Joint ICTP/CAS/IAEA School and Workshop on

PLASMA-MATERIAL INTERACTION IN FUSION DEVICES

18 - 22 July 2016

Hefei Institutes of Physical Science, Hefei, P. R. China
Joint ICTP/CAS/IAEA School and Workshop on

Plasma-Material Interaction in Fusion Devices

18 - 22 July 2016, Hefei Institutes of Physical Science, Hefei, P. R. China

Introduction

The study of plasma-material interaction in fusion devices is devoted foremost to the twin topics of erosion and hydrogen (tritium) retention, and it is closely connected to the study of material microstructure and radiation damage. Basic computational methods include first-principles electronic structure calculations, classical molecular dynamics, kinetic Monte Carlo (KMC) and rate equation modeling, quantum transition state theory, and path integral approaches to hydrogen and defect migration, among other methods. The field has a strong interest in predictive simulations and also in simulations to support interpretation of experimental data. Relevant research is carried out in fusion and materials research institutes and in university departments of physics, chemistry and engineering science.

Purpose

The purpose of the School and Workshop is to provide advanced training and a forum for discussion concerning computational studies of plasma-material interaction processes in fusion devices. The meeting will bring together researchers (lecturers, invited speakers and participants by application) from the areas of materials science and plasma-material interaction in connection with nuclear fusion. Participants should return from the meeting with a richer understanding of computational methods for study of plasma-material interaction processes and of the applications of these methods in fusion energy research. The school and workshop is being held in China in order to take advantage of that country's rapidly growing expertise in modelling of fusion materials and plasma-material interaction and to promote interaction between younger Chinese scientists and their international peers.

Topics to be covered

1. Electronic structure methods and tools for study of material microstructure and trapping and transport of H and He in fusion wall materials.
2. Development of classical interaction potentials for molecular dynamics studies.
3. Development of rate coefficients for KMC and other long-time evolution calculations.
4. Simulation methods for interpretation of experimental data, for example data obtained by thermal desorption spectroscopy.
5. Specific computational studies of erosion of plasma-facing materials due to plasma exposure, of radiation damage in plasma-facing materials and of trapping and migration of hydrogen and helium in such materials.

Lectures

- Fei Gao, Department of Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, MI, USA;
- Niels Gierse, Institute of Energy and Climate Research - Plasma Physics IEK-4, Forschungszentrum Jülich, F. R. Germany;
- Guang-Hong Lu, Department of Physics, Beihang University, Beijing 100191, P. R. China;
- Guang-Nan Luo, Institute of Plasma Physics, Chinese Academy of Sciences, Hefei, Anhui 230031, P. R. China;
- Jörg Neugebauer, Max Planck Institute for Iron Research (MPIE), Düsseldorf, F. R. Germany;
- Brian D. Wirth, Nuclear Engineering Department, University of Tennessee, USA.

Directors

- Bastiaan J. BRAAMS and Hyun Kyung CHUNG, Nuclear Data Section, IAEA, A-1400 Vienna, Austria.
- Huiqiu DENG (邓辉球), Department of Applied Physics, College of Physics and Microelectronic Science, Hunan University, Changsha 410082, P. R. China;
- Qing HOU (侯氢), Institute of Nuclear Science and Technology, Sichuan University, Chengdu 610064, P. R. China;
- Christian LINSMEIER, Institute of Energy and Climate Research - Plasma Physics IEK-4, Forschungszentrum Jülich, F. R. Germany;
- Chang-Song LIU (刘长松), Institute of Solid State Physics, Chinese Academy of Sciences, Hefei, Anhui 230031, P. R. China;
- Guang-Hong LU (吕广宏), Department of Physics, Beihang University, Beijing 100191, P. R. China;
- Guang-Nan LUO (罗广南), Institute of Plasma Physics, Chinese Academy of Sciences, Hefei, Anhui 230031, P. R. China;
- Jizhong SUN (孙继忠), School of Physics and Optoelectronic Technology and College of Advanced Science and Technology, Dalian University of Technology, Dalian 116024, P. R. China;
- Ji-Jun ZHAO (赵纪军), Key Laboratory of Materials Modification by Laser, Ion and Electron Beams, Dalian University of Technology, Ministry of Education, Dalian 116024, P. R. China.
Organizers

