IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Technical Meeting on Tungsten and Hydrogen in Edge Plasmas

Hosted by the

Government of France

through the

ITER Organization

Saint-Paul-Lez-Durance, France

6 - 9 October 2026

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Information Sheet

Introduction

Tungsten is currently the most prominent candidate to be used as an armour material in the first wall components of future fusion power plants. It has excellent physical and thermomechanical properties to withstand the extreme conditions necessary for fusion, including high heat gradients and particle fluxes from the reactor's hydrogen plasma fuel. However, even small amounts of ejected tungsten material off the components' surfaces can be detrimental to the hydrogen plasma operation. In order to perform predictive simulations of plasma performance incorporating tungsten impurities and to characterise the tungsten source originating from the wall components, validated and evaluated atomic and molecular data must be used as input in the simulations.

This Technical Meeting series on Tungsten and Hydrogen in Edge Plasmas brings together physicists from a broad range of fusion research domains to discuss and share information on the current understanding of physics and data requirements for tungsten and hydrogen plasma interactions. The goal is to provide a forum for information exchange between i) fusion experimentalists utilizing linear plasma and magnetic fusion devices as well as researchers performing fundamental laboratory experiments, and ii) physicists performing edge plasma simulations as well as theorists providing fundamental atomic, molecular and plasma-wall interaction data for fusion. Participants are invited to propose a presentation of their research, either as an oral contribution or as a poster.

The previously organized Technical Meetings on Tungsten and Hydrogen in Edge Plasmas:

- 1st Technical Meeting on the Collisional-Radiative Properties of Tungsten and Hydrogen in Edge Plasma of Fusion Devices, 29 March – 1 Apr 2021, IAEA HQ
- 2nd Technical Meeting on the Collisional-Radiative Properties of Tungsten and Hydrogen in Edge Plasma of Fusion Devices, 28 Nov – 1 Dec 2023, IAEA HQ

Past and ongoing IAEA Coordinated Research Project activities related to this Technical Meeting series:

- 2010 – 2015 Coordinated Research Project "Spectroscopic and Collisional Data for Tungsten in Plasma from 1 eV and 20 keV"
- 2010 – 2016 Coordinated Research Project "Atomic and Molecular Data for State-Resolved Modelling of Hydrogen and Helium and Their Isotopes in Fusion Plasmas"
- 2013 – 2019 Coordinated Research Project "Plasma-Wall Interaction with Irradiated Tungsten and Tungsten Alloys in Fusion Devices"
- 2025 – 2031 Coordinated Research Project "Properties of Tungsten Ions in Fusion Plasmas"

This Technical Meeting will continue to act as a forum between the fusion data users related to Tungsten and Hydrogen processes and the corresponding data providers with an aim to advance the fruitful communication between these two communities for finding gaps and needs in Tungsten and Hydrogen data for fusion applications.

As the private fusion companies and enterprises have entered the fusion sector in the recent few years, this Technical Meeting welcomes participation of the private fusion sector and promotes for further private-public partnerships in fusion knowledge exchange.

This Technical Meeting will be hosted by ITER Organization. The event focuses to current data activities on atomic and molecular processes relevant for fusion plasmas as well as on plasma-surface and plasma-material processes with Tungsten-based fusion materials. The meeting fosters global collaboration for fusion R&D in the public and private sectors as well as identifies priorities for fusion data activities relevant for Tungsten and Hydrogen.

Objectives

- Knowledge-sharing and networking between fusion researchers and plasma scientists in different domains to identify commonalities, foster collaboration and share opportunities.
- The event acts as a forum between fusion data users and data providers with an aim to advance communication between these two communities for finding gaps and fusion data needs incorporating tungsten and hydrogen.
- Training and instruction of early-stage career researchers in experimental and theoretical tools used in research of tungsten and hydrogen plasma-particle processes taking place in edge plasma regions of a fusion reactor.
- Discussion and review of emerging research areas in fusion physics and science specifically related to atomic and molecular edge plasma processes and plasma-wall processes incorporating tungsten and hydrogen.
- Incorporating the private fusion sector in discussions on tungsten and hydrogen fusion data requirements and collaborations.

