl*** (Vienna University of Technology) participated in the project "Integration of transport and MHD codes at JET" and continued ITER scenario modelling in co-operation with V. Parail et al. (JET Analysis and Modelling Group). F. Köchl's secondment to JET was interrupted to enable him to perform work in the framework of an F4E Grant on ITER scenario modelling during the first half of 2011.

W. Kernbichler et al. (Graz University of Technology) perform theoretical studies on transport and heating in toroidally confined plasmas and develop new numerical methods and fast computer codes for this purpose. They have long-standing expertise in stellarator modelling in cooperation with the major European stellarator laboratories. Modelling results from NEO-2 und NEO-MC on monoenergetic diffusion coefficients for various stellarator devices have been added to the data base of the International Collaboration on Neoclassical Transport in Stellarators. A comprehensive paper on this topic was submitted to Nuclear Fusion.

I.2. Studies on plasma-wall interaction (PWI)

F. Aumayr et al. (Vienna University of Technology) investigate processes of plasma wall-interaction, in particular wall erosion and fuel retention due to singly and multiply charged ion impact on fusion relevant wall materials, like tungsten and a-C:H using a quartz crystal microbalance setup. The measurements are carried out within the work programme of the EFDA Task-Force on Plasma-Wall-Interaction (TF-PWI). In addition, the group develops beam diagnostic methods at ASDEX Upgrade for time resolved electron and impurity density profile measurements. Atomic collision data relevant for plasma modelling and beam diagnostics are experimentally determined or calculated and compiled in data bases.

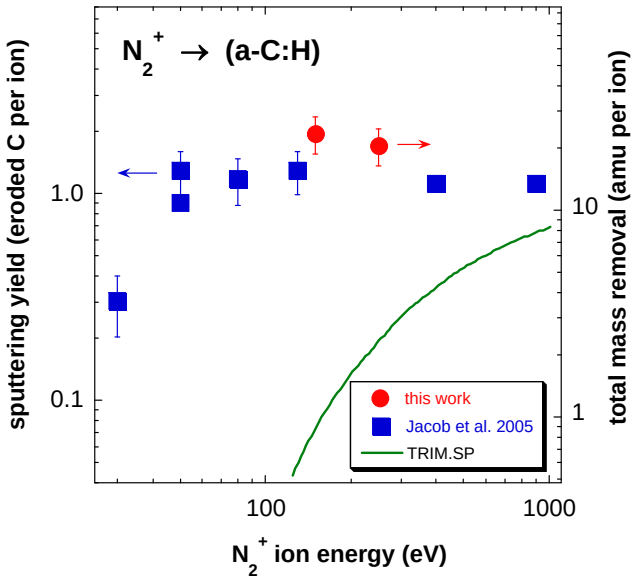


Figure 4. Comparison of the obtained steady-state sputtering yields for impact of N_2^+ ions on soft a-C:H with previous data for hard a-C:H and the results of TRIM.SP calculations, which only show kinetic sputtering contributions.

T.D. Märk, P. Scheier et al. (University of Innsbruck) investigate fusion-relevant plasma-wall interaction processes such as chemical erosion, deposition and transport, fundamental experimental and theoretical studies on atomic and molecular cross-sections.

