



# 11<sup>th</sup> International Symposium on Fusion Nuclear Technology

16-20 September 2013. Barcelona, Spain



## Final Programme

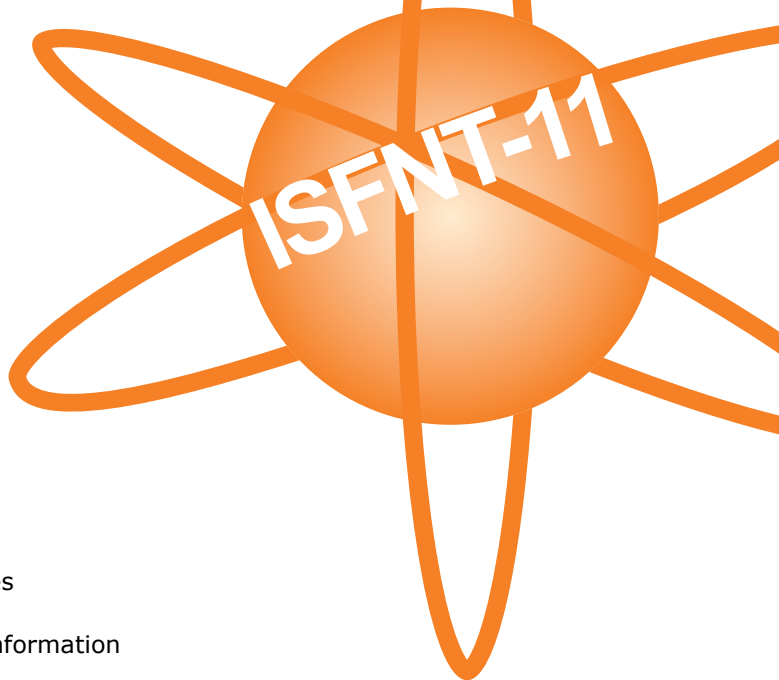
### Organizers:



MINISTERIO  
DE ECONOMÍA  
Y COMPETITIVIDAD



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# Welcome

Dear colleague,

On behalf of the Local Organizing Committee, it is our pleasure to welcome you to the 11th International Symposium on Fusion Nuclear Technology (ISFNT), held in Barcelona, Spain, from 16-20 September 2013.

The main goal of the ISFNT, which has been recognized as one of the main international gathering for fusion energy, is fostering collaborations among scientists and engineers working on the many technical disciplines of the field and to exploit synergies that have arisen in order to identify means to resolve the key issues in Fusion Nuclear Science and Technology. The symposium focuses on both near-term fusion devices and long-term reactor technologies with special attention to science, engineering, experiments, facilities, modeling, analysis, design and safety.

The ISFNT-11, hosted by Ciemat and IREC, presents a scientific program with more than 450 contributions, including a dedicated Fusion Road Map Panel with recognized international experts worldwide. In addition, ISFNT-11 presents a complete Industrial Program with an Industrial Exhibition, an Industrial Forum focused to the ITER project and a B2B/B2C platform in order to foster communication between academia and industry.

Linked to the ISFNT-11 it will be also held a number of satellite meetings and workshops. Between them it can be mentioned the 17th IEA International Workshop on the Ceramic Breeder Blankets:, the 11th IEA International Workshop on Beryllium Technology or the IEA Liquid Breeders Blankets Subtask Workshop.

The International Symposium on Fusion Nuclear Technology-11 will continue its recognized tradition of excellence and stimulate the interest of its participants.

We wish you a successful ISFNT-11 in Barcelona!

Yours sincerely,



Joaquín Sánchez  
Director of National Fusion Laboratory. CIEMAT  
General Chairman ISFNT-11

# Committees

## Symposium Committee

- Honorary Chair:** F. Puig, Minister of Enterprise and Labour, Catalonia
- General Chair:** J. Sánchez, Director of National Fusion Laboratory (CIEMAT)
- General Co-Chair:** H. Bindslev, Director of Fusion for Energy.
- Scientific Secretary:** A. Ibarra, Head of Fusion Technology Division (CIEMAT)

## Local Organizing Committee

**Chair:** M. Sanmartí (IREC)

- O. Nomen, I. Martínez (IREC)  
D. Dabbah, F. Carbajo, A. García, R. Román, J. Molla (CIEMAT)  
G. Prats (ACC10)  
G. Domakowski (b\_TEC)  
A. del Cerro (CDTI)  
J. Dies, J. Abal (UPC)  
B. Perier (F4E)

## ISFNT International Standing Committee Members

**Chair:** H. Takatsu. JAEA, Japan

- M. Abdou. UCLA, USA  
L. Boccaccini. FZK, Germany  
S. Cho. NFRI, Korea  
S. Deshpande. IPR, India  
G. Federici. EFDA, Germany  
K. Feng. SWIP, China  
L. Giancarli. ITER, France  
T. Hayashi. JAEA, Japan  
B. Hong. Chonbuk National University, Korea  
A. Ibarra. CIEMAT, Spain  
G. Janeschitz. ITER, France  
A. Kohyama. Kyoto University, Japan  
E. Rajendra. Kumar IPR, India  
J. Li. ASIPP, China  
D. Maisonnier. European Commission  
I. Mazul. EFREMOV, Russia  
K. McCarthy. INL, USA  
W. Meier. LLNL, USA  
B. J Merrill. INL, USA  
N. Morley. UCLA, USA  
C. Pan. SWIP, China  
Y. Poitevin. F4E, Spain  
J. Sánchez. CIEMAT, Spain  
Y. Strebkov. NIKIET, Russia  
S. Tanaka. Tokyo University, Japan  
Y. Wan. USTC China  
Y. Wu. ASIPP, China

## International Programme Committee

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- The background of the page features a large, faint watermark of the ITER logo, which is a stylized orange sun with rays and the number '11' in the center.
- M. Y. Ahn, Korea  
P. Batistoni, EU  
L. Boccaccini, EU  
S. Cho, Korea  
C. Day, EU  
L. Deli, China  
S. Desphande, India  
E. Diegele, EU  
M. Enoeda, Japan  
W. Farong, China  
G. Federici, EU  
K. Feng, China  
J. M. Filhol, EU  
U. Fischer, EU  
L. Giancarli, ITER Organization  
A. Hasegawa, Japan  
T. Hayashi, Japan  
Y.S. Hwang, Korea  
G. Janeschitz, ITER Organization  
G. Kalinin, Russia  
S. Khirwadkar, India  
A. Kohyama, Japan  
S. Konishi, Japan  
R. Kurtz, USA  
D. W. Lee, Korea  
N. Mingjiu, China  
D. Maissonier, EU  
P. Magaud, EU  
I. Mazul, Russia  
W. Meier, USA  
M. Merola, ITER Organization  
B. Merrill, USA  
A. B. Mineev, Russia  
N. Morley, USA  
R. Nygren, USA  
K. Okuno, Japan  
Y. Poitevin, EU  
H. Qunying, China  
R. Raffray, ITER Organization  
E. Rajendra Kumar, India  
S. Reyes, USA  
B. Rodchenkov, Russia  
A. Sagara, Japan  
S. Smolentsev, USA  
R. Srinivasan, India  
Y. Strebkov, Russia  
S. Suzuki, Japan  
H. Tanigawa, Japan  
N. Taylor, ITER Organization  
M. Q. Tran, EU  
Y. Ueda, Japan  
M. A. Ulrickson, USA  
C. Wong, USA  
Y. Wu, China  
J. Xin, China  
T. Yamanishi, Japan  
A. Ying, USA

# Practical Information

## About Barcelona

Barcelona is a dynamic, welcoming city and one of the major economic and business centers of the Mediterranean Europe. The Catalan capital has a modern hotel infrastructure and boasts first rate shops and leisure, cultural and tourist attractions; all these traits have made Barcelona a first classtourist destination, and the ideal place for meetings and congresses.

Barcelona enjoys a Mediterranean climate with mild, sunny winters, warm summers and relatively low rainfall. Temperatures during September are usually mild (20 to 25 degrees Celsius), and are very pleasant in the evening.

## Getting around

Barcelona has a complete public transport network including metro, tramway, buses and local trains. Sants Station is a multi modal station (train, bus and metro) not far from the venue. In Sants Station you can go in high speed to Madrid or Seville.

From the airport: An aerobus departs every 5 minutes from the Barcelona airport and stops at Plaça Espanya (the stop is located at 5 minutes from the venue) and Plaça Catalunya (City center).

## Taxis

Taxis in Barcelona may be ordered by phone, picked up at authorized taxi stands or flagged down in the street. Taxis must usually be paid in cash though some accept credit cards.

Radio Taxi: +34 933 03 30 33

Taxi for disabled people: +34 935 51 93 68

## Commercial opening times

Opening times for banks: In general, banks and savings banks open from 08.30 a.m. to 02.00 p.m. from Monday to Friday. There is an extended cash-point machines all over the city.

Shopping centers are open Monday - Saturday from 10:00 - 22:00.

## Useful telephones

For emergencies: 112

Municipal Police: 092

Bus station: +34 934913183

RENFE (Spanish railway): Customer Service + 34 902 320 320

## Palau de Congressos de Barcelona

The Conference will be held in the Palau de Congressos de Barcelona in exclusivity:

Avda. Reina Maria Cristina s/n  
08004 Barcelona



This venue offers a wide space for commercial, cultural and scientific events with all the necessary technical facilities. Located in downtown Barcelona, it allows easy access to all historical and tourist attractions, hotels and shopping areas.

The venue is easily accessible by subway: stop Espanya (green and red line) is at only 2 minutes walking.

ISFNT counts with:

- . 1500 sq.m for industrial exhibition and poster presentations
- . Auditorium with a capacity of over 1600 attendees
- . Breakout rooms
- . Cafeteria

### Badge Pick up

Technical Secretariat is in the Hall of the Congress Centre. Bags and accreditations can be picked up on Sunday September 15<sup>th</sup> 16:00 to 18:00 and on Monday - Friday from 8:00.

### Language

The working language of ISFNT is English

### Coffee Breaks (morning and afternoon)

There will be a coffee break every morning from 10.30-11.00 and every afternoon from 16.00- 16.30 (except Wednesday and Friday).

### Internet Access

There is free wi-fi internet access at the meeting venue. The network name is ISFNT-11.

### Cafeteria Opening Times

There is a Cafeteria inside the Palau de Congressos de Barcelona for attendees to purchase sandwiches and drinks. It will be open from 8:30 - 16:00 and is located in level 2.

Nearby restaurants also offer some affordable menus.

# Author's Information

## Oral presentation's Upload

You can upload your presentation in the speaker's room (room 10, second level).

Acceptable presentation formats are PPT, PPTX and PDF. The presentation must be given in the day before except for Monday presentations, that must be uploaded two hours in advance.

## Instructions for Oral Presenters

Talks are scheduled in different time slots.

40 minutes for Keynotes Speakers + 5 min. for Q&A

30 minutes for Plenary Speakers + 5 min. for Q&A

25 minutes for Oral communications + 5 min. for Q&A

Keynotes and Plenary presentations are allocated in room 7 (Auditorium); other oral presentations are allocated in rooms 5 and 6.

## Poster Presentations

The poster boards are located on the ground floor and are numbered. Posters are divided in three two-hour sessions, as follows:

\* Tuesday 17th 16:00 to 18:00 (*posters for this session can be put up from 10.00*)

\* Wednesday 18th 11:00 to 13:00 (*posters for this session can be put up from 08.30*)

\* Thursday 19th 16:00 to 18:00 (*posters for this session can be put up from 10.00*)

Each poster presentation will be displayed for the day of the poster schedule. Authors are kindly requested to be available for discussion of their work during the designated poster sessions. Posters should be installed in the morning and removed after the poster session (but no later than 19.00). Left over posters will be thrown away.

## Notice board

A notice board is located in the reception desk area for Symposium announcements and for delegates to place messages for each other. Please refer to this notice board for any changes in the programme or arrangements during the symposium.



## Satellite meetings

Pre-congress, during and post-congress satellite meetings are arranged.

During the symposium, the satellite meetings are held in rooms 3 and 4. Please refer to the general programme for further information.

Please be aware that most of the satellite meetings are restricted and require invitation.

## SOCIAL EVENTS

### Welcome Cocktail

All participants are invited to attend the Welcome Cocktail on Monday September 16<sup>th</sup> at 18.00 at the Symposium venue.

### Congress Dinner

The congress dinner will be on Thursday September 19<sup>th</sup> at 20.00.

Venue: Teatre Nacional de Catalunya (TNC)  
Address: Plaça de les Arts, 1

#### *How to get there*

#### Metro

Line 1 (Stops: Glòries and Marina)

Line 2 (Stop: Monumental)

#### Tram

Line T4 (Stop: L'Auditori /Teatre Nacional)

Line T5 (Stop: Glòries)

*Please note that transport to the congress gala dinner site is not provided by the organization.*



## Industrial Exhibition

Booths are located in the main hall near the entrance. Attendees are encouraged to spend time visiting the booths and interacting with the exhibitors, commercial and nonprofit exhibitors.

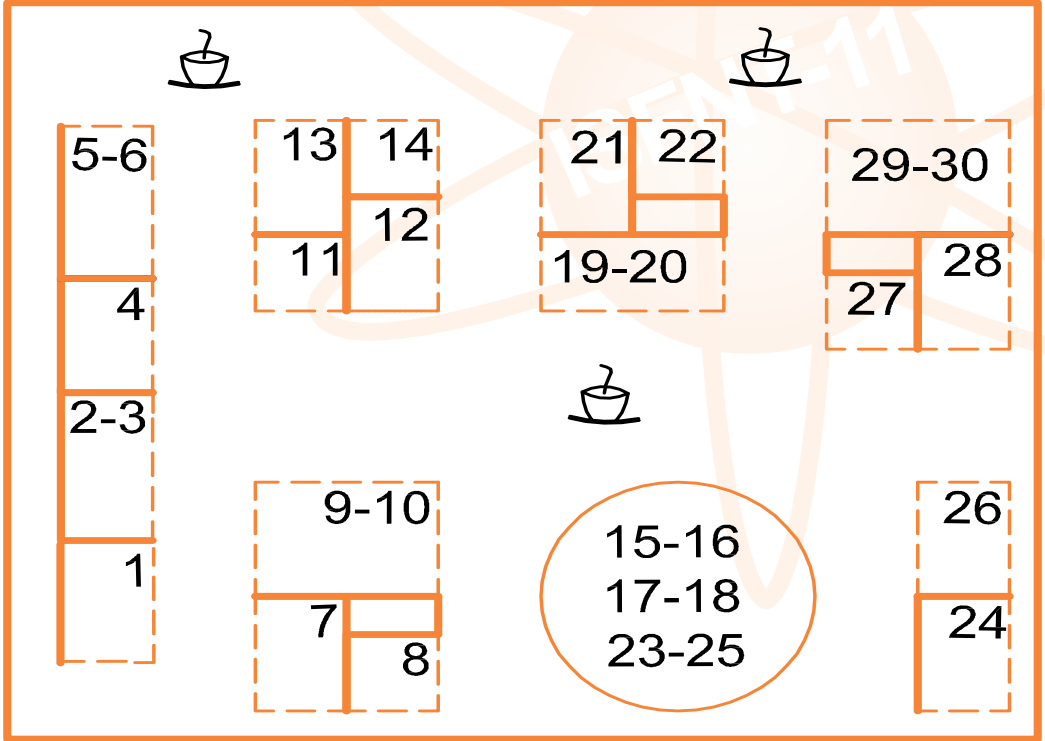
## Industrial Exhibition Schedule

|                             |                |
|-----------------------------|----------------|
| Monday, 16 <sup>th</sup>    | 10.30 to 18.00 |
| Tuesday, 17 <sup>th</sup>   | 09.00 to 18.00 |
| Wednesday, 18 <sup>th</sup> | 09.00 to 18.00 |
| Thursday 19 <sup>th</sup>   | 09.00 to 18.00 |
| Friday, 20 <sup>th</sup>    | 09.00 to 13.30 |

Dismantling: Friday, 20<sup>th</sup> starting from 13:30

# Industrial Exhibition

## Exhibition Floor Map



# Industrial Exhibition

## Exhibitors list

Stand 1:



Stand 2-3:



Stand 4:



Stand 5-6:



Stand 7:



Stand 8:



Stand 9-10:



Stand 11:



Stand 12:



Stand 13:



Stand 14:



Stand 19-20:



Stand 15-16-17-18-23-25:



Stand 21:



Stand 22:



Stand 24:



Stand 26:



Stand 27:



Stand 28:



Stand 29-30:



## Industrial Workshop

An Industrial Workshop will be held within the Symposium on Tuesday, September 17<sup>th</sup>. Please refer to the general programme for detailed information.

## Fusion Road Map Panel

Road Map Panel (Tuesday, 17<sup>th</sup>, 11.00 - 13.00) is thought to be a lively session and attendees are offered the opportunity to submit their questions to the Panel Members in advance. You may submit your question through the website of the Congress, tab Fusion Road Map Panel (detailed programme is available in pages 32-35).

## B2B and C2B Meetings

During the ISFNT symposium delegates and companies will hold B2B and C2B meetings in a dedicated space. Pre-registration is required through the B2B platform that is available on the website.

## Technical Visits

Two technical visits are offered for participants on Wednesday 18<sup>th</sup> in the afternoon. Registration is required.

*ALBA* is a third generation Synchrotron Light Facility located in Cerdanyola del Vallès, near Barcelona. It is constructed and operated by the CELLS consortium and is co-financed by the Catalan and Spanish governments. The storage ring commissioning and the installation of the first seven beamlines are completed. First users are visiting the laboratory since May 2012.

### *Schedule of the buses*

Visit 15.00 - 17.00. The bus will depart at 14.00 from the Conference Center  
Visit 17.00 - 19.00. The bus will depart at 16.00 from the Conference Center

### *MareNostrum: Barcelona Supercomputing Center*

BSC-CNS (Barcelona Supercomputing Center – Centro Nacional de Supercomputación) is the National Supercomputing Facility in Spain and was officially constituted in April 2005. BSC-CNS manages MareNostrum, one of the most powerful supercomputers in Europe, located at the Torre Girona chapel in Barcelona.

The mission of BSC-CNS is to investigate, develop and manage information technology in order to facilitate scientific progress. With this aim, special dedication has been taken to areas such as Computer Sciences, Life Sciences, Earth Sciences and Computational Applications in Science and Engineering.

