

8th IAEA DEMO Programme Workshop

30 August – 2 September 2022

IAEA Headquarters

Vienna, Austria

Sehila M. Gonzalez de Vicente (NAPC - Physics)
Luigi Di Pace (NENP)
Scientific Secretaries

Topic 1: Transient operational phases and transient loading environments for fusion DEMO power plants

- Chairs: Wolfgang Biel (EU-Germany)/ Nobuyuki Aiba (Japan)

Topic 2: ITER TBM status, DEMO needs and satellite facilities needed.

- Chair: Charles Kessel, External Chair: Korean, Seungyon Cho

Topic 3: Efficiency: coolant selection, cost and delivering time

- Chairs: Mike Gorley (UK) / Klaus Hersch + Robert Stieglitz (EU-Germany)

Special topics

- **Materials database and needed facilities** Eberhard Diegele (Germany)
- **Overview of Broader Approach phase II programme.** Susana Clement Lorenzo (EU)

Technical Programme Committee



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| Min Xu (chair) | China |
| Boris Kuteev | Russian Federation |
| Keeman Kim | Rep. of Korea |
| Mike Gorley | UK |
| Minyou Ye | China |
| Nagato Yanagi | Japan |
| Yoshiteru Sakamoto | Japan (LOC) |
| Charles Kessel | USA |
| Mohamed Abdou | USA |
| Philip Ferguson | USA |
| Klaus Hesch | EU- Germany |
| Wolfgang Biel | EU - Germany |
| Francesco Maviglia | EU - Germany |

Programme - i



Tuesday, 30 August 2022

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| 10.00-10.25 | Opening remarks and workshop introduction M. Chudakov, Deputy Director General, Nuclear Energy, IAEA S. M. Gonzalez de Vicente and L. Di Pace, Scientific Secretaries, IAEA M. Xu, 8th DEMO Programme Workshop Chair, SWIP |
| Topic 1 | Transient operational phases and transient loading environments for fusion DEMO power plants Chairs: Wolfgang Biel, Francesco Maviglia, and Aiba Nobuyuki |
| 10.25-10.35 | FRANCESCO MAVIGLIA AND AIBA NOBUYUKI <i>Introduction and overview</i> |
| 10.35-11:20 | FRANCESCO MAVIGLIA <i>Plasma transient challenges and resulting requirements for the machine design of a DEMO tokamak reactor</i> |
| 11.20-11.35 | Coffee/Tea Break |
| 11.35-12.20 | EMILIANO FABLE <i>Development of plasma control for the transient phases of a DEMO tokamak discharge</i> |
| 12.20-13.05 | WOLFGANG TREUTTERER <i>Strategies for gradual increase of flat-top plasma performance towards the operational point according to the ITER operational plan</i> |
| 13.05-14.05 | Lunch Break |
| 14.05-14.50 | GE ZHUANG <i>Solutions for the transients and load variations of the CFETR operation scenarios</i> |
| 14.50-15.35 | TAKUYA GOTO <i>Current status of helical fusion reactor design and study on operation control scenario</i> |
| 15.35-15.50 | Coffee/Tea Break |
| 15.50-16.50 | Discussion |
| Special Topic 2 | |
| 16.50-17.35 | SUSANA CLEMENT LORENZO <i>Overview of broader approach phase II programme</i> |
| 17.35 | Adjourn |

Wednesday, 31 August 2022

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| Topic 2 | ITER TBM program status, DEMO needs and satellite facilities needed Chairs: Charles Kessel and Seungyon Cho |
| 10.00-10.10 | SEUNGYON CHO <i>Introduction and overview</i> |
| 10.10-10.50 | LUCIANO GIANCARLI <i>Review of ITER TBM program technical targets and progress</i> |
| 10.50-11.05 | Coffee/Tea Break |
| 11.05-11.25 | SEUNGYON CHO <i>KO facilities anticipated for DEMO preparation</i> |
| 11.25-11.45 | TANIGAWA HIROYASU <i>JP facilities anticipated for DEMO preparation</i> |
| 11.45-12.05 | LORENZO BOCCACCINI <i>EU facilities anticipated for DEMO preparation</i> |
| 12.05-13.05 | Lunch Break |
| 13.05-13.11 | ANKIT GANDHI <i>POSTER: Numerical analysis for optimization of circulation power in first wall of Indian helium cooled solid breeder blanket using He-CO₂ gas mixture</i> |
| 13.11-13.17 | DMITRY TERYNTYEV <i>POSTER: Qualification of EUROFER97 for TBM: contribution of the EUROfusion project within 2021-2025</i> |
| 13.17-13.23 | INESH KENZHINA <i>POSTER: Reactor studies of two-phase lithium ceramics in Kazakhstan</i> |
| 13.23-13.29 | ANGEL IBARRA <i>POSTER: Capabilities and status of the IFMIF-DONES project</i> |
| 13.29-13.35 | IVAN FERNANDEZ-BERCERUELO <i>POSTER: An approach for the pathway towards the development of high performance breeding blankets</i> |
| 13.35-13.41 | SIMONA BREIDOKAITE <i>POSTER: Overview of the R&D of materials intended for DEMO and DONES at Lithuanian Energy Institute</i> |
| 13.41-13.47 | P.N. MAYA <i>POSTER: Exploration of a compact DEMO reactor: constraints on shielding materials and HTS magnets from parameter-space scans</i> |
| 13.47-13.53 | SOMSAK DANGTIP <i>POSTER: CPAF linear device for plasma materials exposure experiments</i> |