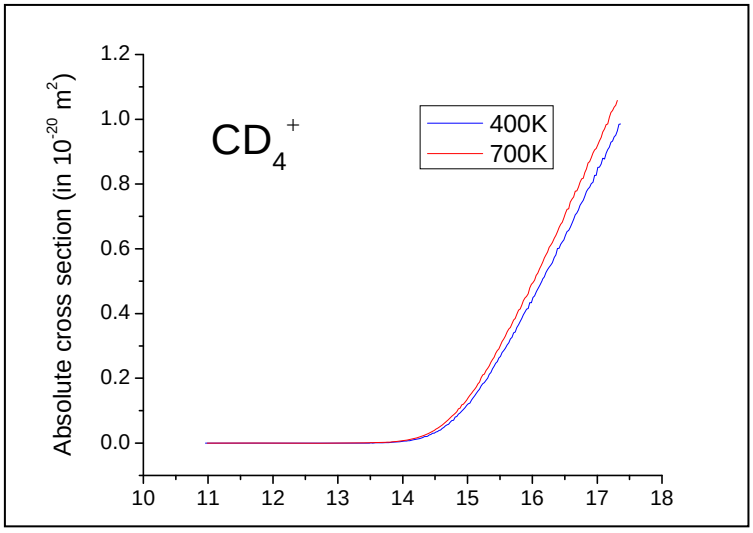


Figure 5. Ion efficiency curve of $(CD_4)^+$ formed upon electron ionization of CD_4 at the gas temperature of 400 K (blue line) and 700 K (red line), respectively.

M. Probst et al. continued their investigations of materials mixing by calculating and simulating graphene/graphite structures in interaction with various particles occurring in a fusion plasma.

I.3. Participation in the Work Programme 2010 of the EFDA Topical Groups

In 2010, scientists of the Association EURATOM-ÖAW participated in tasks of the EFDA Topical Groups on Diagnostics (D), Transport (T) and Plasma Stability and Control (MHD).

R. Schrittwieser, C. Ionita et al. (University of Innsbruck) collect data on plasma phenomena, especially ELMS (short, recurrent instabilities of the edge plasma) by various methods (plasma probes, specifically designed probe systems, magnetic coils) in cooperation with IPP Garching (ASDEX Upgrade), Consortio RFX, MHEST, IPP.CR and Risø (data evaluation). In cooperation with JET, inter-ELM and L-mode blobs and ELM post-cursors have been investigated. The group contributes to tasks of the EFDA Task-Force PWI and the EFDA Topical Groups.

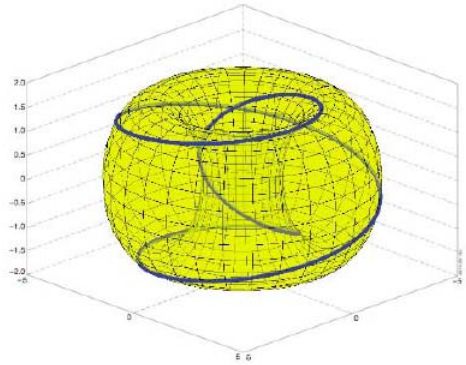


Figure 6. Visualization of the palm tree mode (PTM) filament on a q=3 surface. The PTM filament seems to be a closed 1D structure on a 3D *surface.*

A. Kendl et al. (University of Innsbruck) perform non-linear gyrofluid simulations of plasma edge turbulence and edge localized ideal ballooning modes using the GEMR code (by B.D. Scott, IPP Garching).