### *Schedule of the buses*

Visit 15.00 - 17.00. The bus will depart at 14.15 from the Conference Center  
Visit 17.00 - 19.00. The bus will depart at 16.15 from the Conference Center

# Meeting at a Glance

| Time        | Sunday 15th   | Monday 16th   |   |   |
|-------------|---|---|---|---|
| 8:00        |   | <b>Registrations</b>  |   |   |
| 09:00-10:30 |   | <b>Opening Session</b><br>Dr. Takatsu<br>Dr. Joaquín Sánchez<br>Ms. Carmen Vela<br>Mr. Pere Torres<br>Dr. H. Bindslev<br>9:45 - 10:30 11.1: O. Motojima (ITER)<br>10:30 - 11:00 <b>Inauguration of the Industrial Exhibition by Authorities</b> |   |   |
| 10:30-11:00 |   | <b>Coffee break</b>   |   |   |
| 11:00-13:00 |   | <b>Plenary Session 1</b><br>11.2 F. Romanelli<br>11.3 H. Horiike<br>11.4 G. Lee   |   |   |
| 13:00-14:30 |   | <b>Lunch break</b>  |   |   |
| 14:30-16:00 |   | <b>Parallel M1</b><br><b>Topic B: Blankets-Special TBMs</b><br>O1A.1 Y. Poitevin<br>O1A.2 S. Cho<br>O1A.3 R. Bhattacharyay  | <b>Parallel M2</b><br><b>Topic D: Materials</b><br>O1B.1 S. Zinkle<br>O1B.2 B. Wirth<br>O1B.3 A. Hasegawa   | <b>Parallel M3</b><br><b>Topic E: Exvessel</b><br>O1C.1 A. Dans<br>O1C.2 P. Bruzzone<br>O1C.3 A. Bhardwaj     |
| 16:00-16:30 |   | <b>Coffee break</b>   |   |   |
| 16:30-18:00 | <b>Registration Opens</b>   | <b>Parallel M4</b><br><b>Topic B: Blankets - Special TBMs</b><br>O2A.1 K.M. Feng<br>O2A.2 S. Smolentsev<br>O2A.3 M. Enoeda  | <b>Parallel M5</b><br><b>Topic D: Materials</b><br>O2B.1 H. Tanigawa<br>O2B.2 V. Chernov<br>O2B.3 H. Hirose | <b>Parallel M6</b><br><b>Topic G: Safety Issues</b><br>O2C.1 N. Taylor<br>O2C.2 J. Pamela<br>O2C.3 B. Merrill |
| 18:00-20:00 |   | <b>Welcome Cocktail</b>   |   |   |
| 20:00-23:00 | Free External Event of Cultural Interest: <b>The Magic Fountain Illuminations in Montjuic.</b><br>Located next to the venue.<br>Passes at 21:00, 21:30, 22:00, 22:30 and 23:00. |   |   |   |

Industrial Exhibition

# Meeting at a Glance

| Time        | Tuesday 17th  |   |   |
|-------------|---|---|---|
| 8:00        | Registrations   |   |   |
| 08:30-10:30 | <b>Parallel T1</b><br><b>Topic B: Blankets</b><br>O3A.1 M. Abdou<br>O3A.2 A. Li-Puma<br>O3A.3 P. Calderoni<br>O3A.4 E. Mas De Les Valls | <b>Parallel T2</b><br><b>Topic F: Neutronics</b><br>O3B.1 M. Loughlin<br>O3B.2 K. Tobita<br>O3B.3 U. Fischer<br>O3B.4 S. Yu | <b>Parallel T3</b><br><b>Topic G: Safety Issues</b><br>O3C.1 Y. Hatano<br>O3C.2 K. Okano<br>O3C.3 B. Kolbasov<br>O3C.4 Y. Ikeda |
| 10:30-11:00 | Coffee break  |   |   |
| 11:00-13:00 | Road Map Panel  |   |   |
| 13:00-14:30 | Lunch break   |   |   |
| 14:30-16:00 | <b>Parallel T4</b><br><b>Topic B: Blankets</b><br>O4A.1 A. Ying<br>O4A.2 L. Bühler<br>O4A.3 J. Van Lew                                  | <b>Parallel T5</b><br><b>Topic D: Materials</b><br>O4B.1 A. Moeslang<br>O4B.2 C. Chang-An<br>O4B.3 R. Vila                  | Industrial Workshop   |
| 16:00-16:30 | Coffee Break  |   |   |
| 16:30-18:00 | Posters P1  |   |   |

# Meeting at a Glance

Meeting at a Glance

| Time        | Wednesday 18th   |   |  |
|-------------|--|---|--|
| 8:00        | Registrations  |   |  |
| 08:30-10:30 | <b>Parallel W1</b><br><b>Topic A: First Wall</b><br>O5A.1 S. Khirwadkar<br>O5A.2 Y. Ueda<br>O5A.3 M-J. Ni<br>O5A.4 H. Groeneveld | <b>Parallel W2</b><br><b>Topic F: Neutronics</b><br>O5B.1 D.B Syme<br>O5B.2 J. Song<br>O5B.3 M.Sawan<br>O5B.4 F. Damian | <b>Parallel W3</b><br><b>Topic K: Inertial Confinement</b><br>O5C.1 W. Meier<br>O5C.2 M. Perlado<br>O5C.3 S. Reyes<br>O5C.4 B. Lee |
| 10:30-11:00 | Coffee break   |   |  |
| 11:00-13:00 | Poster P2  |   |  |
| 13:00-14:30 | Lunch break  |   |  |
| 14:30-16:00 | Technical Visits   |   |  |
| 16:00-16:30 |  |   |  |
| 16:30-18:00 |  |   |  |

Industrial Exhibition

# Meeting at a Glance

| Time        | Thursday 19th   |   |   |
|-------------|---|---|---|
| 8:00        | Registrations   |   |   |
| 08:30-10:30 | <b>Plenary Session 2</b><br>I2.1 Y. Wu<br>I2.2 B. Kuteev<br>I2.3 A. Garofalo  |   |   |
| 10:30-11:00 | Coffee break  |   |   |
| 11:00-13:00 | <b>Parallel Th1</b><br><b>Topic A: First Wall</b><br>O6A.1 R. Raffray<br>O6A.2 S. Suzuki<br>O6A.3 A. Gervash O6A.4 J. Bucalossi | <b>Parallel Th2</b><br><b>Topic H: FNT- Special Neutron sources</b><br>O6B.1 J. Knaster<br>O6B.2 R. Heidinger<br>O6B.3 E. Surrey<br>O6B.4 M. Pillon | <b>Parallel Th3</b><br><b>Topic I: Repair &amp; Maintenance</b><br>O6C.1 C. Damiani<br>O6C.2 M. Siuko<br>O6C.3 S. Kakudate<br>O6C.4 A. Loving |
| 13:00-14:30 | Lunch break   |   |   |
| 14:30-16:00 | <b>Parallel Th4</b><br><b>Topic A: First Wall</b><br>O7A.1 J. Aktaa<br>O7A.2 G-N. Luo<br>O7A.3 P. Norajitra                     | <b>Parallel Th5</b><br><b>Topic D: Materials</b><br>O7B.1 D. Stork<br>O7B.2 T. Jayakumar<br>O7B.3 A. Kohyama  | <b>Parallel Th6</b><br><b>Topic I: Repair &amp; Maintenance</b><br>O7C.1 F. Penzel<br>O7C.2 H. Wu<br>O7C.3 A. Martin                          |
| 16:00-16:30 | Coffee Break  |   |   |
| 16:30-18:00 | Poster P3   |   |   |
| 18:00-20:00 |   |   |   |
| 20:00-23:00 | Gala Dinner   |   |   |

Industrial Exhibition



# Meeting at a Glance

| Time        | Friday 20th   |   |  |                       |
|-------------|---|---|--|-----------------------|
| 8:00        | Registrations   |   |  |                       |
| 08:30-10:30 | <b>Parallel F1</b><br><b>Topic H: FNT</b><br>O8A.1 M. Gasparotto<br>O8A.2 A. Sagara<br>O8A.3 S. Konishi<br>O8A.4 E. di Pietro | <b>Parallel F2</b><br><b>Topic C: Fuel Cycle</b><br>O8B.1 C. Wong<br>O8B.2 K. Ochiai<br>O8B.3 T. Giegerich<br>O8B.4 I. Ricapito | <b>Parallel F3</b><br><b>Topic J: Plasma &amp; L: Fission-Fusion</b><br>O8C.1 A. Kellman<br>O8C.2 A. Fukuyama<br>O8C.3 M. Cavinato<br>O8C.4 Wang | Industrial Exhibition |
| 10:30-11:00 | Coffee break  |   |  |                       |
| 11:00-13:00 | <b>Plenary Session 3</b><br>I3.1 G. Federici<br>I3.2 M. Merola<br>I3.3 P. Batistoni   |   |  |                       |
| 13:00-13:30 | Closing Session   |   |  |                       |

# Programme

## MONDAY 16<sup>th</sup> SEPTEMBER

09:45 – 10:30 **Opening Ceremony**  
**Auditorium**

**Chairs:** Takatsu, H. and Sánchez, J.

- Takatsu, H. ISC Representative
- Sánchez, J. Chairman of ISFNT-11
- Torres, P. Secretary of Enterprise and Competitiveness, Generalitat de Catalunya
- Bindslev, H. F4E Director

09:45 – 10:30 **I1.1 ITER Project Status Report**  
Motojima, O.

10:30 – 11:00 **Inauguration of the ISFNT-11 Industrial Exhibition**  
**by Authorities**

Opening Ceremony Authorities and Mr. Dirk Kremer,  
Vice-Consul of Netherlands in Barcelona.  
Visit to the Industrial Exhibition

10:30 – 11:00 **Coffee Break**

11:00 – 13:00 **PLENARY SESSION 1**  
**Auditorium**

**Chairs:** Motojima, O. and Abdou, M.

**I1.2 A Road Map to the realization of Fusion Energy**  
Romanelli, F.

**I.1.3 Overview of Activities and Strategy in Japan on**  
**Fusion Technology for DEMO**

Horiike, H.; Hashizume, H.; Konishi, S.; Nishitani, T.; Okano,  
K.; Ogawa, Y.; Shimizu, K.; Mori, S. and Tobita, K.

**I.1.4 K-DEMO Design, R&D Plan, and International**  
**Collaboration**

Lee, G. S.; Keeman K; Hwang, Y. S.; Han, J. H.; Kim, H.C.;  
Im, K. H.; Neilson, G. H.; Brown, T.; Titus, P.; and Kessel, C.

14:30 – 16:00 **PARALLEL M1 (Topic B: Blanket Technology)**  
**Auditorium**

**Chairs:** Boccacini, L. and Smolentsev, S.

**O1A.1 The European Test Blanket Module Systems: Status of design, technologies development and integration in ITER**

Poitevin, Y.; Ricapito, I.; Zmitko, M.; Panayotov, D.; Calderoni, P.; Galabert, J.; Vallory, J.; Giancarli, L.; Tavassoli F.; Thomas, N.; De Dinechin, G.; Bucci, Ph.; Aiello A.; Rey, J.; Rueda, F.; Ibarra, A.

**O1A.2 Design and R&D Progress of Korean HCCR TBM**

Cho, S.; Ahn, M. Y.; Lee, D. W.; Lee, C. W.; Park, Y.H.; Lee, E. H.; Jin, H. G.; Kim, T. K.; Kim, S. K.; Yoon, J. S.; Yun, Y. H.; Shin, K. I.; Jung, Y. I.; Jeong, Y. H.; Lee, Y. O.; Ku, D. Y.; Park, S. C.; Kim, C. S.; Jung, K.

**O1A.3 Status of Indian LLCB TBM program and R&D activities** **Bhattacharyay, R. and Indian TBM Team**

14:30 – 16:00 **PARALLEL M2 (Topic D: Material Engineering for FNT)**  
**Room 6**

**Chairs:** Moeslang, A. and Jayakumar, T.

**O1B.1 Fusion Materials Science and Technology Research Opportunities now and during the ITER Era**

Zinkle, S.J.; Blanchard, J.P.; Callis, R.W.; Kessel, C.E.; Kurtz, R.J.; Lee P.J.; McCarthy K.A.; Morley, N.B.; Najmabadi, F.; Nygren, R.E.; Tynan, G.R.; Whyte, D.G.; Willms, R.S.; Wirth, B.D.

**O1B.2 Modeling Plasma Surface Interactions in Tungsten through High-Performance Computing**

Wirth, B. D.

**O1B.3 Neutron Irradiation Effects on Tungsten Materials.**

Hasegawa, A.

14:30 – 16:00 **PARALLEL M3 (Topic E: Vacuum Vessel)**  
**Room 5**

**Chairs:** Filhol, J. M. and Gervash, A.

**O1C.1 Challenging issues in the design and manufacturing of the European sectors of the ITER Vacuum Vessel**

Dans, A.; Jucker, P.; Bayon, A.; Arbogast, J-F.; Caixas J.; Fernández, J.; Micó, G.; Pacheco, J.; Trentea, A.; Stamos, V.

**O1C.2 Pre-conceptual studies and R&D for DEMO Superconducting Magnets**

Bruzzone, P. L.

**O1C.3 Challenging Issues in the Manufacturing of the ITER cryostat**

Bhardwaj, A. K.

16:00 – 16:30 **Coffee Break**

16:30 – 18:00 **PARALLEL M4 (Topic B: Blanket Technology) Auditorium**

**Chairs:** Ying, A. and LiPuma, A.

**O2A.1 New Progress on Design and R&D for Solid Breeder Test Blanket Module in China**

Feng, K.; Zhang, G.; Li, Z.; Zhao, Z.; Feng, Y.; Hu, G.; Ye, X.; Zhang, L.; Chen, Y.; Wang, P.

**O2A.2 DCLL blanket: Status and critical R&D needs**

Smolentsev, S.; Morley, N. B.; Abdou, M.; Malang, S.

**O2A.3 R&D status on Water Cooled Ceramic Breeder Blanket Technology**

Enoeda, M.; Tanigawa, H.; Hirose, T.; Sato, S.; Ochiai, K.; Konno, C.; Kawamura, Y.; Yamanishi, T.; Hoshino, T.; Nakamichi, M.; Tanigawa, H.; Nishi, H.; Suzuki, S.; Ezato, K.; Seki, Y.; Tsuru, D.

16:30 – 18:00 **PARALLEL M5 (Topic D: Material Engineering for FNT) Room 6**

**Chairs:** Kohyama, A. and Vila, R.

**O2B.1 Limits and Potential of Reduced Activation Ferritic/Martensitic Steels**

Tanigawa, H.; Sakasegawa, H.; Hirose, T.; Someya, Y.; Ochiai, K.

**O2B.2 Low Activation Alloy V-4Ti-4Cr for Fusion and Fission Power Reactors - the RF Results**

Chernov, V.; Potapenko, M.; Drobyshev, V.; Blokhin, D.; Budylnkin, N.; Mironova, E.; Blokhin, A.; Loginov, N.; Tyumentsev, A.

**O2B.3 Physical properties of F82H for fusion blanket design**

Hirose, T.; Nozawa, T.; Stoller, R.E.; Sakasegawa, H.; Tanigawa, H.; Tanigawa, H.; Enoeda, M.; Katoh, Y.; Snead, L.L.

16:30 – 18:00 **PARALLEL M6 (Topic G: Safety Issues and Waste Management)**  
**Room 5**

**Chairs:** Batistoni, P. and Hong, B.

**O2C.1 Lessons learnt from ITER safety & licensing for DEMO and future nuclear fusion facilities**  
Taylor, N.; Cortes, P.

**O2C.2 ITER tritiated waste management by the Host state**  
Pamela, J.; Canas, D.

**O2C.3 Safety Issues for liquid metal blankets for ITER, FNSF and DEMO and associated R&D needs**  
Merrill, B. J.; Wong, C. P. C.2; Cadwallader, L. C.; Abdou, M.; Morley, N. B.

## **TUESDAY 17<sup>th</sup> SEPTEMBER**

08:30 – 10:30 **PARALLEL T1 (Topic B: Blanket Technology)**  
**Auditorium**

**Chairs:** Poitevin, Y. and Cho, S.

**O3A.1 Blanket/First Wall Challenges and Required R&D on the pathway to DEMO**  
Abdou, M.; Morley, N.; Ying, A.; Smolentsev, S.

**O3A.2 Design and Development of DEMO Blanket Concepts in Europe**  
Li-Puma, A.; Boccaccini, L.V.; Bachmann, C.; Noriajitra, P., Sardain, P.

**O3A.3 Options and methods for instrumentation of Test Blanket Module Systems for experiment control and scientific mission**  
Calderoni, P.; Ricapito, I.; Zmitko, M.; Leichtle, D.; Poitevin, Y.

**O3A.4 Tritium permeation analysis in liquid metal flows with helium bubbles as applied to liquid metal breeding blankets**  
Mas De Les Valls, E.; Batet, L.; Sedano, L. A.

08:30 – 10:30 **PARALLEL T2 (Topic F: Nuclear System Design)**  
**Room 6**

**Chairs:** Stork, D. and Zeng, Q.

**O3B.1 Status and Verification Strategy for ITER neutronics**

Loughlin, M.; Polunovskiy, E.; Pampin, R.; Batistoni, P.; Konno, C.; Angelone, M.; Bertalot, L.

**O3B.2 Research and Development Status on Fusion DEMO Reactor Design under BA**

Tobita, K., Federici, G., Okano, K., the BA DEMO Design Team

**O3B.3 Neutronic Analyses and Tools Development Efforts in the European DEMO Programme**

Fischer, U.; Bachmann, C.; Catalan, J.; Lengar, I.; Szieberth, M.; Pampin, R.; Porton, M.; Pereslavitsev, P.; Ogando, F.; Tracz, G.; Villari, R.

**O3B.4 An Advanced Interface Program for Multiple Neutronics and Radiation Transport Simulation Codes**

Yu, S.; Wang, G.; Long, P.; Wang, D.; Nie, F.; Wang, D.; Gan, Q.; Zeng, Q.; Hu, L.; Wu, Y.

08:30 – 10:30 **PARALLEL T3 (Topic G: Safety Issues and Waste Management)**  
**Room 5**

**Chairs:** Taylor, N. and Dies, J.

**O3C.1 Tritium safety in maintenance and waste handling in fusion reactors**

Hatano, Y.

**O3C.2 DEMO Design Activities (DDA) in the Broader Approach (BA) under Japan/EU collaboration**

Okano, K.; Federici, G.; Tobita, K.

**O3C.3 Some technological problems of fusion materials management**

Kolbasov, B.; Di Pace, L.; El-Guebaly, L.; Han, J. H.; Khripunov, V.; Massaut, V.; Someya, Y.; Tobita, K.; Zucchetti, M.