**Coordination:** B. J. Braams (IAEA), G.-N. Luo (ASIPP) and C.-S. Liu (CAS ISSP).
**ICTP Organizer:** S. Scandolo.
**ICTP Administrative support:** Ms S. Fairclough, Ms P. Wardell.
**Email:** smr2855@ictp.it.
**CAS Local support:** Dr Xiaochun Li (xcli@ipp.ac.cn) and Dr Xuebang Wu (xbwu@issp.ac.cn).

Registration

Registration time/place:
1. July 17, 2016 / 14:00-18:00, lobby of BEST WESTERN PREMIER Hotel Hefei.
2. July 18, 2016 / 8:00-8:30, entrance of meeting room 601, Building No. 4, ASIPP.
No registration fee will be charged.

Presentations

- **The working language of the School and Workshop:** English.
- **Invited talks:** 25 min (20 min talk, 5 min questions)
- **Contributed talks:** 15 min (12 min talk, 3 min questions).
- **Computers:** there is a desktop computer in the conference room, so you can use your USB disks. You can also use your personal laptops, a VGA connector to the projector will be provided.
- **Laser pointer:** We will prepare one with the wireless page up and down functions.
- **Training Courses:** Please take your personal laptops for code training.

Poster Preparation

**Size-height:** 120 cm; width: 80 cm
Please bring your printed poster and post it on site at 6th Floor Middle Meeting Room (from Tuesday to Thursday).
There are some additional poster boards for contributed talks, so if you like, you can also prepare a poster for the poster session.

Contact Information

**Local Contacts:**
Ms. Guohe Wang (王郭合)  wanggh@ipp.ac.cn  +86-15255185909
Dr. Xiaochun Li (李小椿)  xcli@ipp.ac.cn  +86-17755169685
Dr. Xuebang Wu (吴学邦)  xbwu@issp.ac.cn  +86-13225750902
Conference Venue

**Venue:** Building No.4, ASIPP (等离子体物理研究所，四号楼，科学岛).

**Lecture/Oral/Training:** Meeting Room 601;  
**Poster:** 6th Floor Middle Meeting Room (from Tuesday on).

**Meals:** We will have a buffet lunch (Monday - Friday) and one reception (Monday night) in the cafeteria of ASIPP for all participants for free.

Directions between Building No.4 and Cafeteria
Recommended Hotel

BEST WESTERN PREMIER Hotel Hefei (合肥贝斯特韦斯特精品酒店)

Transportation to the Recommended Hotel

(1) Hefei Xinqiao International Airport (合肥新桥国际机场)
- Taxi (about 33 km, about 85 RMB a car)
- Airport Shuttle buses (25 RMB), please take Line 3 or Line 5, and take off at “Crowne Plaza Hefei station” (皇冠假日酒店）

(2) Hefei nan railway station (合肥南站)
- Taxi (about 12 km, about 25 RMB a car)

(3) Hefei railway station (合肥站)
- Taxi (about 15 km, about 30 RMB a car)

If you take a taxi and can’t speak Chinese, please show the following note to the taxi driver:
Please take me to BEST WESTERN PREMIER Hotel Hefei, thank you!
请送到合肥贝斯特韦斯特精品酒店（安徽省合肥市黄山路 598 号 B 座），谢谢！
Transportation from the Recommended Hotel to the Conference Venue

We will arrange a shuttle bus between the Recommended Hotel and the conference venue during the conference (Detailed schedule could be found in the Agenda).