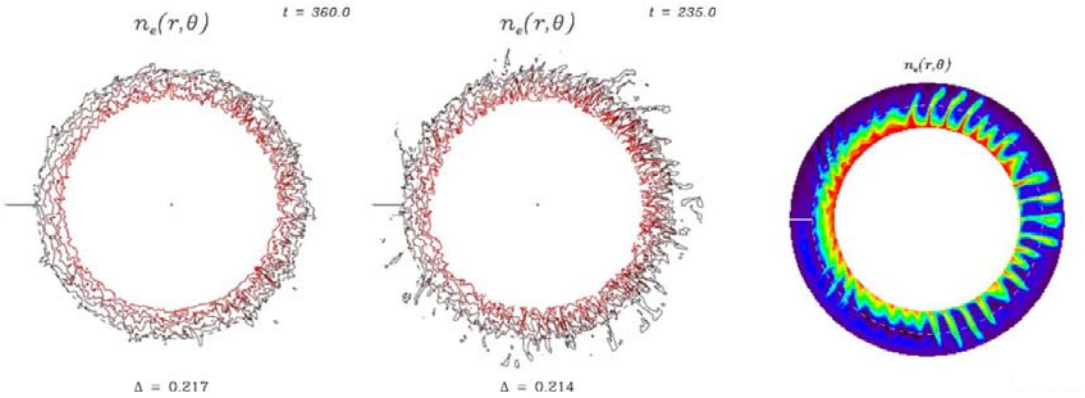


Figure 7. Morphology of the density in an edge annulus GEMR simulation, including profiles and turbulence in a single dependent variable (left) in quiescent phases and (centre) during a burst. Bursts take place when the mesoscale MHD region in the spectra receives an energy excess from the turbulence and then causes increased free energy access before its relatively slow self-decorrelation can act. Right: An ELM crash scenario as an extreme form of this burst phenomenon, driven by a long-wave MHD instability which then saturates on self-generated microturbulence. [B.D. Scott, A. Kendl, T. Ribeiro: Contrib. Plasma Physics 50, 228-241 (2010)].

II. EMERGING TECHNOLOGIES

II.1. Tungsten and tungsten alloy development

Prominent for its high melting point and high temperature strength, W is regarded as a promising material for components to be used in future fusion power plants.

However, its room temperature brittleness represents a major drawback, which reduces the formability of these components, and ultimately limits the usage of these materials. The goal of this work is to understand the fracture of tungsten in a comprehensive manner, including the influences of microstructure, impurity and alloying contents and temperature, in order to shift the DBT temperature to lower temperatures and / or to increase the fracture toughness values at low temperatures.

In earlier experiments, ***R. Pippan et al.*** (Erich Schmid Institute of Materials Science at ÖAW) discovered that the fracture toughness of tungsten-rhenium alloys is considerably higher compared to other tungsten alloys. Now other alloying elements are sought which may have similar effects on fracture toughness. High-pressure torsion and bending tests were performed on miniaturized samples.

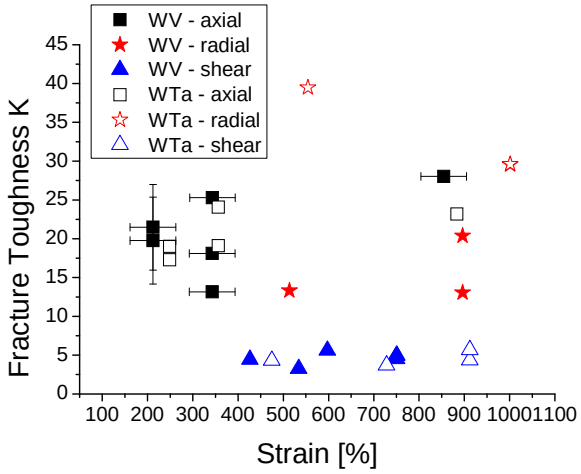


Figure 8. Fracture toughness of W-30%Ta and W-25%V composites for different testing directions as a function of applied equivalent von-Mises strain during high pressure torsion. The indicated directions are crack propagation directions.

II.2. High-temperature superconducting materials for fusion magnets

The evolving technology of high temperature superconductors (HTS) has shown interesting results, especially for applications at higher operating temperatures and magnetic fields. The successful manufacture and testing of a 70 kA HTS current lead has clearly demonstrated the feasibility of assembling larger components using HTS. One of the objectives of this study by ***H.W. Weber, M. Eisterer et al***. (Vienna University of Technology) is to analyse and document the development and improvement of industrial coated conductors.

Prototype cables consisting of 5 strands were investigated by means of the magnetoscan technique (see figure 9). The technique proved to be suitable for detecting defects along the cable.