**O3C.4 Safe Disassembly and Storage of Radioactive Components of JT-60U Torus/ Disassembly of JT-60 for JT-60SA**

Ikeda, Y.; Okano, F.; Hanada, M.; Sakasai, A.; Kubo, H.; Akino, N.; Chiba, S.; Ichige, H.; Kaminaga, A.; Kiyono, K.; Miyo, Y.; Nishiyama, T.; Sasajima, T.; Yagyu, J.; Yokokura, K. and JT-60 Team

10:30 – 11:00 **Coffee Break**

11:00 – 13:00 **Fusion Road Map Panel  
Auditorium**

Chair: Abdou, M.

14:30 – 16:00 **PARALLEL T4 (Topic B: Blanket Technology)  
Auditorium**

Chairs: Federici, G. and Feng, K.

**O4A.1 Virtual Plasma Chamber Integrated Multi-Physics Simulation: Status and Next Steps**

Ying, A.; Youchison, D.; Wu, Y.; Ulrickson, M.; Turner, J.

**O4A.2 Facilities, testing program and modeling needs for studying liquid metal magneto hydrodynamic flows in fusion blankets**

Bühler, L.; Mistrangelo, C.; Konys, J.; Bhattacharyay, R.; Huang, Q.; Obukhov D.; Smolentsev, S.; Utili, M.

**O4A.3 Discrete element method simulations to determine the thermal impact of pebble failures as it relates to solid breeder designs**

Van Lew, J.; Ying, A.; Abdou, M.

14:30 – 16:00 **PARALLEL T5 (Topic D: Material Engineering for FNT)  
Room 6**

Chairs: Bhattacharyay, R. and Morley, N.

**O4B.1 Materials R&D and materials technology for DEMO – Current level of technical readiness of candidate materials, uncertainties and strategies to close holes in knowledge**

Moeslang, A.

**O4B.2 Overview of Development on Tritium Permeation Barriers in CAEP**

Chen, C. A.; Zhang, G.; Wang, X.; Li, J.; Lai, X.

**O4B.3 Radiation Hardness Testing of Functional Materials for Future Fusion Reactors.**

Vila, R.; González, S.

16:00 – 16:30 **Coffee Break**

16:00 – 18:00 **Poster Session P1  
Ground Floor**

Chairs: Enoeda, M. and Moreno, C.

**WEDNESDAY 18<sup>th</sup> SEPTEMBER**

08:30 – 10:30 **PARALLEL W1 (Topic A: First-Wall Technology and High Heat Flux Components)**  
**Auditorium**

**Chairs:** Magaud, P. and Suzuki, S.

**05A.1 Status of Divertor technologies and test facilities developments at IPR**  
Khirwadkar, S.S.

**05A.2 Research status and issues of tungsten plasma facing materials for ITER and beyond**  
Ueda, Y.; Coenen, J. W.; De Temmerman, G.; Doerner, R. P.; Linke, J.; Philipps, V.; Tsitrone, E.

**05A.3 Modeling of MHD Issues Relevant to Liquid Lithium First Wall in China**  
Ni, M. J.; Zhang, J.; Wang, J. J.; Hu, J. S.; Li, J. G.

**05A.4 Developments with explosive forming for complex sheetmetal components and with explosive bonding as a joining technique for dissimilar materials for ITER**  
Dobrushin, L.; Groeneveld, H.; Huber, Th.; Illarionov, S.; Pavei, M.; Richou, M.

08:30 – 10:30 **PARALLEL W2 (Topic F: Nuclear System Design)**  
**Room 6**

**Chairs:** Fischer, U. and Heidinger, R.

**05B.1 Fusion Yield measurements on JET and their Calibration**  
Syme, D. B.; Popovichev, S.; Conroy, S.; Lengar, I.; Snoj, L.; Sowden, C.; Giacomelli, L.; Hermon, G.; Allan, P.; Macheta, P.; Plummer, D.; Stevens, J.; Prokopowicz, R.; Jednorog, S.; Abhangi, M. R.; Makwana, R. JET EFDA Contributors

**05B.2 Development of Super Monte Carlo Simulation Program for Fusion and Fission Applications**  
Song, J.; Sun, G.; Zheng, H.; Chen, Z.; Wu, M.; Hao, L.; Li, G.; Chen, C.; Zhang, K.; He, T.; Yu, S.; Zeng, Q.; Long, P.; Hu, L.; Wu, Y.; FDS Team



**O5B.3 Automatic Mesh Adaptivity for Hybrid Monte Carlo/Deterministic Neutronics Modeling of Fusion Energy Systems**

Ibrahim, A.; Wilson, P; Sawan, M.; Mosher, S.; Peplow, D.; Evans, T.; Grove, R.

**O5B.4 TRIPOLI-4 version 9 Shielding for the fusion community: overview, relevant benchmarking for fusion and licencing policy**

Trama, J. C.; Brun, E.; Damian, F.; Diop, C.; Dumonteil, E.; Hugot, F. X.; Jouanne, C.; Lee, Y. K.; Malvagi, F.; Mazzolo, A.; Petit, O.; Visonneau, T.; Zoia, A.

08:30 – 10:30 **PARALLEL W3 (Topic K: Inertial Confinement)  
Room 5**

**Chairs:** Merrill, B. and Fukuyama, A.

**O5C.1 Fusion Technology Aspects of Laser Inertial Fusion Energy (LIFE)**

Meier, W.R.; Dunne, A.M.; Kramer, K.J.; Reyes, S. and the LIFE Team

**O5C.2 Physics and Technology for Engineering and Power Plant in Laser Fusion Energy Systems under Repetitive Operation**

Perlado, J. M.

**O5C.3 Closing the fusion fuel cycle: LIFE tritium recovery and processing**

Reyes, S.; Anklam, T.; Becnel, J.; Dunne, M.; Farmer, J.; Bandhauer, T.; Kramer, K.; Martinez-Frias, J.; Miles, R.; Taylor, C. Shanahan, K.

**O5C.4 Development of fusion-fission hybrid reactor utilizing high power/rep-rate lasers**

Lee, B.; Kong, H. J.; Lee, Jae Y.; Park, Young C.; Kim, Y. G.

10:30 – 11:00 **Coffee Break**

11:00 – 13:00 **Poster Session P2  
Ground Floor**

**Chairs:** Kuteev, B.V and García, A.

## THURSDAY 19<sup>th</sup> SEPTEMBER

08:30 – 10:30 **PLENARY SESSION 2**  
**Auditorium**

**Chairs:** Gasparoto, M. and Sagara, A.

**I2.1 China's Plan for Design and R&D Activities of Multi-Functional Fusion Test Reactor**

Wu, Y., FDS Team

**I2.2 Development of MW-range fusion neutron sources on the roadmap to DEMO**

Kuteev, B.V.

**I2.3 A Fusion Nuclear Science Facility for a Fast-Track Path to DEMO\***

Garofalo, A.M.; Abdou, M.; Canik, J.M.; Chan, V.S.; Morley, N.B.; Sawan, M.E.; Taylor, T.S.; Wong, C.P.C. and Ying, A.

10:30 – 11.00 **Coffee Break**

11:00 – 13:00 **PARALLEL TH1 (Topic A: First-Wall Technology and High Heat Flux Components)**  
**Auditorium**

**Chairs:** Khirwadkar, S. and Aktaa, J.

**O6A.1 Design, Fabrication and Testing of the ITER FW and Shielding Blanket**

Raffray, R.; Calcagno, B.; Chappuis, P.; Dellopoulos, G.; Eaton, R.; Fu, Zhang; Gervash, A.; Chen, Jiming; Kim, D. H.; Kim S. W.; Khomiakov, S.; Labusov, A.; Martin, A.; Merola, M.; Mitteau, R.; Ulrickson, M.; Zacchia, F. and all contributors to the BIPT\* effort

**O6A.2 R&D and procurement status on ITER divertor components in JAEA**

Suzuki, S.; Ezato, K.; Seki, Y.; Yokoyama, K.; Mohri, K.; Kakudate, S.

**O6A.3 Qualification of ITER EHF First Wall in Russia**

Gervash, A.; Eaton, R.; Glazunov, D.; Kuznetsov, V.; Mazul, I.; Mirgorodsky, V.; Mitteau, R.; Raffray, R.; Rulev, R.; Semichev, D.

#### 06A.4 **The WEST project: testing ITER divertor high heat flux component technology in a steady state tokamak environment**

Bucalossi, J.; Doceul, L.; Firdaouss, M.; Gargiulo, L.; Garin, P.; Grosman, A.; Lipa, M.; Missirlian, M.; Mollard, P.; Nardon, E.; Richou, M.; Sabot, R.; Salasca, S.; Samaille, F.; Tsitrone, E.; Van Houtte, D.

11:00 – 13:00 **PARALLEL TH2 (Topic H: Models and Experiment for FNT) Room 6**

**Chairs:** Lee, G.S. and Okano, K.

#### 06B.1 **IFMIF, a fusion relevant neutron source for material irradiation: current status**

Knaster, J.; Chel, S.; Fischer, U.; Groeschel, F.; Heidinger, R.; Ibarra, A.; Micciche, G.; Möslang, A.; Sugimoto, M.; Wakai, E.

#### 06B.2 **Technical analysis of an early fusion neutron source based on the enhancement of the IFMIF/EVE-DA accelerator prototype**

Heidinger, R.; Ibarra, A., Barabaschi, P.; Cara, P.; Mosnier, A.; Mota, F.; Nitti, Francesco, S.

#### 06B.3 **FAFNIR: strategy and risk reduction in accelerator driven neutron sources for fusion data**

Surrey, E.; Porton, M. and FAFNIR collaboration members

#### 06B.4 **Feasibility Study of an Intense D-T Fusion Source. "The New Sorgentina"**

Pietropaolo, A.; Angelone, M.; Pillon, M.; Pizzuto, A.

11:00 – 13:00 **PARALLEL TH3 (Topic I: Repair & Maintenance) Room 5**

**Chairs:** Toshihiko, Y. and Maissonier, D.

#### 06C.1 **The European contribution to ITER Remote Maintenance**

Damiani, C.; Annino, C.; Bertora, F.; Ceccanti, F.; Di Mascio, T.; Dubus, G.; Esqué, S.; González, C.; Lewczanin, M; Locke, D.; Olajos, K; Ranz, R.; Shuff, R.; Puiu, A.; Van Hille, C.; Van Uffelen, M.; Chang-Hwan, C.; Palmer, Jim; Hamilton, D; Friconneau, J. P., Tesini, A.

#### 06C.2 **Verifying and validating ITER divertor Remote Handling on Divertor Test Platform**

Siuko, M.; Järvenpää, J.; Mäkinen, H.; Määttä, T.; Saarinen, H.; Esque, S.; Palmer, J.

**06C.3 R&D status on Remote Maintenance Technology in JAEA**

Ueno, K.; Takeda, N.; Aburadani, A.; Maruyama, T.; Kakudate, S.

**06C.4 Pre-conceptual Design Assessment of DEMO Remote Maintenance**

Loving, A.; Crofts, O.; Harmon, J.; Fischer, U.; Sanz, J.; Siuko, M.; Mittwollen, M. et.al.

14:30 – 16:00 **PARALLEL TH4 (Topic A: First-Wall Technology and High Heat Flux Components)**  
**Auditorium**

**Chairs:** Raffray, R. and Tran, M. Q.

**07A.1 Manufacturing and joining technologies for helium cooled divertors**

Aktaa, J.; Basuki, W.; Weber, T.; Norajitra, P.; Krauss, W.; Konys, J.

**07A.2 Current status of W/Cu divertor for EAST and related R & D for actively cooled HHF components**

Luo, G.N.; Yao, D.M; Li, G.

**07A.3 Status and prospects of the EU development of the He-cooled divertor for DEMO power plant**

Norajitra, P.; Basuki, W.; Giniyatulin, R.; Koncar, B.; Mazul, I.; Richou, M.; Spatafora, L.

14:30 – 16:00 **PARALLEL TH5 (Topic D: Material Engineering for FNT)**  
**Room 6**

**Chairs:** Zinkle, S. and Tanigawa, H.

**07B.1 Materials R&D for a timely DEMO: key Findings and Recommendations of the EU Roadmap Materials Assessment Group**

Stork, D. and the EU Roadmap Materials Assessment Group

**07B.2 Current Status of the Technology Development for Fabrication of Indian Test Blanket Module (TBM) of ITER**

Jayakumar, T.; Ellappan, R. K.

**07B.3 The Progresses in SiC/SiC Component Development Fusion/Fission Application**

Kohyama, A.; Kishimoto, H.

14:30 – 16:00 **PARALLEL TH6 (Topic I: Repair & Maintenance)**  
**Room 5**

**Chairs:** Damiani, C. and Micciche, G.

**O7C.1 Automated in situ line of sight calibration of ASDEX Upgrade bolometers**

Penzel, F.; Meister, H.; Bernert, M.; Kannamüller, M.; Koll, J.; Trautmann, T.; Koch, A. W.

**O7C.2 Mobile robot for the inspecting in vacuum vessel of ITER**

Wu, H.

**O7C.3 In-Vessel Components Water Cooling Pipes: Design, Installation and Maintenance Strategy**

Martín, A.; Dell Orco, G.; Escourbiac, F.; Furmanek, A.; Gicquel, S.; Jokinen, T.; Macklin, B.; Merola, M.; Palmer, J.; Raffray, R.

16:00 – 16:30 **Coffee Break**

16:00 – 18:00 **Poster Session P3**  
**Ground Floor**

**Chairs:** Konishi, S. and Sanmartí, M.

## **FRIDAY 20<sup>th</sup> SEPTEMBER**

08:30 – 10:30 **PARALLEL F1 (Topic H: Models and Experiment for FNT)**  
**Auditorium**

**Chairs:** Luo, G.N. and Knaster, J.

**O8A.1 Wendelstein 7-X: Status of Project Construction and Commissioning Planning**

Gasparotto, M.; Baylard, C.; Boscary, J.; Bosch, H. S.; Brakel, R.; Hartmann, D.; Grote, H.; Klinger, T.; Lorenz, A.; Nagel, M.; Naujoks, D.; Peacock, A.; Rummel, T.; Schauer, F.; Stadler, R.; Vilbrandt, R.; Wegener, L.

**O8A.2 Helical Reactor Design FFHR-d1 and c1 for Steady State DEMO**

Sagara, A.; Miyazawa, J.; Goto, T.; Tamura, H.; Tanaka, T.; Yanagi, Y. and FFHR Design Group

**O8A.3 Biomass-Fusion Hybrid and Energy Application for Future Energy Strategy**

Konishi, S.; Kasada, R.

**O8A.4 Overview of engineering design, manufacturing and assembly of JT-60SA machine**

Di Pietro, E.; Barabaschi, P.; Kamada, Y.; Ishida, S.

08:30 – 10:30 **PARALLEL F2 (Topic C: Fuel Cycle and Tritium Processing)  
Room 6**

**Chairs:** Reyes, S. and Day, C.

**O8B.1 Estimate of Initial Tritium Inventory for the Fusion Nuclear Science Facility**

Wong, C.; Merrill, B.

**O8B.2 DT neutron irradiation experiment for tritium recovery on WCCB blanket**

Ochiai, K.; Kawamura, Y.; Hoshino, T.; Edao, Y.; Takakura, K.; Ohta, M.; Sato, S.; Konno, C.

**O8B.3 The KALPUTREX-Process -A new vacuum pumping process for exhaust gases in fusion power plants**

Giegerich, T.; Day, C.

**O8B.4 Technologies and Modelling Issues for Tritium Processing in the European Tests Blanket Systems and Perspectives for DEMO**

Ricapito, I.; Calderoni, P.; Poitevin, Y.; Aieloo, A.

08:30 – 10:30 **PARALLEL F3 (Topic J: Burning Plasma Control and Operation & Topic L: Fission-Fusion Synergy and Cross-Cutting Technologies)  
Room 5**

**Chairs:** Perlado, J. M. and Garofalo, A.

**O8C.1 Advanced Tokamak Regime. What technology is needed and what role is D-III research playing**

Kellman, A.

**O8C.2 Progress of integrated modeling for burning plasma control and operation**

Fukuyama, A.

**O8C.3 Preparation for the operation of ITER: EU study of the pulse control system**

Cavinato, M.; Ambrosino, R.; Gribov, Y.; Mattei, M.; Pironti, A.; Saibene, G.; Sartori, R.; Zabeo, L.

**O8C.4 Conceptual Design of a Fusion-Fission Hybrid Reactor for Spent Fuel Burning (FDS-SFB)**

Wang, M.; Jiang, J.; Jin, M.; Lv, Z.; Zeng, Q.; Wu, Y.

10:30 – 11:00 **Coffee Break**

11:00 – 13:00 **PLENARY SESSION 3**  
**Auditorium**

**Chairs:** Ibarra, A. and Wu, Y.

**I3.1 Overview of EU demo design activities**

Federici, G.; Romanelli, F. the PPPT Team et al.

**I3.2 Overview and status of ITER Internal Components**

Merola, M.; Escourbiac, F.; Raffray, R.

**I3.3 The JET technology program in support of ITER**

Batistoni, P.; Likonen, J.; Bekris, N.; Brezinsek, S.; Horton, L.; Matthews, G.; Rube, M.I.; Sips, G.; Syme, B.; Widdowson, A. and EFDA-JET Contributors

13:00 – 13:30 **Closing Session**  
**Auditorium**

# Fusion Road Map Panel

**11:00 –13:00**

**Tuesday, 17 September 2013**

**Auditorium**

**Moderated by  
Mohamed Abdou**

**Panel Members:**

Gianfranco Federici, Yuanxi Wan,  
Gyung-Su Lee, Roberto Adinolfi,  
Pietro Barabaschi, Neil B. Morley,  
Kunihiko Okano, Boris Kuteev

**Objectives of the Panel:**

- Define the 5-10 dominant key questions that a credible roadmap to DEMO must address.
- Elaborate on the challenges embodied in these dominant key questions and suggested approaches to confronting them.

**Panel Members:**

Eight leaders from the major world fusion programs who have experience in fusion and technology R&D, fusion roadmapping, and FNT

**Format:**

- Panel session duration: 2 hours
- Introduction by Moderator, Prof. Mohamed Abdou
- Prepared remarks by panel members (50 minutes)
- Audience Q&A (70 minutes)



# Fusion Road Map Panel



Mohamed Abdou (Panel Moderator) is a Distinguished Professor of Engineering and Applied Science at Univ. of California, Los Angeles (UCLA). He is also the Director of both the Energy and Fusion Centers at UCLA. He is the Founding President of The US Council of Energy Research and Education Leaders (CEREL). He pioneered many research areas of Fusion Nuclear Science and Technology (FNST).

He has published >350 scholarly journal papers on experiment, modeling, and analysis for neutronics, tritium transport, MHD thermofluids, thermomechanics and materials; as well as on creative designs of fusion nuclear components and power plants. He led many US and international studies on fusion issues and innovative solutions as well as on technical planning and development pathways. Prof. Abdou won many honors and recognition for his pioneering technical contributions and leadership.