If you missed the shuttle bus, you have to take a taxi.
If you take a taxi and can’t speak Chinese, please show the following note to the taxi driver:

Please take me to science island (Institutes of Plasma Physics), thank you!
请送我到科学岛（等离子体物理研究所），谢谢！

Restaurants around the Recommended Hotel
Agenda for 2016 Joint ICTP/CAS/IAEA School and Workshop on Plasma-Material Interaction in Fusion Devices  
**Venue:** Building No. 4, ASIPP. Lecture/Oral/Training: Meeting Room 601; Poster: 6th Floor Middle Meeting Room (from Tuesday on)  
7:40 Shuttle bus to ASIPP

<table>
<thead>
<tr>
<th>Monday July 18th</th>
<th>Tuesday July 19th</th>
<th>Wednesday July 20th</th>
<th>Thursday July 21st</th>
<th>Friday July 22nd</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Session L1</strong></td>
<td><strong>Session L3</strong></td>
<td><strong>Session L4</strong></td>
<td><strong>Session L5</strong></td>
<td><strong>Session L6</strong></td>
</tr>
<tr>
<td><strong>Lecture:</strong> Niels Gierse</td>
<td><strong>Lecture:</strong> Jörg Neugebauer</td>
<td><strong>Lecture:</strong> Fei Gao and B. D. Wirth</td>
<td><strong>Lecture:</strong> B. D. Wirth and Fei Gao</td>
<td><strong>Lecture:</strong> Guang-Hong Lu</td>
</tr>
<tr>
<td><strong>8:30-9:00</strong> Opening by Dr. Wan (Director of ASIPP) and Dr. Braams (Chaired by Dr. Luo)</td>
<td><strong>Lecture 1</strong></td>
<td><strong>Lecture 4</strong></td>
<td><strong>Lecture 6 by Fei Gao</strong></td>
<td><strong>Lecture 10</strong></td>
</tr>
<tr>
<td><strong>9:00-10:20</strong> Plasma surface interactions</td>
<td><strong>Ab initio description of defects in materials under extreme conditions (1)</strong></td>
<td><strong>Molecular dynamics simulations of fusion materials: challenges and opportunities (1)</strong></td>
<td><strong>Ab initio description of defects in materials under extreme conditions (2)</strong></td>
<td><strong>Introduction to first-principles method</strong></td>
</tr>
<tr>
<td><strong>10:20-10:40</strong> Photograph taking &amp; Coffee break</td>
<td><strong>Coffee break</strong></td>
<td><strong>Coffee break</strong></td>
<td><strong>Coffee break</strong></td>
<td><strong>Coffee break</strong></td>
</tr>
<tr>
<td><strong>10:40-12:00</strong> Plasma-facing materials</td>
<td><strong>Lecture 2</strong></td>
<td><strong>Lecture 5</strong></td>
<td><strong>Lecture 7 by B. D. Wirth</strong></td>
<td><strong>Lecture 11</strong></td>
</tr>
<tr>
<td><strong>13:30-15:00</strong> Plasma-facing components</td>
<td><strong>Lecture 3</strong></td>
<td><strong>Lecture 4</strong></td>
<td><strong>Lecture 6 by Fei Gao</strong></td>
<td><strong>Lecture 10</strong></td>
</tr>
<tr>
<td><strong>15:10-15:30</strong> Coffee break</td>
<td><strong>15:10-15:30</strong> Coffee break</td>
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<td><strong>15:10-15:30</strong> Coffee break</td>
<td><strong>15:10-15:30</strong> Coffee break</td>
</tr>
<tr>
<td><strong>15:30-18:00</strong> Lab tour to ISSP and ASIPP</td>
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</tr>
<tr>
<td><strong>17:30-20:00</strong> Reception</td>
<td><strong>Reception</strong></td>
<td><strong>Reception</strong></td>
<td><strong>Reception</strong></td>
<td><strong>Reception</strong></td>
</tr>
</tbody>
</table>