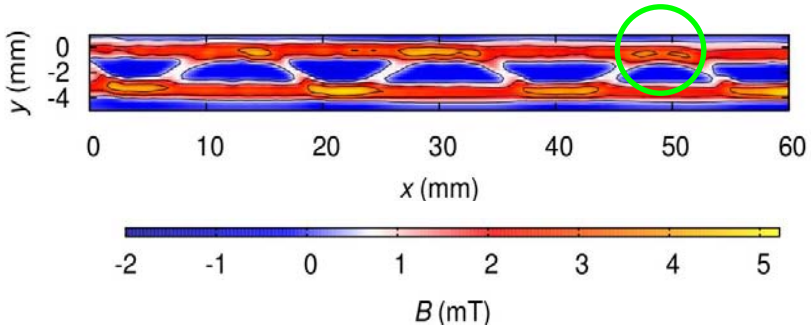


Figure 9. Magnetoscan of a prototype Roebel cable. The green circle highlights a defect.

III. SOCIO-ECONOMIC RESEARCH ON FUSION (SERF)

The objective of the EFDA World TIMES model is the description of a possible future development of the global energy system by implementing a forecast approach. The model comprises the whole range of energy related process chains and commodities. A special focus is dedicated to a possible future market entrance of fusion power. ***M. Biberacher et al.*** (Research Studios Austria / Salzburg) use the TASES (Time And Space reSolved Energy Simulation) model to elaborate a global energy module with a high penetration by solar and wind power as a validation scenario for the EFDA world TIMES model.

IV. TRAINING AND EDUCATION

The Association EURATOM-ÖAW consists of a network of scientific contributors to the fusion programme at three universities and the Austrian Academy of Sciences. Training and education of young researchers has always been a predominant goal within this network. Efforts to keep young researchers in the programme and to enable the continuation and / or completion of several studies described in the Annual Report 2010 have been further supported by a special programme of the Commission for the Coordination of Fusion Research in Austria (KKKÖ) at the Austrian Academy of Sciences.

In September 2010, the Head of Research Unit of the Association participated in the scientific organization of the 4rd Karlsruhe International Summer School on Fusion Technology. The Erich-Schmid Institute of Materials Sciences at ÖAW participates in the Coordination Action "Fusion Energy Materials Science" (FEMaS-CA).

V. RESEARCH GRANTS IN COOPERATION WITH ITER AND F4E

One group with significant experience in the field of ITER magnets successfully continued an ITER contract which had started in 2009. One small F4E research grant was acquired in the field of ITER scenario modelling.

VI. MEETINGS AND CONFERENCES

The University of Innsbruck organized the *18th European Fusion Physics Workshop* in Mayrhofen (Tyrol) from 6 to 8 December 2010. The workshop topic was *origin and impact of flows in fusion plasmas*.

In December 2010 fusion researchers met in Mayrhofen in the Tyrolean Zillertal to participate in the 18th European Fusion Physics Workshop.

Photo: EFDA Garching

An *Integrated Tokamak Modelling Code Camp* took place in Innsbruck from 6 to 17 December 2010. The meeting was chaired by Gloria Falchetto from CEA (ITM Task-Force Leader) and David Coster from IPP Garching (Deputy Leader of the ITM Task-Force). The local organizer was David Tskhakaya junior (Institute of Theoretical Physics, University of Innsbruck).

30 experts in numerical simulation of fusion plasmas met in Innsbruck to compare the results of simulations with different ITM codes.

Photo: University of Innsbruck

The *Annual Meeting of the Plasma-Wall-Interaction Task Force 2010* was held in Vienna from 3-5 November 2010 at the Vienna University of Technology. Almost 50 representatives of EURATOM Associations, EFDA and other European and international organizations participated in this event which was organized by F. Aumayr (TU Wien) with the support of the Coordination Office of the Association. The agenda covered the most urgent PWI-related issues for ITER and the progress made during 2010.