## Panel Members



Gianfranco Federici, current head of EFDA's Power Plant Physics and Technology Department, is responsible for the coordination of EU Design and R&D efforts aimed at the conceptual design of a DEMOnstration Power Reactor. He has more than 20 years of professional experience in fusion engineering and design, mainly in divertor design, plasma surface interactions, and breeding blanket design. In addition to his over 100 publications, he is a Fellow of the American Nuclear Society, and has contributed over the years to the NET Team, ITER EDA Team, and Fusion for Energy (F4E).



Yuanxi Wan graduated from Beijing University and has since been working at the Institute of Plasma Physics, at the Chinese Academy of Science, serving many years as director in charge of the EAST superconducting tokamak project design, construction, and experiments. He is also currently USTC Dean of Nuclear Science and Technology. For several years he was Vice-Chair/Chair of ITER's STAC. In 2009, he was elected as an academician to the prestigious Chinese Academy of Engineering. He is leading the national integration reactor design group for the design of Chinese Fusion Engineering Test Reactor (CFETR).

# Fusion Road Map Panel



Gyung-Su Lee received his doctorate in Plasma Physics and Fusion from the University of Texas at Austin, USA. Over the past fifteen years he has been very active in the fusion engineering and technology community, directing the KSTAR project from 1996-2006, as well as serving as the Director General of ITER Korea and the President of Korea's National Fusion Research Institute (NFRI). He is currently the Chairman of the IAEA International Fusion Research Council, as well as a member of the ITER Council.



Roberto Adinolfi received his degree in Nuclear Engineering cum laude at Milan Polytechnic in 1976. He immediately joined ANSALDO, designing nuclear power plants in Italy and abroad, applying his knowledge in fluid systems design, plant control, and system integration. As of 2007 he has been acting as Chief Executive Officer of ANSALDO Nucleare. He is also Vice- President of the Italian Nuclear Association, member of the nuclear energy commission of the Italian National Standard Institute (UNI), and member of the Governing Board of the European Sustainable Nuclear Energy-Technology Platform.



Pietro Barabaschi is currently the Head of the Broader Fusion Development Department in F4E. Up to early 2006 he was deputy to the Project Leader and Head of the Design Integration Division of the ITER International Team at the Garching Joint Work Site. Soon after his university studies in electrical engineering, he joined the JET Project, Culham UK, where he worked in the Machine Development Department. In 1992 he joined the ITER Joint Central Team, San Diego Site, in the design integration division dealing with systems engineering and analysis.



Neil B. Morley, Adj. Professor at the Univ. of California, Los Angeles, has spent the past 20 years in fusion science and technology research & design, focusing his efforts on liquid metal breeding blankets, first wall, divertor component, and systems. He is currently Chairperson of the IEA-NTFR Liquid Breeder Blankets Subtask (2011-ongoing). In addition to publishing over 100 papers in scientific journals, over the years he has served on several US and international planning committees, including the US APEX Team (1998-2003), US ITER-TBM Team (2003-2009), and the ongoing US Roadmapping Panel (2009-).

# Fusion Road Map Panel



Kunihiko Okano is currently Senior Researcher of the Central Research Institute of Electric Power Industry, while also acting as Project Professor at Keio University and Leader of Demo Design Activity in IFERC. He is a member of the Working Committee on Fusion Research in the Council for the Japanese government MEXT. He has served as Chair of Roadmap Committee of Fusion Energy Forum of Japan and Board Member of Directors of the Japan Society of Plasma Science and Fusion Research. His primary areas of research include tokamak and current-drive physics and conceptual design/strategy for future energy technology.



Boris Kuteev is Head of the Fusion reactor department at Kurchatov Centre's Institute for Tokamak Physics, where he designs demonstration fusion reactors and neutron sources in RF. He has over 30 years of related professional experience, mainly in pellet fueling/diagnostics, transport phenomena in tokamaks and helical systems, divertor and breeding blanket design, plasma surface interactions, fusion neutron sources and fusion-fission hybrids. From 1972, he has also been a professor, at the State Polytechnic Univ. of St. Petersburg, the NRC Kurchatov Institute and currently as Plasma Physics Chair of Moscow Engineering Physics Univ.

# Industrial Workshop



**Tuesday 17<sup>th</sup> September  
Room 5**

- 13:30- 14:20** **Opening**  
Motojima, O., IO  
Bindslev, H., F4E  
Poncela, M.L., MINECO  
Grau, A. Generalitat de Catalunya  
Sánchez, J., CIEMAT
- 14:20-15:00** **Status of the ITER project, main on-going contracts and forthcoming opportunities (IO)**  
Motojima, O.; Flament, F.
- 15:00-15:40** **Diagnostics and Assembly (IO)**  
Walsh, M.
- 15:40-16:00** **ITER Nuclear Safety, Quality and Security (IO)**  
Alejaldre, C.
- 16:00-16:30** **Coffee Break**
- 16:30-17:10** **Future developments: blanket technology and material engineering for FNT (IO/F4E)**  
Raffray, R.; Knaster, J.  
Q&A
- 17:10-17:30** **Overview of F4E activities, main on-going contracts and forthcoming opportunities (F4E)**  
Filhol, J. M.
- 17:30-18:00** **HCD Systems & NBTF (F4E)**  
Bonicelli, T.
- 18:00-18:30** **Plant Systems: Fuel Cycle and Cryoplant, WDS, ISS, WMS, REMS, (F4E)**  
Teissier, A.  
Q&A
- 18:30-19:15** **Round table: New collaborative approaches between industry and research centers**  
**Chair:** Sanmartí, M. (IREC)  
- CERN Anelli, G.  
- FIIF (Fusion Industry Innovation Forum) Domínguez, M.  
- F4E Saez, V.  
- IO Guenter, J.



# Poster Sessions

## POSTER SESSION 1

Tuesday 17<sup>th</sup> September

16:00 – 18:00 Ground Floor

Chairs: Enoeda, M. and Moreno, C.

### Topic A First-Wall Technology and High Heat Flux Components

**P1-001 The New Method of Creation of Plasma and its Fast Heating till Thermonuclear Temperatures**

Chikvashvili, I.

**P1-003 Fabrication of W/FMS joint mock-ups for first-wall using a hot isostatic pressing**

Jung, Y-I.; Park, J-Y.; C., B-K.; Lee, D. W.; Cho, S.

**P1-004 Design Strategy for the PFC in DEMO Reactor**

Igitkhanov, Y.; Bazylev, B.; Boccaccini, L.

**P1-005 Numerical study of the impact of hydrogen bombardment on the mechanical properties of tungsten**

Yu, X.; Gou, F.

**P1-007 Joining of HHF components applying electroplating technology**

Krauss, W.; Lorenz, J.; Konys, J.

**P1-008 Er2O3 coating: process optimization through film characterization**

Rayjada, P. A.; Vaghela, N. P.; Chauhan, N. L.; Sircar, A.; Rajendrakumar, E.; Manocha, L. M.; Raole, P. M.

**P1-009 Recent Advances of T-11m Lithium Program**

Lazarev, V.; Mirnov, S.; Djigailo, N.; Kostina, A.; Nesterenko, V.; Vertkov, A.; Lyublinski, I.

**P1-010 Helium-implanted CLAM steel and their annealing behavior investigated by positron-annihilation spectroscopy**

Cao, Q.; Ju, X.; Guo, L.; Wang, B.

**P1-011 Manufacturing of ITER pre-qualification Normal Heat Flux (NHF) First Wall (FW) 2 MW/m<sup>2</sup> small-scale mock-ups and semi-prototype**

Banetta, S.; Zacchia, F.; Lorenzetto, P.; Bobin-Vastra, I.; Boireau, B.; Cottin, A.; Mitteau, R.; Eaton, R.; Raffray, R.

**P1-012 Three-dimensional flow measurement of a sphere-packed pipe by a digital hologram and refractive index-matching method**

Satake, S.; Aoyagi, Y.; Tsuda, T.; Unno, N.; Yuki, K.

**P1-014 Analyses results of the EHF FW Panel with welded fingers**  
Sviridenko, M.; Leshukov, A.; Razmerov, A.; Tomilov, S.; Danilov, I.; Strebkov, Y.; Mazul, I.; Labusov, A.; Gervash, A.; Belov, A.; Semichev, D.

**P1-015 Production Management and Quality Assurance for the Fabrication of the In-Vessel Components of the Stellarator Wendelstein 7-X**

Li, C.; Boscary, J.; Junghanns, P.; Mendelevitch, B.; Peacock, A.; Pirsch, H.; Sellmeier, O.; Springer, J.; Stadler, R.; Streibl, B.

**P1-016 Analysis and Primary Experiment Results of a Guidable Free Curve-Surface Flow for Liquid Metal PFCs**

Xu, Z.; Pan, C.; Zhang, X.; Liu, B.; Duan, X.

**P1-017 Mechanical Analysis of the Joint between Wendelstein 7-X Target Element and the Divertor Frame Structure**

Smirnow, M.; Kuchelmeister, M.; Boscary, J.; Peacock, A.

**P1-018 Effects of heat treatments on deuterium retention/desorption properties of tungsten materials**

Yamauchi, Y.; Nihei, N.; Armando, M.; Hino, T.; Nobuta, Y.; Oya, Y.; Okuno, K.; Ueda, Y.

**P1-019 Simulation of neutral gas flow in a tokamak divertor using Direct Simulation Monte Carlo method**

Gleason González, C.; Varoutis, S.; Day, C.

**P1-020 Simulation of runaway electron evolution during a disruption in HL-2A tokamak\***

Li, Y.; Wu, N.; Zhang, Y.; Sang, C.; Wang, Z.; Sun, J.; Wang, D.

**P1-021 Molecular dynamics simulation of the energy deposition of low energy hydrogen and its isotopes in tungsten**

Guo, L.; Sun, J.; Liu, S.; Sang, C.; Wang, D.

**P1-022 Evaluation of heat transfer by sublimation for the application to the divertor heat sink for high fusion energy conversion**

Gwon, H.; Wada, K.; Takeuchi, Y.; Kasada, R.; Konishi, S.

**P1-023 Prototyping of the Blanket Shield Module for the ITER ECH&CD Upper Launcher**

Spaeh, P.; Aiello, G.; Gessner, R.; Grossetti, G.; Kroiss, A.; Meier, A.; Obermeier, C.; Scherer, T.; Schreck, S.; Strauss, D.; Vaccaro, A.

**P1-024 Infrared thermography inspection for mono-block divertor target in JT-60SA**

Nakamura, S.; Sakurai, S.; Ozaki, H.; Seki, Y.; Yokoyama, K.; Sakasai, A.

**P1-025 Study on Deuterium Retention and Lithiation Properties of Tungsten**

Li, C.; Wu, X.; Zhang, C.; Ding, H.; De Temmerman, G.; van der Meiden, H.J.

**P1-026 Dual-pulse laser induced breakdown spectroscopy for measuring laser cleaning process of co-deposition layer on the first mirror of HL-2A**

Hai, R.; Zhang, L.; Zhao, D.; Ding, H.

**Topic B Blanket Technology**

**P1-027 Preparation of Al<sub>2</sub>O<sub>3</sub>/YSZ Multi-laminated Coatings by Sol-gel Technique as Tritium Permeation Barrier**

Zhang, K.; Hu, Q.; Liu, L.; Guo, Y.; Dai, G.; Zheng, X.

**P1-028 Studies on the solubility of hydrogen in molten Pb83Li17 eutectic alloy**

Singh, K.; Kumar, S.; Krishnamurthy, N.

**P1-029 Results of LLCB TBM conceptual design optimization**

Obukhov, D.; Kirillov, I.; Pertsev, D.; Kartashev, I.; Leshukov, A.; Sviridenko, M.

**P1-030 Development of the tritium breeder monitoring systems for the Lead-Lithium cooled Ceramic Breeder (LLCB) Module of the ITER**

Kapyshev, V.; Danilov, I.; Kartashov, I.; Kovalenko, V.; Leshukov, A.; Sviridenko, M.; Vladimirova, N.; Strebkov, Y.

**P1-031 RF DEMO Helium Cooled Ceramic Breeder Blanket**

Kovalenko, V.; Danilov, I.; Kalashnikov, A.; Leshukov, A.; Poliksha, V.; Razmerov, A.; Strebkov, Y.

**P1-032 Neutronic study of an innovative natural uranium-thorium based fusion-fission hybrid energy system**

Xiao, S.; Zhou, Z.; Zhao, J.; Yang, Y.

**P1-033 Synthesis and Fabrication of Lithium Orthosilicate Pebbles by Solid State Reaction Process**

Mandal, D.

**P1-034 Characteristics of microstructure and tritium release properties of different kinds of beryllium pebbles for application in tritium breeding modules**

Kurinskiy, P.; Vladimirov, P.; Moeslang, A.; Rolli, R.; Zmitko, M.

**P1-035 Design development and analytical assessment of LLCB TBM in Russian Federation during 2012-2013**

Leshukov, A.; Danilov, I.; Kartashev, I.; Kovalenko, V.; Razmerov, A.; Strebkov, Y.; Sviridenko, M.; Sysoev, A.; Kirillov, I.; Obukhov, D.; Pertsev, D.; Vitkovskiy, I.

**P1-036 Experimental Investigation of Liquid-Metal Distribution in MHD Flows in Insulating Parallel Ducts**

Ueki, Y.; Miura, M.; Yokomine, T.; Kunugi, T.

**P1-037 Development of beryllide pebble fabrication as advanced neutron multiplier**

Nakamichi, M.; Kim, J-H.

**P1-038 Neutron cross section evaluation of Chromium and Iron for Fusion Application**

Kim, H. I.; Lee, C. W.; Kim, D. H.; Lee, Y-O.; Lee, D-W.; Cho, S.

**P1-039 Development of CAD-based Discrete Ordinates Code and Comparison of Neutron Flux Distributions in the Korea Helium Cooled Ceramic Reflector Test Blanket Module**

Kim, J. W.; Lee, C. W.; Lee, Y-O.; Lee, D-W.; Cho, S.

**P1-040 Long-term annealing of lithium orthosilicate based ceramic breeder pebbles**

Kolb, M.; Leys, O.; Knitter, R.

**P1-041 Comparison of coating processes for the development of aluminum-based barriers for blanket applications**

Wulf, S.-E.; Krauss, W.; Konys, J.

**P1-042 Corrosion susceptibility comparison of Eurofer 97 steel in contact two ceramic breeders lithium silicates**

Hernández, T.; Fernández, P.

**P1-043 An Integrated Mesh Translation Scheme for the High-fidelity Coupling of Fusion Neutronics and TH/SM Analyses**

Qiu, Y.; Fischer, U.; Pereslavytsev, P.

**P1-044 Experimental Investigation of Thermal Properties of the Li<sub>4</sub>SiO<sub>4</sub> Pebble Beds**

Yongjin, F.; Kaiming, F.; Yinfen, C.; Yang, L.; Jin, H.

**P1-045 Novel Granulation Method for Advanced Tritium Breeder**

Hoshino, T.

**P1-046 Effect of plasma sintering consolidation on reactivity of beryllium**

Kim, J-H.; Nakamichi, M.

**P1-048 Results of EUROFER-97 corrosion tests in lead-lithium alloy**

Loginov, N.; Mikheyev, A.; Morosov, V.; Zazorin, I.; Solomatin, A.; Engelko, V.; Kirillov, I.; Tkachenko, K.

**P1-049 Development of the Water Cooled Lithium-Lead Blanket for DEMO**

Aubert, J.; Aiello, G.; Jonquères, N.; Li Puma, A.; Morin, A.; Rampal, G.

**P1-050 Liquid metal magnetohydrodynamic flows in manifolds of dual coolant lead lithium blankets**

Mistrangelo, C.; Bühler, L.



**P1-051 Development of the Helium Cooled Lithium Lead Blanket for DEMO**

Aiello, G.; Aubert, J.; Jonquères, N.; Li Puma, A.; Morin, A.; Rampal, G.

**P1-052 Influence of surface oxidation on electric potential measurements in MHD liquid metal flows**

Chowdhury, V.; Bühler, L.; Mistrangelo, C.

**P1-053 Influence of magnetic field deformation by ferromagnetic wall materials on MHD flows in pipes and ducts of fusion blankets**

Ehrhard, S.; Bühler, L.

**P1-054 Status of the new DEMO HCPB Blanket design in the European DEMO studies**

Kecskés, S.; Carloni, D.; Kang, Q.; Ilic, M.; Bitz, O.

**P1-055 Tritium permeation experiments using reduced activation ferritic/martensitic steel tube and erbium oxide coating**

Chikada, T.; Shimada, M.; Pawelko, R.; Terai, T.; Muroga, T.

**P1-056 Microstructural Characterization for Radiation Enhanced Deuterium Loaded RB-SiC.**

Moroño, A.; Hernández, T.; Hodgson, E.; Malo, M.

**P1-057 Conceptual design of a water cooled breeder blanket for CFETR**

Liu, S.; Pu, Y.; Li, J.; Peng, C.; Cheng, X.; Ma, X.

**P1-058 Corrosion and Transport of Activated Corrosion Products in DCLL Blanket**

Smolentsev, S.; Saeidi, S.; Zucchetti, M.; Abdou, M.

**P1-059 Fission blanket benchmark experiment on spherical assembly of uranium and PE with PE reflector**

Tonghua, Z.; Xinxin, L.; Rong, L.; Zijie, H.; Li, J.; Mei, W.

**P1-060 Measurement and Calculation of Neutron Energy Spectrum in an Alternate Depleted Uranium-Polyethylene System**

Xinxin, L.; Tonghua, Z.; Rong, L.; Zijie, H.; Li, J.

**Topic C Fuel Cycle and Tritium Processing**

**P1-061 Theoretical prediction of thermodynamic properties of tritiated beryllium molecules and application to ITER source term**

Virost, F.; Barrachin, M.; Souvi, S.; Cantrel, L.

**P1-062 Investigation on degradation mechanism of ion exchange membrane immersed into high-concentration tritiated water under the Broader Approach Activities**

Iwai, Y.; Sato, K.; Yamanishi, T.

**P1-063 Hydrogen and water vapor adsorption properties on cation-exchanged mordenite for use to a tritium recovery system**

Kawamura, Y.; Edao, Y.; Iwai, Y.; Yamanishi, T.

**P1-064 On ion implantation and damage effect in Li<sub>2</sub>TiO<sub>3</sub> as a fusion breeder blanket: a technological approach for in-situ degradation testing.**

Carella, E.; Hernández, M. T.; González, M.

**P1-065 Experimental testing results to demonstrate tritium extraction in LiPb loop systems with a compact permeator against vacuum**

Sacristán, R.; Veredas, G.; Bonjoch, I.; Peñalva, I.; Calderón, E.; Alberro, G.; Balart, D.; Sarrionandia-Ibarra, A.; Pérez, V.; Ibarra, A.; Legarda, F.