**Session L2**  
**Lecturer:** Guang-Nan Luo  
**Chair:** Jörg Neugebauer  
**13:30-15:00** Plasma-facing components  
**15:10-15:30** Coffee break  
**15:30-18:00** Lab tour to ISSP and ASIPP

**Session L3**  
**Lecturer:** Guang-Nan Luo  
**Chair:** Jörg Neugebauer  
**13:30-15:00** Plasma-facing components  
**15:10-15:30** Coffee break  
**15:30-18:00** Lab tour to ISSP and ASIPP

**Session L4**  
**Lecturer:** Guang-Nan Luo  
**Chair:** Jörg Neugebauer  
**13:30-15:00** Plasma-facing components  
**15:10-15:30** Coffee break  
**15:30-18:00** Lab tour to ISSP and ASIPP

**Session L5**  
**Lecturer:** Guang-Nan Luo  
**Chair:** Jörg Neugebauer  
**13:30-15:00** Plasma-facing components  
**15:10-15:30** Coffee break  
**15:30-18:00** Lab tour to ISSP and ASIPP

**Session L6**  
**Lecturer:** Guang-Hong Lu  
**Chair:** Jörg Neugebauer  
**13:30-15:00** Plasma-facing components  
**15:10-15:30** Coffee break  
**15:30-18:00** Lab tour to ISSP and ASIPP
### Sunday July 17th, 2016 / Arrival

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00-18:00</td>
<td>Registration (lobby of BEST WESTERN PREMIER Hotel Hefei)</td>
</tr>
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</table>

### Monday July 18th, 2016 / Session day 1st

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>7:40</td>
<td>Shuttle bus to ASIPP (main gate of BEST WESTERN PREMIER Hotel Hefei)</td>
</tr>
<tr>
<td>8:00-8:30</td>
<td>Registration (entrance of meeting room 601)</td>
</tr>
</tbody>
</table>

**Opening session – Chairman: Guang-Nan Luo (Institute of Plasma Physics, Chinese Academy of Sciences)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>8:30-9:00</td>
<td>Welcome by Dr. Baonian Wan (Director of ASIPP) and Dr. Bastiaan J.Braams (IAEA)</td>
</tr>
</tbody>
</table>

**Session L1 – Lecturer: Niels Gierse (Forschungszentrum Jülich)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>9:00-10:20</td>
<td>Lecture 1 – Plasma surface interactions</td>
</tr>
<tr>
<td>10:20-10:40</td>
<td>Photograph taking &amp; Coffee break</td>
</tr>
<tr>
<td>10:40-12:00</td>
<td>Lecture 2 – Plasma-facing materials</td>
</tr>
<tr>
<td>12:00-13:30</td>
<td>Lunch</td>
</tr>
</tbody>
</table>

**Session L2 – Lecturer: Guang-Nan Luo (Institute of Plasma Physics, Chinese Academy of Sciences)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>13:30-15:00</td>
<td>Lecture 3 – Plasma-facing components</td>
</tr>
<tr>
<td>15:10-15:30</td>
<td>Coffee break</td>
</tr>
</tbody>
</table>