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| 13.53-14.13 | XURU DUAN <i>CN facilities anticipated for DEMO preparation</i> |
| 14.13-14.33 | CHARLES KESSEL <i>US facilities anticipated for DEMO preparation</i> |
| 14.33-14.53 | MIKHAIL SHLENSKII <i>RF facilities anticipated for DEMO preparation</i> |
| 14.53-15.13 | MIKE GORLEY <i>UK facilities anticipated for DEMO preparation</i> |
| 15.13-15.53 | CHARLES KESSEL <i>Preparation for DEMO and other next steps, what are required extensions to ITER TBM achievements</i> |
| 15:53-16:10 | Coffee/Tea Break |
| 16:10-17:10 | Discussion |
| Special Topic 1 | |
| 17:10-17:55 | EBERHARD DIEGELE <i>Materials database and needed facilities (focus on structural materials like RAFM)</i> |
| 17.55 | Adjourn |

Programme - ii

Thursday, 1 September 2022

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| Topic 3 | Efficiency: coolant selection, cost, and delivering time Chairs: Michael Gorley, Klaus Hesch, and Robert Stieglitz |
| 10.00-10.10 | MICHAEL GORLEY AND KLAUS HESCH <i>Introduction and overview</i> |
| 10.10-10.55 | YUTAKA KAMADA AND SAKAMOTO YOSHITERU <i>Plasma physics performance and impact on plant efficiency</i> |
| 10.55-11.40 | WOLFGANG HERING AND LUCIANA BARUCCA <i>Thermal power management in view of coolant choice and the balance of plant</i> |
| 11.40-11.55 | Coffee/Tea Break |
| 11.55-12.40 | ELENA GAIO <i>Electrical power management - the path toward energy production</i> |
| 12.40-13.40 | Lunch Break |
| 13.40-13.46 | SERGEY ANANYEV POSTER: <i>Progress in modeling the D/T component flows in fueling system of controlled fusion reactor by SOLPS+ASTRA+FC+FNS codes</i> |
| 13.46-13.52 | STEVEN WRAY POSTER: <i>Power balance challenge for fusion</i> |
| 13.52-14.37 | QING LI <i>Nuclear power plant digital twinning for efficient operation</i> |
| 14.37-15.22 | JAE-MIN KWON AND EMILIANO FABLE <i>Fusion plant flight simulator - present status</i> |
| 15.22-16.22 | Discussion |
| Topic summaries | |
| 16.22-16.42 | FRANCESCO MAVIGLIA <i>Topic 1 Summary</i> |
| 16.42-17.02 | SEUNGYON CHO <i>Topic 2 Summary</i> |
| 17.02-17.22 | MICHAEL GORLEY AND KLAUS HESCH <i>Topic 3 Summary</i> |
| 17.22-17.42 | Discussion |
| 17.42-18.22 | M. XU AND S. M. GONZALEZ DE VICENTE <i>Workshop final remarks and closing speech</i> |
| 18.22 | Adjourn |

Friday, 2 September 2022

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| Closed session | |
| 10.00-10.30 | ALL <i>Identification of key elements</i> |
| 10.30-12.00 | ALL <i>Preparation of the summary paper</i> |
| 12.00-13.00 | ALL <i>Preparation of next edition</i> |
| 13.00 | End of Meeting |

Objective

- Discuss in depth the topic (and breakdown subtopics) presented
- **Understand the state of the art and existing gaps**
- Point out missing information
- Identify priorities where actions has to be put in place
- **Identify potential coordination and collaborations that could benefit Fusion progress**
- *Please provide feedback to the speakers/chairs/scientific secretaries -> to be included in the final report*

Time for Questions