**P1-066 Tritium retention properties of tungsten, co-deposited carbon films and graphite**

Nobuta, Y.; Hatano, Y.; Matsuyama, M.; Abe, S.; Akamaru, S.; Yamauchi, Y.; Hino, T.; Suzuki, S.; Akiba, M.

**P1-067 Hydrogen Isotopes behavior on water-metal boundary with simultaneous transferring from and to the metal surface**

Hayashi, T.; Isobe, K.; Edao, Y.; Nakamura, H.; Kobayashi, K.; Oya, Y.; Okuno, K.; Yamanishi, T.

**P1-068 Recent results on tritium technology for DEMO reactor in JAEA under BA program**

Yamanishi, T.; Nakamura, H.; Kawamura, Y.; Iwai, Y.; Isobe, K.; Yamada, M.; Oyaidu, M.

**P1-069 Construction and commissioning of a Hydrogen Cryogenic Distillation system for tritium recovery at ICIT Rm. Valcea**

Ana, G.; Pasca, G.; Bucur, C.; Brad, S.; Vijulie, M.

**P1-070 Tokamak exhaust gas composition measurement via different mass spectrometers**

Battes, K.; Day, C.; Hauer, V.

**P1-071 Activity monitoring of ppm concentrations of tritium in helium gas streams by beta induced X-ray spectrometry**

Röllig, M.; Bornschein, B.; Priester, F.

**Topic D Material Engineering for FNT**

**P1-072 Status & Progress of the R&D Work for ITER Magnet Supports**

Li, P.; Hou, B.

**P1-073 Corrosion of 9Cr-1Mo steel in Pb-17Li in a rotating disc experiment**

Chakraborty, P.; Pradhan, P. K.; Fotedar, R. K.; Krishnamurthy, N.

**P1-074 Tritium Transport calculations for the IFMIF Tritium Release Test Module**

Freund, J.; Arbeiter, F.; Abou-Sena, A.; Franza, F.; Kondo, K.

**P1-075 IFMIF-LIPAc beam diagnostics and its challenges**

Carmona Torres, J. M.; Calvo, J.; Guirao, A.; Oliver, C.; Podadera, I.; Soletto, A.; Marroncle, J.; Abbon, P.; Egberts, J.; Gournay, J.F.; Jeanneau, F.; Marchix, A.; Poggi, M.

**P1-076 Microstructural characteristics of commercial W-1% La2O3 alloys**

Yinzhong, S.; Kai, C.; Jie, Y.; Bo, J.

**P1-077 Study on the capsule material feasibility in ITER environment**

Lee, Y.; Dang, J.-J.; Chung, K.-J.; Cheon, M. S.; Lee, H. G.; Bertalot, L.; Hwang, Y.-S.

**P1-078 Influences of alloying elements and tempering on the impact and creep properties of Korean RAFM steel**

Chun, Y.-B.; Han, C. H.; Choi, B. K.; Kim, K. B.; Kang, S. H.; Noh, S. H.; Baek, J.-H.; Kim, T.-K.; Lee, D.; Cho, S.; Jeong, Y. H.

**P1-079 Impact Properties of Electron Beam Welds of V-4Ti-4Cr alloys NIFS-HEAT-2 and CEA-J57**

Tsisar, V.; Nagasaka, T.; Le Flem, M.; Muroga, T.; Yeliseyeva, O.; Konys, J.

**P1-080 Evaluation on Defect in the Weld of Stainless Steel Materials using Nondestructive Technique**

Lee, J.; Lee, J.; Lee, S.; Bae, D.

**P1-081 Nanoindentation by using CSM as tool to measure changes in mechanical properties on RAFM steels irradiated with heavy ions.**

Roldán Blanco, M.; Rams Ramos, J.; Jiménez Rey, D.; Fernández Paredes, P.

**P1-082 Mechanical properties of nano-particle dispersion strengthened V-4Cr-4Ti alloy**

Zheng, P.; Nagasaka, T.; Muroga, T.; Chen, J.; Fu, H.; Li, C.

**P1-083 Joining Technologies of RAFM steel CLF-1 for Fabrication of ITER Test Blanket Module**

Wang, P.; Chen, J.; Xu, Z.

**P1-084 Performance characterization of the FLEX low pressure helium facility for fusion technology experiments**

Sch lindwein, G.; Arbeiter, F.; Klein, C.

**P1-086 Engineering Design of the IFMIF EVEDA Reference Test Cell and Key Components**

Tian, K.; Arbeiter, F.; Chen, Y.; Heinz el, V.; Kondo, K.; Mittwollen, M.

**P1-087 Preliminary design of the Neutron Spectral Shifter dedicated to the IFMIF Liquid Breeder Validation Module**

Mas, A.; Mota, F.; Casal, N.; García, A.; Rapisarda, D.; Arroyo, J. M.; Molla, J.; Ibarra, A.

**P1-088 IFMIF-EVEDA SRF Linac Couplers Test Bench**

Regidor, D.; Kirpitchenov, I.; Méndez, P.; Molla, J.; Salom, A.; Weber, M.; Desmons, M.; Grouas, N.; Hardy, P.; Hennion, V. M.; Jenhani, H.; Orsini, F.

**P1-089 Electrical insulating radiation-resistant coatings for the design elements of ITER Blanket**

Maksimov, V.; Ivanov, V.; Dubinin, G.; Leshukov, A.; Strebkov, Y.; Sviridenko, M.

**P1-090 Metallurgical Analysis of Lithium Test Assembly Operated for 1200 hours**

Furukawa, T.; Kondo, H.; Kanemura, T.; Hirakawa, Y.; Yamaoka, N.; Hoashi, E.; Suzuki-Yoshihashi, S.; Horiike, H.

**Topic E Vacuum Vessel**

**P1-091 Pendulum Support of Plasma Vessel W7-X**

Missal, B.; Hansen, A.; Liesenberg, K.; Leher, F.; Schiller, T.

**P1-092 Thermal-hydraulic analysis for ITER Upper ELM Coil**

Zhang, S.; Song, Y.; Wang, Z.; Du, S.; Ji, X.

**P1-093 Intelligent Controller of aFlexible Hyprid Robot Machine for ITER Assembly and Maintenance**

AL-Saedi, M.; Wu, H.; Handroos, H.

**P1-094 Design of the Tore Supra West divertor structure according to nuclear construction code**

Larroque, S.; Portafaix, C.; Doceul, L.; Saille, A.; Nardon, E.; Samaille, F.; Bucalossi, J.

**P1-095 Thermal Analysis on Detailed 3D Finite Element Models of ITER Thermal Shield**

Nam, K.; Chung, W.; Noh, C. H.; Ahn, H. J.; Lee, H. G.; Hamlyn-Harris, C.; Her, N.; Choi, C. H.; Sborchia, C.

**P1-096 Fabrication Results of Full Scale Mock-up for ITER VV Port in Korea**

Kim, H-S.; Park, C.-K.; Kim, G.-H.; Hong, K.-H.; Lee, Y.-J.; Kim, B.-C.; Ahn, H.-J.; Lee, H.-G.; Lee, J.-S.; Won, J.-G.; Sa, J.-W.; Choi, C.-H.

**P1-097 Bolted Ribs Analysis for the ITER Vacuum Vessel using Finite Element Submodelling Techniques**

Zarzalejos, J. M.; Fernández, E.; Caixas, J.; Bayón, A.; Polo, J.; Guirao, J.; García Cid, J.; Rodríguez, E.

**P1-098 Electrical Parameters for KTX vacuum vessel**

Liu, X.; Xu, W.; Yang, Q.; Zheng, J.

**P1-099 Detailed Analysis of Eddy Currents in Wendelstein 7-X**

Köppen, M.; Bykov, V.; Schauer, F.

**P1-100 The ITER EC H&CD Upper Launcher: Seismic Analysis**

Aiello, G.; Vaccaro, A.; Combescure, D.; Gessner, R.; Grossetti, G.; Meier, A.; Saibene, G.; Scherer, T.; Schreck, S.; Spaeh, P.; Strauss, D.

**P1-101 Design of ITER Vacuum Vessel In-wall Shielding**

Wang, X.; Ioki, K.; Morimoto, M.; Tailhardat, O.; Terasawa, A.; Gribov, Y.; Barabash, V.; Polunovskiy, E.; Dani, S.; Choi, C-h.; Sborchia, C.; Pathak, H.; Raval, J.

**Topic F Nuclear System Design****P1-102 Current status of engineer design of KTX components**

Yang, Q.; Song, Y.; Zhao, W.; Zheng, J.; Shi, S.; Chen, Z.; Zhang, J.; Xu, H.; Liu, W.; Ding, W.

**P1-103 Nuclear Analysis for ITER JA WCCB-TBM**

Sato, S.; Tanigawa, H.; Hirose, T.; Enoeda, M.; Ochiai, K.; Konno, C.

**P1-104 Overview of neutronic analysis results for RF LLCB TBM**

Kartashev, I.; Leshukov, A.; Sviridenko, M.; Kirillov, I.; Obukhov, D.; Pertsev, D.

**P1-105 K-effective Benchmarking of SuperMC 2.0**

Song, J.; Sun, G.; Zheng, H.; Chen, Z.; Wu, M.

**P1-106 FENDL-3 benchmark test with neutronics experiments related to fusion in Japan**

Konno, C.; Ohta, M.; Takakura, K.; Ochiai, K.; Sato, S.

**P1-107 Status of ITER TBM port plug conceptual design and analyses**

Kim, B. Y.; Sabourin, F.; Merola, M.; Giancarli, L.; Villari, R.; Di Maio, A.; Lucca, F.; Levesy, B.

**P1-108 Re-design of ITER GDC system based on a fixed electrode concept**

Yang, Y.; Maruyama, S.; Kiss, G.; O'connor, M.; Zhang, Y.; Pitts, R.; Shimada, M.; Fang, T.; Wang, Y.; Wang, M.; Pan, Y.; Li, B.; Li, L.

**P1-109 The Electromagnetic design and Analysis for CFETR magnet system**

Zheng, J.; Song, Y.; Liu, X.; Wu, S.; Lu, K.; Wan, Y.; Liu, J.; Weng, P.; Wu, W.; Ye, M.; Liu, S.; Wei, J.; Du, S.; Cheng, Y.; Xu, W.; Wei, J.

**P1-111 Modeling and sizing of the heat exchangers of a new supercritical CO<sub>2</sub> Brayton power cycle for energy conversion for fusion reactors**

Serrano, I. P.; [Cantizano, A.](#); Linares, J. I.; Moratilla, B. Y.

**P1-112 Enhanced arrangement for recuperators in supercritical CO<sub>2</sub> Brayton power cycle for energy conversion in fusion reactors**

Serrano, I. P.; [Linares, J. I.](#); Cantizano, A.; Moratilla, B. Y.

**P1-113 Thermodynamic Evaluation on Power Conversion System Options for Potential K-DEMO Fusion Reactor**

[Park, I. W.](#); Park, M. Y.; Park, G. C.; Lee, Y. S.; Im, K. H.; Kim, H. C.; Kim, K. M.; Kim, E. S.

**P1-114 Assessment of Mesh-Coupled R2S Shutdown Dose Calculation Error Dependence on Voxel Resolution**

[Mangham, S.](#); Turner, A.

**Topic G Safety Issues and Waste Management**

**P1-115 Activation analyses for the IFMIF-LBVM**

[Mota, E.](#); Casal, N.; García, A.; Mas, A.; Molla, J.; Ibarra, A.

**P1-119 Busbar arcs at large Fusion Magnets: Conductor to Feeder Tube arcing Model Experiments with the LONGARC device**

[Klimenko, D.](#); Pasler, V.

**P1-120 Preliminary results from a detritiation facility dedicated to soft housekeeping waste and tritium valorisation.**

[Liger, K.](#); Trabuc, P.; Mascarade, J.; Troulay, M.; Perrais, C.; Tosti, S.; Borgognoni, F.

**P1-121 Shutdown dose rate assessment with the Advanced D1S method: development, applications and validation**

[Villari, R.](#); Fischer, U.; Moro, F.; Pereslavl'tsev, P.; Petrizzi, L.; Podda, S.; Serikov, A.

**P1-122 CFD analysis for the transport of tritium within different process rooms of ITER**

[Colomer, C.](#); Ariño, X.; Alemán, A.; Martín, M.; Salellas, J.; Salvat, M.

**P1-124 Penetration of tritiated water vapor through hydrophobic paints for concrete materials**

[Edao, Y.](#); Kawamura, Y.; Yamanishi, T.; Fukada, S.

**P1-125 Neutron Spectral Effects on Pb-17Li Activation: a Study for different Blanket Designs**

[Zucchetti, M.](#); Youssef, M.; Liu, H.; Abdou, M.

## Topic H Models and Experiment for FNT

### P1-127 **Manufacturing Prototypes for Lipac Beam Dump**

Arranz, F.; Brañas, B.; Iglesias, D.; Nomen, O.; Rapisarda, D.; Lapeña, J.; Muñoz, A.; Szcepaniak, B.; Manini, J.; Gómez, J.

### P1-128 **The F4E programme on nuclear data validation and nuclear instrumentation techniques for TBM in ITER**

Leichtle, D.; Angelone, M.; Batistoni, P.; Calderoni, P.; Fischer, U.; Izquierdo, J.; Kliks, A.; Kodeli, I.; Kuc, T.; Lilley, S.; Majerle, M.; Packer, L.; Pillon, M.; Pohorecki, W.; Snoj, L.; Villari, R.

### P1-129 **Development on Nuclear Validation Facility and Test Platform for Fusion Reactor in China**

Huang, Q.; Zhu, Z.; Song, G.; Li, C.; Wu, Y.

### P1-130 **Direct Measurements of Particle Flux along Gap Sides in Castellated Plasma Facing Components**

Dejarnac, R.; Sestak, D.; Terra, A.; Komm, M.; Gunn, J.; Schweer, B.; Moeller, S.; Martin, A.; Boizante, G.

### P1-131 **Numerical Simulations on Natural Convective Heat Transfer and Active Cooling of IFMIF Test Cell**

Chen, Y.; Arbeiter, F.; Heinzl, V.; Kondo, K.; Mittwollen, M.; Tian, K.

### P1-133 **Luminescence Qualification of Radiation Induced Damage and Thermal Recovery in Aluminas**

Malo, M.; Moroño, A.; Hodgson, E.

### P1-134 **Asymmetry of Wendelstein 7-X magnet system introduced by torus assembly**

Fellinger, J.; Egorov, K.; Kallmeyer, J. P.; Bykov, V.; Schauer, F.

### P1-135 **Development of a high resolution neutron spectroscopy system using a diamond detector and a remote digital acquisition methodology**

Pillon, M.; Andreoli, F.; Angelone, M.; Milocco, A.

### P1-136 **TRIPOLI-4® Monte Carlo code ITER A-lite Neutronic Model Validation**

Jaboulay, J-C.; Cayla, P-Y.; Fausser, C.; Lee, Y-K.; Trama, J-C; Li-Puma, A.

### P1-137 **Modeling of Hydrogen Isotope Retention in the Tungsten Divertor of EAST under different discharge operations**

Sang, C.; Sun, J.; Du, H.; Wang, D.

### P1-138 **Radiation and momentum exchange in the divertor detachment induced by gas puffing: PIC-DSMC simulation**

Tang, T.; Sang, C.; Sun, J.; Wang, D.

P1-139 **Development of ITER IOIS Assembly Tool and Mock-up**  
Nam, K.; Park, H.; Kim, D.; Kim, K.; Jung, S.; Ahn, H.; Watson, E.; Shaw, R.

P1-140 **Production and validation of a 3D-printed coil frame for the UST\_2 modular stellarator**  
Queral, V. M.

### Topic I Repair and Maintenance

P1-141 **Concept design on RH maintenance of CFETR Tokamak Reactor**  
Song, Y.; Wu, S.; Wan, Y.; Li, J.; Weng, P.; Ye, M.; Wu, W.; Zheng, J.; Liu, X.; Liu, S.; Cheng, Y.; Shen, G.; Yang, Y.; Lin, L.; Wei, J.; Xu, W.

P1-142 **Determination of capsule position by monitoring flow-rate in ITER neutron activation system**  
Dang, J.-J.; Jo, J.-m.; Chung, K.-J; Cheon, M. S.; Lee, H. G.; Bertalot, L.; Hwang, Y. S.

P1-143 **A three-layered model for generic description of remote handling maintenance tasks in supervisory control systems**  
Zieba, S.; Russotto, F.-X.; Da Silva Simoes, M.; Measson, Y.

P1-144 **Implementation of Multibody analysis in the Verification and Validation process of ITER Remote Handling Systems**  
Sibois, R.; Määttä, T.; Siuko, M.; Mattila, J.

P1-145 **Interactive Virtual Mock-ups for Remote Handling Compatibility Assessment of Heavy Components**  
Van Oosterhout, J.; Heemskerk, C.J.M.; Koning, J.F.; Ronden, D.M.S.; de Baar, M.

P1-146 **TAO3: modular controller software for highly interoperable force feedback teleoperation**  
Dionnet, F.; Da Silva Simoes, M.; Measson, Y.

P1-147 **Assessment of a Rate-Position Controller for Remote Handling in Nuclear Fusion Maintenance Tasks**  
Suárez-Ruiz, F.; Breñosa, J.; Ferre, M.

P1-148 **Gripping tool for the ITER upper port plug RH extraction/insertion**  
Rosa, E. V.; Ríos, L.

P1-149 **Software fault detection and recovery in critical real-time systems: an empirical study**  
Alho, P.; Mattila, J.

P1-150 **Human-in-the-loop tele-operated maintenance: what can ITER learn from JET?**  
Boessenkool, H.; Thomas, J.; Abbink, D.; Heemskerk, C.; de Baar, M.; Steinbuch, M.



**P1-151 Reliability Requirements Management – addressing Remote Handling controller reliability via probabilistic methods**

Väyrynen, J.; Alho, P.; Mattila, J.

**P1-152 ITER EC H&CD Upper Launcher: Design Options and Remote Handling Issues of the Waveguide Assembly**

Grossetti, G.; Aiello, G.; Chavan, R.; Geßner, R.; Goodmann, T.; Heemskerk, C.; Meier, A.; Ronden, D.; Scherer, T.; Schreck, S.; Späh, P.; Strauß, D.; Vaccaro, A.; Van Oosterhout, J.

**P1-153 Evaluation of a reconfigurable Modular robot system for inspection and maintenance tasks in nuclear fusion facility**

Pagala, P.; Ferre, M.; Aracil, R.

**P1-154 Progress in the design of the ITER Neutral Beam Cell Remote Handling System**

Van Uffelen, M.; Shuff, R.; Haist, B.; Damiani, C.; Choi, C-H; Tesini, A.