**Session O1: Experiments – Chairman: Niels Gierse (Forschungszentrum Jülich)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:30-15:55</td>
<td>I1 (Huiqiu Deng) – Hunan University – Molecular dynamics simulation of the wetting behaviors of liquid Li on W surface</td>
</tr>
<tr>
<td>15:55-16:10</td>
<td>O01 (Petter Ström) – KTH, Royal Institute of Technology – Ion beam methods for the study of plasma-facing materials</td>
</tr>
<tr>
<td>16:10-16:25</td>
<td>O02 (Yuping Xu) – Institute of Plasma Physics, Chinese Academy of Sciences – Plasma-Material Interaction experiments during the 2015 spring EAST campaign employing MAPES</td>
</tr>
<tr>
<td>16:25-16:40</td>
<td>O03 (Jun Wang) – Beihang University – Surface morphology and deuterium retention in tungsten vanadium alloys exposed to deuterium plasmas in linear plasma device STEP</td>
</tr>
<tr>
<td>16:40-16:55</td>
<td>O04 (Younggil Jin) – Seoul National University – TDS Study of Effect of High Energy Ion induced Cascade Collisonal Damage on Deuterium Retention in Tungsten</td>
</tr>
<tr>
<td>16:55-17:10</td>
<td>O05 (Long Cheng) – Beihang University – Investigation of surface morphology and deuterium retention in tungsten exposed to neon and deuterium mixture plasmas in Pilot-PSI</td>
</tr>
<tr>
<td>17:30-20:00</td>
<td>Reception</td>
</tr>
<tr>
<td>20:00</td>
<td>Shuttle bus to the hotel (Main gate of Cafeteria of ASIPP)</td>
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</table>
# Tuesday July 19th, 2016 / Session day 2nd

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>7:40</td>
<td>Shuttle bus to ASIPP (main gate of BEST WESTERN PREMIER Hotel Hefei)</td>
</tr>
<tr>
<td><strong>Session L3 – Lecturer: Jörg Neugebauer (Max Planck Institute for Iron Research)</strong></td>
<td></td>
</tr>
<tr>
<td>8:30-10:00</td>
<td>Lecture 4 Ab initio description of defects in materials under extreme conditions (1)</td>
</tr>
<tr>
<td>10:00-10:20</td>
<td>Coffee break</td>
</tr>
<tr>
<td>10:20-11:50</td>
<td>Lecture 5 Ab initio description of defects in materials under extreme conditions (2)</td>
</tr>
<tr>
<td>12:00-13:30</td>
<td>Lunch</td>
</tr>
<tr>
<td><strong>Session O2: Tungsten (1) – Chairman: Jörg Neugebauer (Max Planck Institute for Iron Research)</strong></td>
<td></td>
</tr>
<tr>
<td>13:30-13:55</td>
<td>I2 (Chang-Song Liu) Institute of Solid State Physics, Chinese Academy of Sciences Multiscale insights into radiation resistance of nanocrystals</td>
</tr>
<tr>
<td>13:55-14:10</td>
<td>O06 (XianShan Kong) Institute of Solid State Physics, Chinese Academy of Sciences Towards understanding the differences in irradiation effects of He, Ne and Ar plasma by investigating the physical origin of their clustering in tungsten</td>
</tr>
<tr>
<td>14:10-14:25</td>
<td>O07 (Li-Fang Wang) Beihang University A new embedded-atom method interatomic potential for tungsten-hydrogen system</td>
</tr>
<tr>
<td>14:25-14:40</td>
<td>O08 (Yinan Wang) Tsinghua University Hydrogen-induced change in core structures of screw and edge dislocations in Tungsten</td>
</tr>
<tr>
<td>14:40-14:55</td>
<td>O09 (Jiechao Cui) Sichuan University Estimation of the lifetime of small helium bubbles near tungsten surfaces - a methodological study.</td>
</tr>
<tr>
<td>14:55-15:10</td>
<td>O10 (Jie Hou) Institute of Solid State Physics, Chinese Academy of Sciences Retention behavior of hydrogen isotopes in tungsten revisited by multi-scale modelling</td>
</tr>
<tr>
<td>15:10-15:30</td>
<td>Coffee break</td>
</tr>
<tr>
<td>15:30-18:00</td>
<td>Lab tour to ISSP and ASIPP</td>
</tr>
<tr>
<td>18:00</td>
<td>Shuttle bus to the hotel (Main gate of Building No. 4 in ASIPP)</td>
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**Wednesday July 20th, 2016 / Session day 3rd**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>7:40</td>
<td>Shuttle bus to ASIPP (main gate of BEST WESTERN PREMIER Hotel Hefei)</td>
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<tr>
<td></td>
<td><strong>Session L4 – Lecturer: Fei Gao (University of Michigan) and Brian D. Wirth (University of Tennessee)</strong></td>
</tr>
<tr>
<td>8:30-10:00</td>
<td>Lecture 6 by Gao</td>
</tr>
<tr>
<td>10:00-10:20</td>
<td>Coffee break</td>
</tr>
<tr>
<td>10:20-11:50</td>
<td>Lecture 7 by Wirth</td>
</tr>
<tr>
<td>12:00-13:30</td>
<td>Lunch</td>
</tr>
<tr>
<td></td>
<td><strong>Session O3: Tungsten (2) – Chairman: Fei Gao (University of Michigan)</strong></td>
</tr>
<tr>
<td>13:30-13:45</td>
<td>O11 (Yu-Wei You)</td>
</tr>
<tr>
<td>13:45-14:00</td>
<td>O12 (Jingzhong Fang)</td>
</tr>
<tr>
<td>14:00-14:15</td>
<td>O13 (Zhangcan Yang)</td>
</tr>
<tr>
<td>14:15-14:30</td>
<td>O14 (Haohua Wen)</td>
</tr>
<tr>
<td>14:30-14:50</td>
<td>Coffee break</td>
</tr>
<tr>
<td></td>
<td><strong>Session CT: Training Courses</strong></td>
</tr>
<tr>
<td>14:50-16:20</td>
<td>Training on Xolotl by Prof. Wirth</td>
</tr>
<tr>
<td>16:30-18:00</td>
<td>Training on LAMMPS by Prof. Gao</td>
</tr>
<tr>
<td>18:00</td>
<td>Shuttle bus to the hotel (Main gate of Building No. 4 in ASIPP)</td>
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### Thursday July 21st, 2016 / Session day 4th