Annual Meeting of the EFDA Task-Force Plasma-Wall-Interaction, Vienna, 3-5 November 2010

Photo: F. Aumayr, Vienna University of Technology

VII. PUBLIC INFORMATION

Several lectures for high-school students and teachers were organized at the participating universities. In March 2011 the Vienna University of Technology hosted the Fusion Expo, a travelling exhibition designed for the general public to explain the principles of controlled thermonuclear fusion and to present the ITER project to the general public (http://www.fusion-expo.si/).

Participation of Austrian scientists in the EFDA Workprogramme 2010
List of tasks

PHYSICS	
Integrated Tokamak Modelling	
Transport code and discharge evolution	WP10-ITM-IMP3
Transport processes and micro stability	WP10-ITM-IMP4
Heating, current drive and fast particle physics	WP10-ITM-IMP5
Atomic, molecular, nuclear and surface physics data	WP10-ITM-AMNS
Plasma-Wall-Interaction	
Erosion, transport and deposition of low-Z wall materials	WP10-PWI-04
Development of the PWI basis in support of integrated high-Z scenarios for ITER. Demonstration of liquid plasma-facing components	WP10-PWI-05
Determination of expected alloys and compounds in ITER-relevant conditions and their influence on PWI processes and fuel retention	WP10-PWI-06
Mitigation of disruptions and investigations of ELM and inter-ELM heat loads	WP10-PWI-07
EFDA Topical Groups	
Diagnostics for burning plasmas	WP10-DIA-01
Experimental simulation of non-linear burning plasma	WP10-HCD-01-01
Specific heating and current drive physics for ITER	WP10-HCD-01-05
Off-axis current drive and rotation	WP10-HCD-01-06
Neutral-beam advanced technologies	WP10-HCD-02-02
Fast particle physics	WP10-MHD-01
Saw-tooth and tearing modes (NTMs), edge localised modes (ELMs) and stability at high beta (RWMs)	WP10-MHD-03
Physics of L-H transition	WP10-TRA-01
Statistical properties of edge turbulent transport	WP10-TRA-05
EMERGING TECHNOLOGIES	
Materials	
Tungsten and tungsten alloy development	WP10-MAT-WWALLOY

Participation in the EFDA-JET Workprogramme 2010

Integration of transport and MHD codes at JET	JW10-O-OAW10

Number of publications in 2010

Publications in scientific journals	31
Publications in conference proceedings	11
Presentations at conferences and workshops	45

FINANCIAL INFORMATION

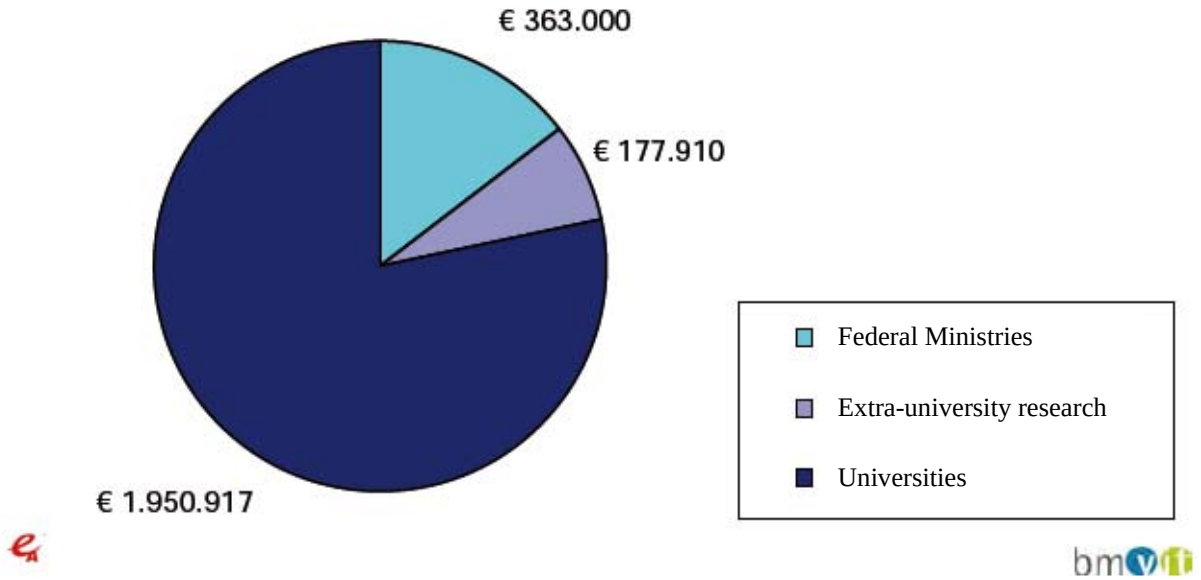
Table 1. Association EURATOM-ÖAW: expenditure and EURATOM support in 2009