**P1-155 Design of a MGy radiation tolerant resolver-to-digital converter IC for remotely operated maintenance in harsh environments**

Leroux, P.; Van Uffelen, M.; Damiani, C.; Hamilton, D.

**Topic L Fission-Fusion Synergy and Cross-Cutting Technologies**

**P1-156 MCNPX/ANSYS Fluent automatic coupling software**

Fabbri, M.; Colomer, C.; Alemán, A.; Salellas, J.

**P1-157 Conceptual Study of Fusion-Driven System for Nuclear Waste Transmutation**

Hong, B. G.

**P1-158 Rigorous 2-step shutdown dose rate calculation method based on mesh tally and its application to CLEAR-I**

Zheng, J.; Zou, J.; Yang, Q.; Zeng, Q. and the FDS Team

**P1-159 Integral neutron experiments for fusion -fission hybrid energy reactor**

Li, M.; Liu, R.; Zhu, T.

**P1-160 The Source Neutrons and Fuel Distribution Importance for Power Generation and Heat Transfer In Fusion-Fission Hybrids**

Wójcik, G.; Taczanowski, S.

**POSTER SESSION 2**  
**Wednesday 18<sup>th</sup> September**

11:00 – 13:00 Ground floor

**Chairs:** Kuteev, B.V and García, A.

**Topic A First-Wall Technology and High Heat Flux Components**

**P2-002 Numerical Solutions for Liquid Metal MHD Flow in an L-Bend under a Uniform Magnetic Field**

Jing, Z.; Chen, L.; Ni, M-J

**P2-003 High heat flux testing of Normal Heat Flux First Wall (NHF FW) Mock-ups with calibrated defects**

Bellin, B.; Banetta, S.; Zacchia, F.; Davydov, V.; Kuznetsov, V.; Rulev, R.; Eaton, R.; Mitteau, R.; Raffray, R.

**P2-004 Study of laser-removal and structural changes of W:Al:C layer with Deuterium content**

Kubkowska, M.; Kowalska-Strzeciwiłk, E.; Gasior, P.; Skrzeczanowski, W.; Fortuna-Zalesna, E.; Grzonka, J.

**P2-005 Stability of liquid metal thin film flow under varying heat load**

Jakobs, M.; Jaspers, R.; Kamp, L.; Lopes Cardozo, N.

**P2-006 Liquid Film First Wall Feasibility**

Okino, E.; Noborio, K.; Kasada, R.; Konishi, S.

**P2-008 Effect of induced damage on hydrogen isotope retention of F82H with impurity layer**

Shinoda, N.; Yamauchi, Y.; Nobuta, Y.; Hino, T.

**P2-009 Calorimetry and Electron Beam Control in Korea Heat Load Test Facility KoHLT-EB**

Kim, S-K.; Jin, H. G.; Shin, K. I.; Choi, B. G.; Lee, E. H.; Yoon, J.-S.; Lee, D. W.; Park, C. K.; Cho, S.

**P2-010 Underwater explosive welding of tungsten and reduced-activation ferritic steel F82H**

Mori, D.; Kasada, R.; Konishi, S.; Morizono, Y.; Hokamoto, K.

**P2-011 Progress in the design of Normal Heat Flux (NHF) First Wall panels**

Dellopoulos, G.; Jimenez, M.; Cicero, T.; Banetta, S.; Bellin, B.; Zacchia, F.; Calcagno, B.; Chappuis, P.; Gicquel, S.; Mitteau, R.; Raffray, R.

**P2-012 Characterization of HIP joints for ITER First Wall involving SS, Cu, CuCrZr and Be**

Ordas, N.; Galarza, N.; Moreno, E.; Nation, P.; Iturriza, I.; Garcia-Rosales, C.; Guilemany, J. M.; Iliescu, S.; Báscones, A.; Samaniego, F.

- P2-014 A solution for operation embrittlement of tungsten components: tungsten fibre-reinforced tungsten**  
Riesch, J.; Buffière, J-I.; Höschen, T.; Di Michiel, M.; Scheel, M.; Wurster, S.; Linsmeier, C.; You, J-H.
- P2-015 Progress in Development and Application of Lithium Based Components for Tokamak**  
Vertkov, A.; Lyublinski, I.; Zharkov, M.; Semenov, V.; Azizov, E.; Mirnov, S.; Lazarev, V.; Kostina, A.
- P2-016 High heat flux PLIF facility for the first wall component test**  
Wang, Z.; Song, Y.; Huang, S.
- P2-017 Manufacture of 14 First Wall Mock-ups with calibrated defects**  
Bobin, I.; Boireau, B.; Cottin, A.; Burat, O.; Lepers, F.; Banetta, S.; Zaccchia, F.; Lorenzetto, P.
- P2-018 High Heat Flux Test of a Korea ITER TBM FW Mock-up**  
Yoon, J. S.; Kim, S. K.; Lee, E. H.; Choi, B. G.; Shin, K. I.; Lee, D.W.; Cho, S.
- P2-019 Current Status of Structural Components Design of a Korean HCCR TBM in ITER**  
Shin, K. I.; Lee, D. W.; Gon, J. H.; Lee, E. H.; Kim, S-K.; Yoon, J. S.; Ahn, M-Y.; Cho, S.
- P2-020 Comparison of hydrogen isotope retention for tungsten probes in LHD vacuum vessel during the experimental campaigns in 2011 and 2012**  
Oya, Y.; Masuzaki, S.; Tokitani, M.; Kobayashi, M.; Taguchi, T.; Toda, K.; Uchimura, H.; Miura, R.; Yoshida, N.; Watanabe, H.; Yamauchi, Y.; Hino, T.; Miyamoto, M.; Hatano, Y.; Okuno, K.
- P2-021 Current Status of Plasma Facing Components for the WEST Project**  
Missirlian, M.; Richou, M.; Firdaouss, M.; Hernandez, C.; Lipa, M.
- P2-022 Thermo-mechanical analysis of RMP coil system for EAST tokamak**  
Wang, S.; Ji, X.; Song, Y.; Zhang, S.; Wang, Z.; Sun, Y.; Qi, M.; Liu, X.; Wang, S.; Yao, D.
- P2-023 Design of a monoblock type water cooled DEMO divertor using Eurofer as structural material**  
Richou, M.; Li-Puma, A.
- P2-024 Mechanical properties of the advanced tungsten alloys**  
Fukuda, M.; Saito, T.; Hasegawa, A.; Nogami, S.; Yabuuchi, K.; Muroga, T.

**P2-025 Experimental Try-out of IR Thermography Method for Final Acceptance Tests of the ITER Divertor Dome**

Tanchuk, V.; Grigoriev, S.; Makhankov, A.; Senik, K.; Yablokov, N.; Belenky, M.; Blinov, M.; Lebedev, M.; Fokin, B.

**Topic B Blanket Technology**

**P2-026 Interaction of tritium and helium with lithium -lead eutectic under reactor irradiation**

Tazhibayeva, I.; Kulsartov, T.; Kenzhin, E.; Zaurbekova, Z.; Ponkratov, Y.; Gordienko, Y.; Barsukov, N.; Tulubaev, E.

**P2-027 Development of Lithium meta-titanate Ceramics pebbles for Indian LLCB TBM**

Shrivastava, A.; Makwana, M.; Chaudhuri, P.; Rajendrakumar, E.

**P2-028 Measurements of the purge helium pressure drop across pebble beds packed with lithium orthosilicate and glass pebbles**

Abou-Sena, A.; Arbeiter, F.; Boccaccini, L.; Schindwein, G.

**P2-029 A Neutron Poison Tritium Breeding Controller Applied to a HCPB Fusion Reactor Model**

Morgan, L.; Packer, L.

**P2-030 Optimised mass flow rate distribution analysis for cooling the ITER Blanket System**

Pérez, G.; Mitteau, R.; Furmanek, A.; Martin, A.; Raffray, R.; Merola, M.

**P2-031 Simple Thought Experiment to Examine Benchmark Performance for Fusion Nuclear Data**

Murata, I.; Ohta, M.; Miyamaru, H.

**P2-032 Mechanical Behaviors of FCI in Thermo-Magneto-Structure Coupling Field**

Li, M-J.; Yu, X-G.; Ni, M-J.; Zhang, N-M.

**P2-033 Electrical Connectors for Blanket Modules in ITER**

Poddubnyy, I.; Danilov, I.; Calcagno, B.; Chappuis, P.; Khomiakov, S.; Kolganov, V.; Raffray, R.; Roccella, R.; Sadakov, S.; Ulrickson, M.

**P2-034 Dynamic Analysis of the ITER Blanket Attachment System**

Khomiakov, S.; Kolganov, V.; Poddubnyy, I.; Sadakov, S.; Vlasov, D.

**P2-035 Ultrasonic Doppler Experimental Research of Gas Bubble Rising in Liquid Metal under a Strong Magnetic Field**

Wang, Z. H.; Wang, S. D.; Meng, X.; Ni, M. J.

**P2-036 MHD analysis of Lead lithium flow in a duct consisting of circular and square cross-sections under high magnetic field**

Swain, P. K.; Tiwari, V.; Sahu, S.; Polepalle, S.; Bhattacharyay, R.; Patel, A.; Platacis, E.; Shisko, A.

P2-037 **Trapping of deuterium dissolved in fluidized Li by Y**  
Fukada, S.; Hiromoto, T.; Shigeharu, S.; Sugie, K.; Edao, Y.

P2-038 **Liquid Metal MHD studies with non-magnetic and ferro-magnetic structural material**  
Patel, A.

P2-039 **Progress in Engineering Design of Indian LLCB TBM Set for testing in ITER**  
Chaudhuri, P.; Ranjithkumar, S.; Sharma, D.; Danani, C.; Swami, H. L.; Bhattacharay, R.; Rajendra, K. E.; Vyas, K. N.

P2-040 **In-situ impedance measurement of corrosion interface in liquid metals**  
Kondo, M.; Suzuki, N.; Nakajima, Y.; Muroga, T.; Tanaka, T.

P2-041 **Structural Design and Thermal-Hydraulic Analysis of Liquid Lead-Lithium Tritium Breeder Blanket for China Fusion Engineering Testing Reactor**  
Li, M.; Ni, M.; Lian, C.; Wang, W.; Jiang, J.; Zeng, Q.; Wu, Y.

P2-042 **Influence of surface condition on deuterium release from Li<sub>2</sub>TiO<sub>3</sub> pebble**  
Tsuchiya, A.; Hino, T.; Yamauchi, Y.; Nobuta, Y.; Akiba, M.; Enoeda, M.

P2-043 **MHD LiPb Flow and analysis of thermal stress of structure and First Wall in DLL Blanket**  
Wang, H.; Tang, C.

P2-045 **Measurement of Hydrogen Isotope Concentration in Erbium Oxide Coatings**  
Sato, R.; Chikada, T.; Matsuzaki, H.; Suzuki, A.; Terai, T.; Sugiyama, K.; Maier, H.

P2-046 **Neutronic assessment of a dual-coolant blanket design for DEMO**  
Palermo, I.; Veredas, G.; Gómez-Ros, J. M.; Sanz, J.

P2-047 **Behaviour of the Pb-Li Eutectic Alloy Impurities by ICP-MS**  
Conde, E.; Barrado, A.I.; Pascual, L.; Fernández, M.; Gómez de Salazar, J.M.; Barrena, M.I.; Quiñones, J.

P2-048 **Testing of Porous SiC With Dense Coating Under Relevant Conditions for Flow Channel Insert Application**  
Bereciartu, A.; Ordas, N.; Garcia-Rosales, C.; Moroño, A.; Malo, M.; Hodgson, E.; Peñalva, I.; Alberro, G.; Abellà, J.; Colominas, S.; Sedano, L.

P2-050 **Interaction of titanium beryllide with steam at high temperatures**  
Munakata, K.; Hara, K.; Akimoto, Y.; Takeda, H.; Wada, K.; Kim, J-H.; Nakamich, M.

**P2-051 Determination of the protective atmosphere during the Pb-Li alloy fusion. Part I. Furnace atmosphere and temperature.**

Pascual, L.; Barrena, M. I.; Gómez de Salazar, J.M.; Soria, A.; Fernández, M.; Conde, E.; Quiñones, J.

**P2-052 Definition of the key parameter for production of eutectic Pb-Li alloys. Part II. Mass balance and temperature.**

Pascual, L.; Barrena, M. I.; Gómez de Salazar, J. M.; Soria, A.; Fernández, M.; Conde, E.; Quiñones, J.

**P2-053 Effect of post-weld heat treatment on irradiation hardening of the weld metal of low activation vanadium alloys**

Kometani, N.; Nagasaka, T.; Hishinuma, Y.; Muroga, T.; Yoshiie, T.; Kubo, S.; Miyazawa, T.

**P2-054 Loop heat pipes for energy conversion in fusion reactors**

Dobran, F.

**P2-055 First Wall Assembly Technologies of 1/3 Scale China Test Blanket Module**

Huang, B.; Li, C.; Zhong, B.; Wu, Q.; Huang, Q.

**P2-056 Neutronics analysis of the shielding performance of HCCB TBM**

Li, Z.; Feng, K.; Zhao, F.; Wang, Q.

**P2-057 Design Progress and Performance evaluation of a Korean HCCR TBM in ITER**

Lee, D. W.; Jin, H. G.; Shin, K. I.; Lee, E. H.; Kim, S. K.; Yoon, J. S.; Ahn, M-Y.; Cho, S.

**P2-058 Numerical Analysis of the Heat Transfer Coefficient for Blanket Shield Block by Simplified 3D Model**

Jung, H-C.; Kim, D-H.; Kim, S-W.; Ha, M-S.; Heo, Y-G.; Ahn, H-J.; Lee, H-G.; Jung, K-J.

**P2-059 Manufacturing and Testing of Full Scale Prototype for ITER Blanket Shield Block**

Kim, S.-W.; Kim, D-H.; Jung, H-C.; Lee, S-K.; Park, H-K.; Kang, S-C.; Lee, D-H.; Zhang, F.; Kim, B-Y.; Ahn, H-J.; Lee, H. G.; Jung, K-J.

**Topic C Fuel Cycle and Tritium Processing**

**P2-060 Numerical modelling of a tapered Holweck vacuum pump via linear kinetic theory**

Naris, S.; Tantos, C.; Valougeorgis, D.; André, J.; Millet, F.; Perin, J. P.

**P2-061 Design and development of hydrogen isotope sensor in liquid Pb-Li**

Sircar, A.; Sharma, S. K.; Patel, R. B.; Rayjada, P. A.

**P2-062 Design and R&D Activities of TriPla-CA Consortium in support of ITER Tritium Plant development**

Cristescu, I.; Ana, G.; Michling, R.; Petrutiu, C.; Pinna, T.; Stefanescu, A.; Welte, S.

**P2-064 DINS method for diagnosing fuel retention in plasma facing components**

Perelli, E.; Gorini, G.; Tardocchi, M.; Pietropaolo, A.

**P2-066 Design Concept of the ITER SDS Getter Bed**

Yun, S-H.; Kang, H-G.; Chang, M.; Cho, S.; Lee, H. G.; Jung, K. J.; Chung, H.; Sohn, S-H.; Song, K-M.; Camp, P.; Willms, S.; Glugla, M.

**P2-067 Direct Measurement of Tritium Production Rate in LiPb with removed parasitic activities: preliminary experiments.**

Pohorecki, W.; Kuc, T.; Ostachowicz, B.

**P2-068 R&D on Hydrogen in the Liquid Lithium Loop for TechnoFusion**

González-Del Moral, O.; Moral Fernández, N.; Álvarez Ruiz, J.; García, A.; Casal, N.; Abánades, A.; Ibarra, A.; Perlado, J. M.

**P2-069 Separation of fuel and Impurity particles using divertor simulator TPD-Sheet IV**

Maekawa, T.; Tanaka, S.; Iijima, T.; Hagiwara, S.; Tonegawa, A.; Sato, K.; Kawamura, K.

**Topic D Material Engineering for FNT****P2-070 TEM Characterization of He Effects in First-Wall Structural Materials Under Fusion Relevant Conditions**

Kurtz, R.; Yao, B.; Edwards, D.

**P2-071 Depth-dependent nanoindentation hardness of reduced-activation ferritic steels after MeV Fe-ion irradiation**

Kasada, R.; Konishi, S.; Ando, M.; Hamaguchi, D.; Tanigawa, H.

**P2-072 Diffusion Bonding of 9Cr ODS Ferritic/martensitic Steel with the Phase Transformation**

Noh, S.; Kimura, A.; Choi, B.; Kang, S-H; Han, C-H.; Kim, K-B.; Kim, T. K.

**P2-073 Fatigue Property Change of Pure Tungsten Due to Heat Treatment**

Nogami, S.; Iwata, T.; Fukuda, M.; Kurishita, H.; Hasegawa, A.; Yabuuchi, K.

**P2-074 Selection of technology manufacturing ITER blanket modules flexible attachment from Ti-6Al-4V alloy**

Rodchenkov, B.; Strebkov, Y.; Evseev, M.; Shushlebin, V.; Sinelnikov, L.

**P2-075 Numerical study of the flow conditioner for the IFMIF liquid lithium target**

Gordeev, S.; Heinzl, V.; Stieglitz, R.

- P2-076 Neutronic analysis for the IFMIF EVEDA Reference Test Cell and Test Facility**  
Kondo, K.; Arbeiter, F.; Fischer, U.; Große, D.; Heinzl, V.; Klux, A.; Lu, L.; Mittwollen, M.; Serikov, A.; Tian, K.; Weber, V.
- P2-077 Microstructural studies and surface analysis of laser irradiated in-situ Co-TiC composites.**  
Kowalska-Strzeciwillk, E.; Strzeciwillk, D.; Kubkowska, M.; Skrzeczanowski, W.; Figacz, W.
- P2-078 Stress envelope of silicon carbide composites at elevated temperatures**  
Nozawa, T.; Ozawa, K.; Tanigawa, H.
- P2-079 Fabrication and Characterization of Reference 9Cr and 12Cr-ODS Low Activation Ferritic/Martensitic Steels**  
Muroga, T.; Nagasaka, T.; Li, Y.; Abe, H.; Ukai, S.; Kimura, A.; Okuda, T.
- P2-080 Effect of potential factors in manufacturing process on mechanical properties of F82H plate**  
Sakasegawa, H.; Tanigawa, H.; Tanigawa, H.; Hirose, T.
- P2-081 Blanket material and technology developments toward DEMO under the Broader Approach framework**  
Nishitani, T.; Yamanishi, T.; Tanigawa, H.; Nakamichi, M.; Nozawa, T.; Hoshino, T.
- P2-082 Effect of Laser Beam Position on Mechanical Properties of F82H/SUS316L Butt-Joint Welded By Fiber Laser**  
Serizawa, H.; Mori, D.; Ogiwara, H.; Mori, H.
- P2-083 Overview of the Ceramic Breeder Materials Development**  
Chen, X.; Peng, S.; Xiao, C.; Gao, X.
- P2-084 Influence of Cr Content On the Diffusive Transport Parameters and Trapping of Hydrogen in Fe Alloys**  
Peñalva, I.; Alberro, G.; Legarda, F.; Ortiz, C. J.; Vila, R.
- P2-085 Annealing behavior of heavily neutron-irradiated beta-SiC on swelling and thermal diffusivity**  
Akiyoshi, M.; Yano, T.; Tachi, Y.
- P2-086 First principles modelling of the initial steps of the ODS particle formation process in the alpha-Fe lattice.**  
Mastrikov, Y.; Vladimirov, P.; Borodin, V.; Gopejenko, A.; Zhukovskii, Y.; Kotomin, E.; Möslang, A.
- P2-087 Observation of the Li target in the EVEDA Li Test Loop**  
Kondo, H.; Kanemura, T.; Furukawa, T.; Hirakawa, Y.; Groeschel, F.; Wakai, E.