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<th>Details</th>
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<tbody>
<tr>
<td>7:40</td>
<td>Shuttle bus to ASIPP (main gate of BEST WESTERN PREMIER Hotel Hefei)</td>
<td></td>
</tr>
<tr>
<td>8:30-10:00</td>
<td>Lecture 8 by Wirth</td>
<td>Atomistic modeling of helium diffusion and clustering behavior in tungsten</td>
</tr>
<tr>
<td>10:00-10:20</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>10:20-11:50</td>
<td>Lecture 9 by Gao</td>
<td>Molecular dynamics simulations of fusion materials: challenges and opportunities (2)</td>
</tr>
<tr>
<td>12:00-13:30</td>
<td>Lunch</td>
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</table>

**Session L5 – Lecturer: Brian D. Wirth (University of Tennessee) and Fei Gao (University of Michigan)**

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>13:30-13:45</td>
<td>O15 (Jingyi Shi)</td>
<td>University of Science and Technology of China&lt;br&gt;Atomistic study on the growth of helium bubbles in α-Fe from the view of energetics and mechanics</td>
</tr>
<tr>
<td>13:45-14:00</td>
<td>O16 (Tao Lu)</td>
<td>Institute of Plasma Physics, Chinese Academy of Sciences&lt;br&gt;Atomistic study of hydrogen behavior around a screw dislocation in alpha iron</td>
</tr>
<tr>
<td>14:00-14:15</td>
<td>O17 (Jianhua Ding)</td>
<td>Dalian University of Technology&lt;br&gt;The magnetism (Fe, Cr) and the stability of He-vacancy complexes in Fe-9Cr alloys</td>
</tr>
<tr>
<td>14:15-14:30</td>
<td>O18 (Yange Zhang)</td>
<td>Institute of Solid State Physics, Chinese Academy of Sciences&lt;br&gt;Effect of carbon and alloying solute atoms on helium behaviors in α-Fe</td>
</tr>
<tr>
<td>14:30-14:45</td>
<td>O19 (Amit Sharma)</td>
<td>Wright State University&lt;br&gt;Adaptive Kinetic Monte Carlo Study of Hydrocarbon Diffusion/Trapping in First–Wall and Amorphous Hydrocarbon Flakes</td>
</tr>
<tr>
<td>14:45-15:05</td>
<td>Coffee break</td>
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**Session O4: Iron – Chairman: Brian D. Wirth (University of Tennessee)**