(all figures in Euro)

	Expenditure	Support
Work performed in the framework of the Contract of Association		
Baseline support	2,890,920	453,800
Priority support	(268,700)	53,740
Sub-total 1	*2,890,920*	*507,540*
EFDA article 6.3 contracts (JET orders)	49,108	49,108
EFDA article 9 (secondments to Close Support Units)	67,137	67,137
Sub-total 2	*116,245*	*116,245*
TOTAL	**3,007,165**	**623,785**
Mobility	**143,350**	**143,350**

Source: Association EURATOM-ÖAW
Certified Annual Accounts for 2009

Distribution of national funding of fusion research (year 2009)

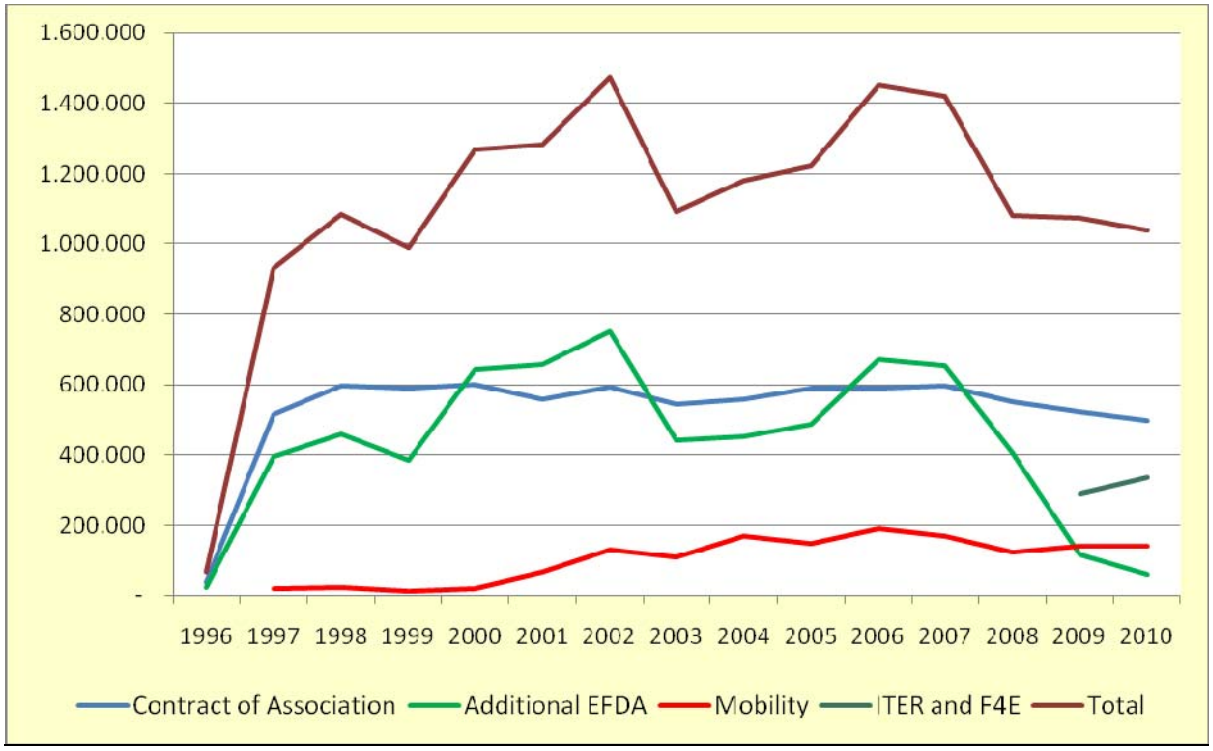


Source: Energieforschungserhebung 2009, Federal Ministry for Transport, Innovation and Technology

EURATOM support for Austrian fusion research projects

(1996-2010, in Euro)

The graph below shows the development of EURATOM support for Austrian fusion research projects from the establishment of the Association EURATOM-ÖAW in 1996 until the end of 2010. Individual lines are shown for support under the Contract of Association, additional support under EFDA (5.1a and 5.1b contracts under previous EFDA, participation in the EFDA-JET campaigns under orders, secondments of staff to Culham and Garching), missions and secondments in the framework of the Agreement on Staff Mobility and contracts with Fusion for Energy and the ITER Organization as of 2009. Participation in the Coordinated Support Actions of the 7th EU Framework programme is not included in the diagram.



Participation in Coordinated Support Actions (CSAs) of the 7th Framework Programme

Three groups participate in the three FP7 Coordinated Support Actions of the EURATOM Fusion Programme:

Institute of Ion Physics and Applied Physics, University of Innsbruck: *Fusion Education*

Institute of Applied Physics, Vienna University of Technology: *Fusion Data*

Erich-Schmid Institute of Materials Science at ÖAW: *Fusion Materials*