## Topic E Vacuum Vessel

### P2-088 **Gas Exchange Processes on Stainless Steel Vessel Wall due to Interaction with Oxygen Contaminated Hydrogen Plasma.**

Begrambekov, L.; Grunin, A.; Ermakov, V.; Kaplevsky, A.; Sadovsky, Y.; Shigin, P.; Vergasov, S.

### P2-089 **Ultrasonic Examination Feasibility Study for ITER Vacuum Vessel from Korea Domestic Agency**

Lee, Y. J.; Kim, B. C.; Hong, K. H.; Kim, H. S.; Park, C. K.; Kim, G. H.; Ahn, H. J.; Jung, Y. H.; Sa, J. W.; Choi, C. H.

### P2-090 **Thermocouple fixation and High Heat Flux Test on the ITER Neutral Beam Duct Liner mock-up**

Park, C. K.; Kim, H. S.; Kim, G. H.; Lee, Y. J.; Kim, B. C.; Ahn, H. J.; Kim, S. K.; Lee, D. W.; Urbani, M.

### P2-091 **Multi-Scenario Evaluation, Specification and Comparison of Electromagnetic Loads on ITER Vacuum Vessel**

Rozov, V.; Martinez, J-M.; Portafaix, C.; Sannazzaro, G.

### P2-092 **Design and fabrication of the ITER thermal shield**

Her, N.; Hamlyn-Harris, C.; Le Barbier, R.; Utin, Y.; Choi, C-H.; Sborchia, C.; Chung, W.; Nam, K.; Noh, C. H.; Kang, D. K.; Kang, K-O.

### P2-093 **Thermal-hydraulic analysis of ITER Vacuum Vessel Field Joints**

Savoldi, L.; Bonifetto, R.; Corpino, S.; Izquierdo, J.; Le Barbier, R.; Utin, Y.; Zanino, R.

### P2-094 **Status of the ITER Vacuum Vessel Construction**

Choi, C. H.; Alekseev, A.; Sborchia, C.; Ioki, K.; Giraud, B.; Utin, Yu.; Sa, J.W.; Wang, X.; Barabash, V.; Vertongen, P.; Jucker, P.; Bayon, A.; Pathak, H.; Raval, J.; Ahn, H.J.; Kim, B.C. ; Kuzmin, E.; Savrukhin, P.

### P2-095 **Mechanical Testing of the ITER Vacuum Vessel Support Structure - Coating Screening Tests and High Load Multi-Axial Mock Up Tests**

Zauner, C.; Reindl, M.; Le Barbier, R.; Choi, C. H.; Ahn, H-J.

### P2-096 **Structural Analysis of the ITER Vacuum Vessel regarding 2012 ITER Project-Level Loads**

Martinez, J-M.; Choi, C-H.; Ioki, K.; Jun, C. H.; Portafaix, C.; Sborchia, C.; Cambazar, M.; Corti, P.; Pinori, K.; Sfarni, S.; Tailhardat, O.; Borrelly, S.; Albin, V.; Pelletier, N.

### P2-097 **F4E strategy for the electromagnetic analysis of ITER components**

Testoni, P.; Cau, F.; Portone, A.; Albanese, R.; Guirao, J.

**P2-098 Structural Response of ITER Vacuum Vessel to Combustion Pressure Loads**

Kuznetsov, M.; Xiao, J.; Jordan, T.

**P2-099 Thermo-structural optimization of the ITER ICRH Four Port Junction and Straps against in-vessel design criteria**

Lafuente, A.; Fursdon, M.; Shannon, M.

**Topic F Nuclear System Design****P2-101 ITER Components Cooling: Satisfying the Distinct Needs of Systems and Components**

Ployhar, S.; Gopalapillai, B.; Teodoros, L.; Dell Orco, G.; Kumar, A.; Gupta, D.; Patel, N.; Jadhav, M.

**P2-103 Nuclear Analysis and Shielding Optimisation in Support of the ITER In-Vessel Viewing System Design**

Turner, A.; Ghani, Z.; Hurst, G.; Lo Bue, A.; Mangham, S.; Pampin, R.; Puiu, A.; Zheng, S.

**P2-104 RF coupler tests of the prototype RFQ linac for the IFMIF/EVEDA project**

Maebara, S.; Palmieri, A.; Mereu, P.; Ichikawa, M.; Takahashi, H.; Comunian, M.; Suzuki, H.; Pisent, A.; Sugimoto, M.

**P2-105 The simulation of seismic analysis for ITER fourth PF (Poloidal Field Coil) feeder**

Liu, S.; Chen, W.; Song, Y.; Ni, X.; Wang, Z.; Chen, Y.; Gong, C.

**P2-106 Neutronic Analyses for the ITER electron cyclotron-heating upper launcher**

Weinhorst, B.; Serikov, A.; Fischer, U.; Spaeh, P.; Strauss, D.

**P2-107 Improved Algorithms and Advanced Features for the CAD to MC conversion tool McCad**

Lu, L.; Pereslavitsev, P.; Fischer, U.

**P2-108 Neutronic analyses of the HCPB DEMO reactor using a consistent integral approach**

Pereslavitsev, P.; Fischer, U.; Lu, L.

**P2-109 Shut-Down Dose Rate Analysis for ITER Diagnostic Equatorial and Upper Ports**

Serikov, A.; Bertalot, L.; Fischer, U.; Pitcher, C. S.; Suarez, A.; Udintsev, V. S.; Weinhorst, B.

**P2-110 An Exploratory Study on the Engineered Safety Features of a Fusion DEMO Plant**

Kim, H. J.; Chung, B-D.; Hwang, Y.

**P2-112 Effect of the Impurity on the Activation Analysis for the Korean HCCR TBM**

Lee, C-W.; Ahn, M-Y.; Park, Y-H.; Lee, Y-O.; Lee, D. W.; Cho, S.; Kim, H. I.; Kim, J. W.

**Topic G Safety Issues and Waste Management**

**P2-113 MFM-Based Diagnostic Technology for ITER DFLL-TBM System**

Run, Y.; Liqin, H.; Muiyi, N.; Rongxiang, H.; Dagui, W.

**P2-114 Evaluation of the neutron activation of JET in-vessel components following D-T irradiation**

Vuolo, M.; Bonifetto, R.; Dulla, S.; Heinola, K.; Lengar, I.; Ravetto, P.; Savoldi Richard, L.; Villari, R.; Widdowson, A.; Zanino, R. and JET EFDA Contributors\*

**P2-115 Tritium and Heat Management in ITER Test Blanket Systems Port Cell for Maintenance Operations**

Giancarli, L.; Cortes, P.; Iseli, M.; Le Petit, L.; Levesy, B.; Livingston, D.; Nevrière, J-C.; Pascal, R.; Ricapito, I.; Shu, W.; Wyse, S.

**P2-116 Little Tritium Extraction System Pipe Break Environmental Impact by Atmospheric Modelling of Elemental Tritium Gas and HTO Transport**

Castro, M. P.; Velarde, M.; Ardao, J.; Perlado, J. M.; Sedano, L. A.

**P2-118 Visualized Nuclear and Radiation Safety Simulation Program and Its Application to Fusion and Fission**

He, T.; Shang, L.; Zhou, S.; Zhao, J.; Zhang, S.; Li, T.; Yang, Z.; Cheng, X.; Yang, Q.; Dang, T.; Zou, J.; Zeng, Q.; Long, P.; Hu, L.; Wu, Y. and the FDS Team

**P2-119 Safety managements of the IFMIF/EVEDA accelerator building**

Takahashi, H.; Maebara, S.; Kojima, T.; Narita, T.; Tsutsumi, K.; Sakaki, H.

**P2-120 Sensitivity study for a TES pipe rupture accident inside port cell**

Jin, H. G.; Ahn, M-Y.; Cho, S.; Lee, D. W.; Lee, E. H.; Kim, S. K.; Yoon, J. S.

**P2-121 Study on Safety Requirements of Korean Fusion DEMO Plant using Integrated Safety Assessment Methodology**

Oh, K.; Kang, M.-S; Heo, G.; Kim, H-C.

**P2-122 ITER Safety Studies: The effect of two simultaneous perturbations during a Loss of Plasma Control Transient**

Rivas, J. C.; Dies, J.

**P2-123 Neutron shielding and activation of the MASTU device and surrounds**

Taylor, D.; Lilley, S.; Turner, A.; Davis, A.

## Topic H Models and Experiment for FNT

### P2-125 **Characterization of MHD mixed-convection flows in a vertical rectangular duct with volumetric heating**

Vetcha, N.; Smolentsev, S.; Abdou, M.

### P2-126 **Experimental Validation of the ITER Blanket Attachments**

Kolganov, V.; Danilov, I.; Kalinin, G.; Khomiakov, S.; Poddubnyy, I.; Parshutin, E.; Raffray, R.; Sadakov, S.; Chappuis, P.; Vlasov, D.; Zhmakin, A.

### P2-127 **Safety analyses in support of neutron detector calibration operations**

Stankunas, G.; Syme, B.; Popovichev, S.; Conroy, S.; Batistoni, P. and JET EFDA Contributors

### P2-128 **Development of Compact D-D Neutron Generator**

Das, B.; Shyam, A.; Das, R.; Rao, A.; Durga P.

### P2-129 **Parametrization of radiative properties of ICF mono- and multi-component plasmas**

Espinosa, G.; Rodríguez, R.; Gil, J. M.; Florido, R.; Rubiano, J.; Mendoza, M. A.; Martel, P.; Mínguez, E.

### P2-130 **Benchmarking of SuperMC2.0 with Fusion-Driven Subcritical System**

Zheng, H.; Sun, G.; Song, J.; Hao, L.; Chen, Z.; Li, G.; Wu, M.

### P2-131 **Support of Repeated Structure For Automatic Neutronics Modeling**

Gan, Q.; Wang, G.; Yu, S.; Wang, D.; Long, P.; Xiong, J.; Wu, Y. and FDS Team

### P2-133 **Benchmark Experiment on Titanium with DT Neutron at JAEA/FNS**

Ohta, M.; Takakura, K.; Ochiai, K.; Sato, S.; Konno, C.

### P2-134 **Effect of impurities on vacancy migration energy in Fe-based alloys**

Hashimoto, N.; Tanimoto, J.; Ohnuki, S.

### P2-135 **Conceptual design of a helium heater for high temperature applications**

Jin, X. Z.; Chen, Y.; Ghidrsa, B-E.

### P2-136 **Study of the sensitivity of a Cerenkov Fibre Optics Sensor (C-FOS) in the IFMIF Test Cell**

Rapisarda, D.; Gómez-Ros, J. M.; Mota, F.; García, A.; Gouat, P.; Leysen, W.; Mas, A.; Mollá, J.; Ibarra, A.

### P2-137 **Design prospect of remountable high-temperature superconducting magnet**

Hashizume, H.; Ito, S.

**P2-138 Molecular dynamics simulations to evaluate the nano-mechanism responsible for irradiation hardening in alpha-iron**  
Okita, T.; Fujita, S.; Itakura, M.

**P2-139 Verification of the displacement damage processes by STM observation at atomistic spatial resolution**  
Hirabayashi, J.; Sato, M.; Okita, T.

### Topic I Repair and Maintenance

**P2-140 Development of a brazing connector for DEMO in-vessel components**  
Fernández, I.; Rosa, E. V.; Palermo, I.

**P2-141 Maintenance Duration Estimate for a Fusion Power Plant based on the EFDA DEMO 2012 design concept**  
Crofts, O.; Harman, J.

**P2-142 Concept for a Vertical Maintenance Remote Handling System for Multi Module Blanket Segments in DEMO**  
Coleman, M.; Sykes, N.; Loving, A.; Harman, J.

**P2-143 Progress in the design, R&D and procurement preparation of the ITER Divertor Remote Handling System**  
Esque, S.; Van Hille, C.; Damiani, C.; Ranz, R.; Palmer, J.; Hamilton, D.

**P2-144 DEMO Active Maintenance Facility Progress 2012**  
Thomas, J.; Loving, A.; Crofts, O.; Morgan, R.; Harman, J.

**P2-145 ITER divertor Thomson scattering system: in-vessel movements and remote handling kinematics**  
Kochergin, M.; Mukhin, E.; Safronov, A.; Razdobarin, A.; Semenov, V.; Tolstyakov, S.; Kurskiev, G.; Masyukevich, S.; Bukreev, I.; Chernakov, P.; Litvinov, A.; Koval, A.; Vecherkovsky, A.; Egorov, P.; Walsh, M.; Andrew, P.

**P2-146 Design of the remote handling equipment for the refurbishment of the European target assembly design for IFMIF**  
Miccichè, G.; Lorenzelli, L.; Bernardi, D.; Frascati, F.; Becchi, F.

**P2-147 Hardware availability calculations and results of the IFMIF accelerator facility**  
Bargalló, E.; Arroyo, J. M.; Abal, J.; Beauvais, P-Y.; Gobin, R.; Orsini, F.; Weber, M.; Podadera, I.; Grespan, F.; Fagotti, E.; Dies, J.; Tapia, C.; De Blas, A.; Molla, J.; Ibarra, A.

**P2-148 RAMI status in the IFMIF Test Facilities at the end of the engineering design phase**  
Abal, J.; Dies, J.; Arroyo, J. M.; Bargalló, E.; García, A.; Casal, N.; Mas, A.; Tapia, C.; De Blas, A.; Molla, J.; Ibarra, A.

**P2-149 Availability simulation software adaptation to the IFMIF accelerator facility RAMI analysis**

Bargalló, E.; Sureda, P. J.; Arroyo, J. M.; Abal, J.; De Blas, A.; Dies, J.; Tapia, C.; Molla, J.; Ibarra, A.

**P2-150 Improving the performance of DTP2 bilateral teleoperation control system with haptic augmentation**

Viinikainen, M.; Tuominen, J.; Mattila, J.

**P2-151 Design of Structural Components for the helical DEMO reactor FFHR-d1**

Tamura, H.; Goto, T.; Tanaka, T.; Masuzaki, S.; Yanagi, N.; Miyazawa, J.; Sagara, A.

**P2-152 A R&D program on Leak localization concepts for actively cooled fusion machines**

Durocher, A.; Bruno, V.; Chantant, M.; Gargiulo, L.; Hatchressian, J-C.; Houry, M.; Mouyon, D.; Anthoine, D.

**P2-153 RAMI analysis in IFMIF remote handling operations**

Abal, J.; Dies, J.; Baeza, E.; Arroyo, J. M.; Bargalló, E.; García, A.; Tapia, C.; De Blas, A.; Molla, J.; Ibarra, A.

**P2-154 Test of the Piezoceramic Motor Technology in ITER Relevant High Magnetic Fields**

Monti, C.; Besi, U.; Mugnaini, G.; Neri, C.; Rossi, P.; Dubus, G.; Damiani, C.

**Topic J Burning Plasma Control and Operation**

**P2-155 Plasma current sustainment after iron core saturation in the STOR-M tokamak**

Mitarai, O.; Ding, Y.; Hubeny, M.; Lue, Y.; Onchi, T.; McColl, D.; Xiao, C.; Hirose, A.

**P2-157 Consequences of plasma disruption mitigation by massive gas injection on the ITER torus cryopumping system**

Scannapiego, M.; Day, C.; Hauer, V.

**P2-158 Numerical simulation of ELMy H-mode in EAST using SOLPS**

Du, H.; Sang, C.; Wang, L.; Sun, J.; Wang, D.

**P2-159 Conceptual design of dc power system for superconducting magnet of helical DEMO reactor FFHR-d1**

Chikarasihi, H.; Goto, T.; Sagara, A.; FFHR Design Group

**P2-160 Upgrade of the IR thermography diagnostic for the WEST project**

Courtois, X.; Aumeunier, M-H.; Joanny, M.; Balorin, C.; Jouve, M.; Micolon, F.; Salasca, S.

**P2-161 Neutronic Analysis for design of ITER IR thermography**  
Ishikawa, M.; Shimada, T.; Takeuchi, M.; Sugie, T.

**P2-162 Matrix Converter Design for Feedback Stabilization of Vertical Position Instability on QUEST**

Nakamura, K.; Fujita, H.; Liu, X.; Xue, E.; Mitarai, O.; Hasegawa, M.; Tokunaga, K.; Zushi, H.; Hanada, K.; Fujisawa, A.; Matsuoka, K.; Idei, H.; Nagashima, Y.; Kawasaki, S.; Nakashima, H.; Higashijima, A.

**P2-163 Projection of foreseeable integrated plasma performance to DEMO**

Sakamoto, Y.; Nakamura, M.; Tobita, K.; Asakura, N.; Hoshino, K.; Utoh, H.; Someya, Y.

**POSTER SESSION 3****Thursday 19<sup>th</sup> September**

16:00- 18:00 Ground floor

Chairs: Konishi, S. and Sanmartí, M.