<table>
<thead>
<tr>
<th>Time</th>
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<th>Details</th>
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<tbody>
<tr>
<td>15:05-18:00</td>
<td>6th Floor Middle Meeting Room, to be posted from Tuesday till Thursday</td>
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<tr>
<td>18:00</td>
<td>Shuttle bus to the hotel (Main gate of Building No. 4 in ASIPP)</td>
<td></td>
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</table>
### Friday July 22nd, 2016 / Session day 5th

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>7:40</td>
<td>Shuttle bus to ASIPP (main gate of BEST WESTERN PREMIER Hotel Hefei)</td>
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<tr>
<td></td>
<td><strong>Session L6 – Lecturer: Guang-Hong Lu (Beihang University)</strong></td>
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<tr>
<td>8:30-10:00</td>
<td>Lecture 10</td>
</tr>
<tr>
<td>10:00-10:20</td>
<td>Coffee break</td>
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<tr>
<td>10:20-11:50</td>
<td>Lecture 11</td>
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<tr>
<td>12:00-13:30</td>
<td>Lunch</td>
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**Session O5: Damages – Chairman: Guang-Hong Lu (Beihang University)**

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<thead>
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<th>Paper</th>
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<tr>
<td>13:30-13:55</td>
<td>I3 (Jizhong Sun)</td>
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<td>13:55-14:10</td>
<td>O20 (Baoqin Fu)</td>
</tr>
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<td>14:10-14:25</td>
<td>O21 (Yuexia Wang)</td>
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<tr>
<td>14:25-14:40</td>
<td>O22 (Xuebang Wu)</td>
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<tr>
<td>14:40-14:55</td>
<td>O23 (Yonggang Li)</td>
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<td>14:55-15:20</td>
<td>Coffee break</td>
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**Session R: Review and Closing**

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<tr>
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<th>Activity</th>
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<tr>
<td>15:20-16:20</td>
<td>Discussion chaired by Bastiaan J.Braams</td>
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<tr>
<td>16:20-16:50</td>
<td>Summary by Guang-Nan Luo &amp; Closing by Bastiaan J.Braams</td>
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<tr>
<td>17:00</td>
<td>Shuttle bus to the hotel (Main gate of Building No. 4 in ASIPP)</td>
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### Saturday July 23rd, 2016 / Departure
**Poster Session**

Size- height: 120 cm; width: 80 cm

Please bring your printed poster and post it on site at 6th Floor Middle Meeting Room (from Tuesday to Thursday).