AUSTRIAN REPRESENTATIVES IN EUROPEAN COMMITTEES RELEVANT FOR FUSION RESEARCH AND DEVELOPMENT (2010)

Consultative Committee for the EURATOM Specific Programme on Nuclear Energy Research

Dr. Daniel Weselka	Federal Ministry of Science and Research
Mag. Volker Holubetz	Federal Ministry of Forestry and Agriculture, Environment and Water-Economy
Univ.Prof.Dr. Harald W. Weber	Institute of Atomic and Subatomic Physics / Vienna University of Technology

EFDA Steering Committee

Univ.Prof.Dr. Harald W. Weber	Institute of Atomic and Subatomic Physics / Vienna University of Technology
Dr. Daniel Weselka	Federal Ministry of Science and Research

EFDA Scientific and Technical Advisory Committee (EFDA-STAC)

Univ.Prof.Dr. Friedrich Aumayr	Institute of Applied Physics / Vienna University of Technology

Governing Board of *Fusion for Energy*

Univ.Prof.Dr. Harald W. Weber	Institute of Atomic and Subatomic Physics / Vienna University of Technology
Dr. Daniel Weselka	Federal Ministry of Science and Research

Executive Committee of *Fusion for Energy*

Dr. Reinhard Maix	Institute of Atomic and Subatomic Physics / Vienna University of Technology

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High-Performance Computer (FZ Jülich)	Dr. David Tskhakaya	Institute for Theoretical Physics, University of Innsbruck

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CONTENTS OF THE FULL REPORT AS CONTAINED ON THE ENCLOSED CD AND ON THE WEBSITE http://www.oeaw.ac.at/euratom

Back cover: Opening of the Fusion Expo, Vienna University of Technology, 1 March 2011:
First row from left to right: S. Kuhn, M. Fischer, P. Niekchen (EFDA), F. Aumayr, H.W. Weber, R. Schrittwieser, A. Kantner, R. Giannella (European Commission), K. Schöpf
Second row from left to right: R. Kamendje, (IAEA), G. Janeschitz (ITER), W. Kernbichler, R. Kaiser (IAEA)

Photo: Vienna University of Technology

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