**Topic A First-Wall Technology and High Heat Flux Components****P3-001 Hydrogen Retention in Plasma Facing Materials: The Influence of Material Microstructure**Panizo, M.; Gordillo, N.; Munnik, F.; Saravanan, K.; Tejado, E.; Pastor, J. Y.; Perlado, J. M.; Gonzalez, R.**P3-002 Study of experimental simulations for the closed divertor using divertor simulator TPD-Sheet IV**Kobayashi, H.; Tanaka, S.; Iijima, T.; Tonegawa, A.; Kawamura, K.; Sato, K.**P3-003 Deflection of a liquid metal jet in a tokamak environment**Pelekasis, N.; Gomes, R.**P3-005 Operational impact on the JET ITER-like wall in-vessel components**Riccardo, V.; Arnoux, G.; Collins, S.; Lomas, P.; Matthews, G.; Pace, N.; Thompson, V.**P3-007 The Remote Handling Compatibility Analysis of the ITER Generic Upper Port Plug structure**Ronden, D.; Elzendoorn, B.; Goodman, T.; Grossetti, G.; Heemskerk, C.; Van Oosterhout, J.; Spaeh, P.; Schreck, S.; Strauss, D.**P3-008 Preliminary results on tungsten tile test in KSTAR**Hong, S-H.; Bang, E-N.; Litnovsky, A.; Hellwig, M.; Seo, D-C.; Lho, T.**P3-009 Measurement and calculations of long-lived radionuclide activity forming in the fast neutron field in ITER vacuum vessel composites**Pohorecki, W.; Jodlowski, P.; Pytel, K.; Prokopowicz, R.**P3-010 Comparison between FEM and High Heat Flux Thermal Fatigue Testing results of ITER Divertor Plasma Facing mock-ups**Crescenzi, F.; Roccella, S.; Visca, E.**P3-011 Development of a Plasma Driven Permeation Experiment for TPE**Buchenauer, D.; Kolasinski, R.; Shimada, M.; Donovan, D.; Youchison, D.; Merrill, B.**P3-012 Quality Evaluation of Hip Joints Using Ultrasonic Technique**Galarza, N.; De Miguel, D.; Ordas, N.; Rubio, B.; Iturriza, I.; Moreno, E.; Gorrotxategi, A.; Nation, P.; Guilemany, J. M.; Samaniego, F.



**P3-013 Modeling First Wall Mechanical Fracture due to Thermal Shocks Using X-FEM**

Garoz Gómez, D.; Rivera, A.; González-Arrabal, R.; Álvarez, J.; Perlado, J. M.

**P3-016 First wall design for compact tokamak – neutron source.**

Shpanskiy, Y.; Kilischenko, A.; Kuteev, B.; Petrov, V.

**P3-017 Tracer Techniques in the Assessment of Erosion and Property Modification of Plasma-Facing Components**

Rubel, M.; Petersson, P.; Möller, S.; Garcia-Carrasco, A.; Ivanova, D.; Brezinsek, S.; Coenen, J.; Kreter, A.; Philipps, V.; Wauters, T.

**P3-020 Defect Evolution In Tungsten Under Helium Irradiation: A Comparison With Experimental Results.**

Valles, G.; Martín-Bragado, I.; González-Arrabal, R.; Gordillo, N.; Caturla, M. J.; Perlado, J. M.; Rivera, A.

**P3-021 Impact of repeated high heat loading on surface modification of tungsten materials**

Tokunaga, K.; Ukita, T.; Araki, K.; Fujiwara, T.; Miyamoto, Y.; Hasegawa, M.; Nakamura, K.; Kurishita, H.

**P3-023 Effect of transient heating loads on beryllium**

Kupriyanov, I.; Porezanov, N.; Nikolaev, G.; Kurbatova, L.; Podkovyrov, V.; Muzichenko, A.; Zhitlukhin, A.; Khimchenko, L.; Gervash, A.

**P3-024 Development of Materials for the First Wall of a Nuclear Fusion Reactor**

Garoz, D.; Fernández-Martínez, I.; González-Arrabal, R.; Rivera, A.; Gordillo, N.; Panizo-Laiz, M.; Vallés, G.; Briones, F.; Perlado, J. M.

**P3-025 Status of the IDTF high-heat-flux test facility**

Kuznetsov, V.; Gorbenko, A.; Davydov, V.; Kokoulin, A.; Komarov, A.; Mazul, I.; Mudygin, B.; Ovchinnikov, I.; Stepanov, N.; Rulev, R.; Volodin, A.

**P3-026 Computational Methodology For Study Nuclear Fusion Materials And Systems**

Garoz, D.; Guerrero, C.; del Río, E.; Cereceda, D.; Prada, A.; Rivera, A.; Fraile, A.; Valles, G.; Moral, N.; Alvarez, J.; Juárez, R.; Sánchez, C.; Sanz, J.; Páramo, A.; Sordo, F.; Perlado, J. M.

**Topic B Blanket Technology****P3-027 Numerical study of the MHD flow characteristics in a three-surface-multi-layered channel with different inlet conditions**

Aoyagi, M.; Ito, S.; Hashizume, H.

**P3-028 Fabrication and characteristics of SiC-coated graphite pebbles for HCCR TBM**

Lee, Y.; Yun, Y-H.; Park, Y-H.; Ahn, M-Y.; Cho, S.

**P3-029 Evaluation of the Response Time of H-Concentration Probes for Tritium Sensors**

Abella, J.; Colominas, S.; Llivina, L.

**P3-030 Development of a Hydrogen Permeation Sensor for Future Tritium Applications**

Colominas, S.; Abella, J.; Llivina, L.

**P3-031 Current Status of Accident Analysis for Korean HCCR TBS**

Ahn, M.-Y.; Jin, H. G.; Cho, S.; Lee, D. W.; Ku, D. Y.; Park, Y.-H.; Kim, C.-S.

**P3-032 Analysis of Electromagnetic Loads on EU-DEMO Inboard and Outboard Blanket Vertical Segments**

Maione, I. A.; Vaccaro, A.

**P3-033 On the numerical assessment of the thermo-mechanical performances of the DEMO Helium-Cooled Pebble Bed breeding blanket module**

Di Maio, P. A.; Arena, P.; Boccaccini, L. V.; Bongiovì, G.; Carloni, D.; Giammusso, R.; Kecskes, S.

**P3-034 Study on effect of moderating materials on Tritium Production Rate in IN-LLCB TBM**

Gathibandhe, M.; Goverdhan, P.; Vyas, K.; Danani, C.

**P3-035 Neutronics of LiPb blanket and design and evaluation of integral experiment with D-D neutrons**

Kwon, S.; Sato, S.; Kasada, R.; Konishi, S.

**P3-036 Influence of chemisorption products of carbon dioxide on radiolysis of tritium breeding ceramic**

Zarins, A.; Kizane, G.; Knitter, R.; Supe, A.

**P3-037 Gas Absorption and Discharge Behaviors of Lithium-lead**

Sakabe, T.; Kunugi, T.; Yokomine, T.; Kawara, Z.; Ueki, Y.

**P3-038 Numerical Simulation of Buoyancy Effects of MHD Flow for ITER SLL-TBM**

Meng, Z.; Zhou, T.; Zhang, H.; Chen, H. and FDS Team

**P3-039 Heat load test with the HCCR TBM first wall mock-up and the GAMMA-FR code validation**

Lee, E. H.; Jin, H. G.; Kim, S.-K.; Yoon, J. S.; Lee, D. W.; Cho, S.

**P3-040 First-principles study of hydrogen adsorption and permeation in the reconstructed cubic erbium oxide surfaces**

Mao, W.; Chikada, T.; Shimura, K.; Suzuki, A.; Terai, T.

**P3-041 Visualization Experiment of Complex Flow Field in a Sphere-packed Pipe by Detailed PIV measurement**

Ebara, S.; Nematollahi, M. R.; Hashizume, H.

- P3-042 Rational of Helium Cooled Pebble Bed Blanket and R&D Activities**  
Carloni, D.; Boccaccini, L. V.; Franza, F.; Kecskes, S.
- P3-043 Engineering analyses of ITER divertor Thomson scattering**  
Nemov, A.; Modestov, V.; Borovkov, A.; Kochergin, M.; Mukhin, E.; Litvinov, A.; Koval, A.; Andrew, P.
- P3-044 Ceramic breeder for fusion nuclear reactors: thermo-mechanical tests on pebble beds**  
Aquaro, D.; Lo Frano, R.; Baudanza, V.
- P3-045 Effect of Electromagnetic Coupling on MHD Flow in the Manifold of Fusion Liquid Metal Blanket**  
Chen, H.; Zhou, T.; Zhang, H.; Meng, Z.; Wu, Y. and FDS Team
- P3-046 Progress on a coupled Systems Code-CFD MHD solver for fusion blanket design**  
Wolfendale, M.
- P3-047 Design and Setup of a Testing Device to investigate a reduced sized attachment system mock up for the ITER EU HCPB-TBM under different mechanical loading conditions**  
Zeile, C.; Maione, I. A.
- P3-048 Construction of PREMUX and preliminary experimental results, as preparation for the Helium Cooled Pebble Bed Breeder Unit mock-up testing**  
Hernandez, F.; Kolb, M.; Annabattula, R.; Schindwein, G.; Von der Weth, A.
- P3-049 Evaluation of hydrogen isotope absorption/diffusion coefficient of CVD-SiC in high temperature**  
Yamamoto, Y.; Karasawa, T.; Takemoto, S.; Noborio, K.; Konishi, S.
- P3-050 Tritium management issues and anti-permeation strategies for different DEMO breeder blanket options**  
Demange, D.; Boccaccini, L.; Franza, F.; Santucci, A.; Tosti, S.; Wagner, R.
- P3-051 Experimental study of instabilities in a quasi-2D MHD duct flow with near-wall jets**  
Young, J.; Smolentsev, S.; Abdou, M.
- P3-052 Characterizing Pressure Equalization in MHD Flow in a Rectangular Duct with an Insulating Flow Channel Insert**  
Sutevski, D.; Smolentsev, S.; Abdou, M.
- P3-053 Design and Construction of a Multipurpose Laboratory Scale Apparatus to Investigate Hydrogen Isotopes Behaviour In Pb15.7li and Permeation Technology**  
Aiello, A.; Utili, M.; Storai, S.; Desideri, F.; Bettocchi, N.

**P3-054 Burnup analysis and fissile fuel breeding with a Uranium-Plutonium cycle in the molten salt blanket in a FFHR**

Zhao, J.; Yang, Y.; Xiao, S.; Zhou, Z.

**P3-055 Development of the breeding blanket and shield model for the fusion power reactors system SYCOMORE**

Li Puma, A.; Jaboulay, J. C.

**P3-056 Parametrical analysis of HCLL and HCPB TBM tritium transfer model with TMAP7**

Moreno, C.; Herrera, C.; Martínez, P. M.; Ibarra, A.

**P3-057 Development of an HCLL TBM Configuration And Ancillary Systems Dynamic Transfer Model with ECOSIMPRO®**

Serna, J.; Rueda, A.; Moreno, C.; Martínez, P. M.; Ricapito, I.; Calderoni, P.

**P3-058 Modelling a supercritical CO2 power cycle for nuclear fusion reactors using RELAP5-3D®**

Batet, L.; Alvarez Fernandez, J. M.; Mas de les Valls, E.; Perez, M.; Reventos, F.; Sedano, L. A.

**P3-059 Hydrogen solubility in liquid lithium-sodium alloy**

Yagi, J.; Tanaka, T.; Muroga, T.; Sagara, A.

**P3-061 Analysis of the thermo-mechanical behaviour of the DEMO Water-Cooled Lithium Lead breeding blanket module**

Chiovaro, P.; Di Maio, P. A.; Aiello, A.; Arena, P.; Bongiovì, G.; Giannusso, R.; Li Puma, A.

**Topic C Fuel Cycle and Tritium Processing**

**P3-062 Alternative Analysis for Fuel Storage and Delivery in the ITER Tritium Plant**

Chang, M. H.; Yun, S-H.; Kang, H-G.; Cho, S.; Song, K-M.; Kim, D.; Chung, H.; Camp, P.; Willms, S.; Glugla, M.

**P3-063 Tritium Transport Modelling of Libretto-4 & 5 Transients**

Martínez, P.; Moreno, C.; Magielsen, L.; Ibarra, A.

**P3-064 Hydrogen extraction characteristics of high-temperature proton conductor ceramics for hydrogen isotopes purification and recovery**

Xia, T.; He, C.; Yang, H.; Zhao, W.; Yang, L.; Liu, Z.

**P3-065 Towards a physics-integrated view of the fusion fuel cycle**

Day, C.; Hauer, V.; Igitkhanov, J.; Kalupin, D.; Valovic, M.; Varoutis, S.

**P3-066 Research activities related to water detritiation at ICIT Rm. Valcea**

Zamfirache, M.; Bornea, A.; Stefanescu, I.; Varlam, C.; Bidica, N.

**P3-067 Tritium Removal Facility for processing of a large range tritiated water waste**

Bornea, A.; Zamfirache, M.; Stefanescu, I.; Stefan, L.

**P3-068 High gain and frequency ultra-stable integrators for long pulse applications**

Ziembra, T. M.; Miller, K. E.; Slobodov, I.; Prager, J.; Carscadden, J.

**P3-069 Research and Development of Online Tritium Monitoring Ionization Chamber**

Guangda, L.; Cheng, Q.; Deli, L.; Hongquan, T.; Changan, C.

**P3-072 Evaluation of tritium transport in nuclear fusion materials under irradiation at LIBRETTO-4**

Moral, N.; Martínez, P.; Sedano, L.; Álvarez, J.; Perlado, J. M.

**P3-073 Modelling of ITER divertor pumping system during various operational scenarios via kinetic theory**

Valougeorgis, D.; Misdanitis, S.

**Topic D Material Engineering for FNT****P3-074 Evaluation of applicability of a laser-based distance meter to measurement of Li jet thickness for the IFMIF/EVEDA project**

Kanemura, T.; Kondo, H.; Hoashi, E.; Yoshihashi-Suzuki, S.; Yamaoka, N.; Horiike, H.; Furukawa, T.; Hirakawa, Y.; Ida, M.; Wakai, E.

**P3-075 Mechanical Properties of Similar and Dissimilar Weldments of RAFM Steel and AISI 316L(N) Stainless Steel Prepared by Electron Beam Welding Process**

Albert, S.; Das, C. R.; Sam, S.; Mastanaiah, P.; Patil, M.; Bhaduri, A. K.; Jayakumar, T.; Murthy, C.V.S.; Ellappan, R. K.

**P3-076 Non-linear Failure Analysis of HCPB Blanket for DEMO Taking into Account High Dose Irradiation**

Aktaa, J.; Kecskés, S.; Pereslavlsev, P.; Fischer, U.; Boccaccini, L.

**P3-077 Study on Li diffusivity in lithium metatitanate with excess lithium ( $\text{Li}_2+2x\text{TiO}_3+y$ ) at high temperature**

Mukai, K.; Omoto, K.; Yashima, M.; Sasaki, K.; Terai, T.; Suzuki, A.; Hoshino, T.

**P3-078 Compatibility of F82H exposed to liquid Pb-Li flow**

Kanai, A.; Park, C.; Noborio, K.; Kasada, R.; Konishi, S.; Hirose, T.; Nozawa, T.; Tanigawa, H.

**P3-079 Evaluation of multi-layered hardness in ion-irradiated stainless steel by nano-indentation technique**

Oka, H.; Sato, Y.; Hashimoto, N.; Ohnuki, S.

- P3-080 Manufacturing and oxidation behaviour of bulk self-passivating tungsten-based alloys**  
García-Rosales, C.; López-Ruiz, P.; Álvarez-Martín, S.; Ordás, N.; Iturriza, I.; Koch, F.; Brinkmann, J.; Lindig, S.; Walter, M.
- P3-081 Swelling of SiC materials and its helium effects for expected operating conditions based on some blanket design using SiC materials**  
Ozawa, K.; Nozawa, T.; Uto, H.; Someya, Y.; Tanigawa, H.; Tobita, K.
- P3-082 IFMIF-Test Facilities: Functional Analysis and Improvement of Hot Cells**  
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|---|------------------------|----------|---------------|-------------|
| 11th IEA International Workshop on Beryllium Technology <i>(fee)</i>  | KIT                    | 12-13/09 |               | ETSEIB-UPC  |
| 17th International Workshop on Ceramic Breeder Blanket Interactions (CBB1-17)   | Ciemat-KIT             | 12-14/09 |               | IREC        |
| Workshop on EFDA GOTRH contributions to ITER Remote Handling  | Ciemat-UPM             | 16/09    | 10:30-19:00   | Venue: Room |
| F4E ILO's Meeting   | CDTI                   | 16/09    | 13:00-18:00   | Venue: Room |
| EFDA GOTRH Board Meeting  | Ciemat-UPM             | 17/09    | 9:00-11:00    | Venue: Room |
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| IEA Implementing Agreement Cooperative Programme on the Environmental, Safety and Economic Aspects of Fusion Power (IEA-ESEFP)  | DOE, USA               |          |               |             |
| BeYOND, Beryllium Opportunities for New Developments Meeting  | A. Goraieb-K8HF GmbH   | 18/09    | 9:00-13:00    | Venue: Room |
| 23rd IEA Annex II Workshop on Radiatoin Effects in Ceramic Insulators   | Ciemat                 | 18/09    | 14:00 - 18:00 | Venue: Room |
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| IEA Liquid Breeders Blankets Subtask Workshop <i>(fee)</i>  | N. Morley-UCLA         | 20-21/09 |               | IREC        |

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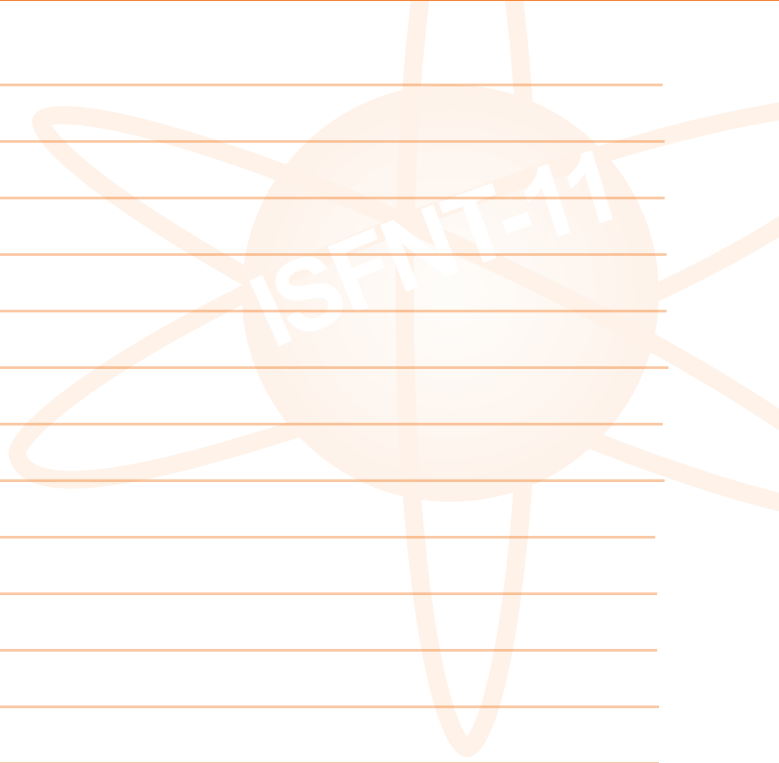
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