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<th>No.</th>
<th>Name</th>
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<th>Title</th>
</tr>
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<tbody>
<tr>
<td>P02</td>
<td>Chengzhi Cao</td>
<td>Southwestern Institute of Physics</td>
<td>Modelling of HL-2M Standard Single Null Divertor by SOLPS-ITER</td>
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<tr>
<td>P03</td>
<td>Guohua Duan</td>
<td>Institute of Solid State Physics, Chinese Academy of Sciences</td>
<td>Energetic and kinetic role of free surface in healing irradiation-damage in nanoporous tungsten</td>
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<tr>
<td>P04</td>
<td>Jinming Gao</td>
<td>Southwestern Institute of Physics</td>
<td>Divertor heat flux mitigation by using supersonic molecular beam injection on the HL-2A tokamak</td>
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<td>P05</td>
<td>Stanislav Herashchenko</td>
<td>National Science Center &quot;KharKiv Institute of Physics and Technology&quot;</td>
<td>Damage of castellated tungsten targets under QSPA KH-50 plasma irradiation in experiments on simulation of ITER-like transient events</td>
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<td>P06</td>
<td>Salah Ud-Din Khan</td>
<td>King Saud University</td>
<td>Theoretical Calculation and Simulation Studies for sideways force on vacuum vessel during VDEs in EAST Tokamak</td>
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<td>P07</td>
<td>Shahab Ud-Din Khan</td>
<td>Institute of Plasma Physics, Chinese Academy of Sciences</td>
<td>Theoretical Calculation and Simulation Studies for asymmetric forces on the EAST plasma in kink mode and halo current analysis</td>
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<td>P08</td>
<td>Xiaojie Li</td>
<td>Dalian University of Technology</td>
<td>Ab initio calculations of mechanical properties of bcc W-Re-Os random and RAFM alloys</td>
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<tr>
<td>P09</td>
<td>Guyue Pan</td>
<td>Institute of Solid State Physics, Chinese Academy of Sciences</td>
<td>The behavior of the hydrogen and helium under different orientation to W surface: A first principles study</td>
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<td>P10</td>
<td>Ki-Baek Roh</td>
<td>Seoul National University</td>
<td>Recrystallization of bulk tungsten and plasma-sprayed tungsten with accumulated thermal energy relevant to Type-I ELM H-mode operation</td>
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<td>P11</td>
<td>Siriyaporn Sangaroong</td>
<td>Mahasarakham University</td>
<td>A model for predicting tritium flux from blanket mock-up in Tokamak fusion reactors</td>
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<td>P12</td>
<td>Dan Sun</td>
<td>Dalian University of Technology</td>
<td>Numerical simulation of plasma facing component with built-in tungsten filament on basis of join W/Cu functionally graded layer</td>
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<td>No.</td>
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<tr>
<td>P13</td>
<td>Jingjing Sun</td>
<td>Institute of Solid State Physics, Chinese Academy of Sciences</td>
<td>The diffusion and trapping properties of hydrogen in SiC: A first-principles study</td>
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<td>P14</td>
<td>Carlos Eduardo Velasquez Cabrera</td>
<td>Universidade Federal de Minas Gerais</td>
<td>First wall dpa for plasma facing materials</td>
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<td>P15</td>
<td>Xiaoyang Wang</td>
<td>Tsinghua University</td>
<td>Effect of radiation damage on mechanical and structural properties of symmetric tilt grain boundaries and nanocrystalline grain boundary networks in bcc Fe</td>
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<td>P16</td>
<td>Apiwat Wisitsorasak</td>
<td>King Mongkut's University of Technology Thonburi</td>
<td>The Development of SOL Transport Model for Integrated Core-SOL Simulation of L-Mode Plasma</td>
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<td>Jianchun Wu</td>
<td>Sichuan University</td>
<td>Study of the tungsten coated stainless steels with ion beam mixing or electron beam alloying treatment</td>
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<td>Yichun Xu</td>
<td>Institute of Solid State Physics, Chinese Academy of Sciences</td>
<td>Dissolution corrosion and embrittlement of iron in liquid lead-lithium</td>
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<td>P19</td>
<td>Yaochun Yang</td>
<td>Dalian University of Technology</td>
<td>Ab initio study of the elastic properties of body-centered cubic Ti-Mo-M (M = Mg, Mn, Ni, Zr, Nb and W) random alloys</td>
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<td>P20</td>
<td>Mingzhong Zhao</td>
<td>Institute of Plasma Physics, Chinese Academy of Sciences</td>
<td>The effect of intrinsic defects in the deuterium retention of tungsten</td>
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<td>P21</td>
<td>Zhe Zhao</td>
<td>Institute of Solid State Physics, Chinese Academy of Sciences</td>
<td>Cluster dynamics simulation of grain boundary behaviors in the property of incidenting ion irradiation in tungsten</td>
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