- Increase understanding in experimental and theoretical tools used in research of tungsten and hydrogen plasma-particle processes taking place in the core and edge regions of the plasma as well as in plasma-wall interactions of a fusion reactor.
- Proceedings of the meeting to be made available in a suitable IAEA or journal publication.

Target Audience

Research scientists related nuclear fusion, at any stage of their career, who are involved in the quantitative and qualitative study, measurement, analysis, modelling, simulation or prediction of collisional-radiative properties or plasma-wall interactions of tungsten and hydrogen in fusion plasmas or plasma-wall interactions in fusion devices, using or producing fundamental data on these processes. Experimental and theoretical approaches are welcomed.

The IAEA is committed to the promotion of gender equality in all its activities and qualified women scientists are particularly encouraged to participate in the meeting.

Working Language

English

Topics

Main topics of the event

- Missing tungsten and hydrogen data in magnetically-confined edge plasma models
    - Rates for ionization, recombination and excitation
    - Multi-step ionization and excitation
    - Non-resonant charge exchange
- Recommended tungsten and hydrogen data for edge plasma modelling
    - Addressing the large scatter in the various sets for W atomic data (in particular excitation rates)
    - Hydrogen molecular data: vibrationally-, rotationally- and isotopically-resolved data; mixed molecules; limited data available for T2, TH and TD
    - Metastable states of W
    - Uncertainties of W and hydrogen data

- Plasma-surface process properties, trends and underlying effects related to W-based components
- The inclusion of reduced photon opacity information in collisional-radiative models
    - Revised CRM with (semi)opaque lines
    - Full non-linear model or a reduced CRM
    - Isotope effects of collisional broadening in high plasma density
    - Wall reflection models for photons: on W and W deposited layers; surface roughness effects
- Data needs for ITER, DEMO and private sector: CR and plasma-wall interactions with W and hydrogen
    - Accuracy improvement for ionization, recombination, radiation and CX rates of W
    - CR: to obtain reliable charge distribution of W for modelling W upstream migration and penetration to core plasma
    - Spectral lines of interest W^{0} to at least W^{64+}
    - Dielectronic recombination rates and photon opacity for W vapour shielding during fast transients

Participation and Registration

All persons wishing to participate in the event have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

In order to be designated by an IAEA Member State or invited organization, participants are requested to submit their application via the InTouch+ platform (https://intouchplus.iaea.org) to the competent national authority (Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) or organization for onward transmission to the IAEA by **27th July 2026**, following the registration procedure in InTouch+:

1. Access the InTouch+ platform (https://intouchplus.iaea.org):
    - Persons with an existing NUCLEUS account can sign in to the platform with their username and password;
    - Persons without an existing NUCLEUS account can register here.

2. Once signed in, prospective participants can use the InTouch+ platform to:
    - Complete or update their personal details under 'Complete Profile' and upload the relevant supporting documents;
    - Search for the relevant event under the 'My Eligible Events' tab;
    - Select the Member State or invited organization they want to represent from the drop-down menu entitled 'Designating Authority' (if an invited organization is not listed, please contact InTouchPlus.Contact-Point@iaea.org);
    - If applicable, indicate whether financial support is requested and complete the relevant information (this is not applicable to participants from invited organizations);

- Based on the data input, the InTouch+ platform will automatically generate the Participation Form (Form A) and/or the Grant Application Form (Form C);
- Submit their application.

Once submitted through the InTouch+ platform, the application, together with the auto-generated form(s), will be transmitted automatically to the required authority for approval. If approved, the application, together with the applicable form(s), will automatically be sent to the IAEA through the online platform.

NOTE: The application for financial support should be made, together with the submission of the application, by **27th July 2026.**

For additional information on how to apply for an event, please refer to the InTouch+ Help page. Any other issues or queries related to InTouch+ can be sent to InTouchPlus.Contact-Point@iaea.org.

Selected participants will be informed in due course on the procedures to be followed with regard to administrative and financial matters.

Participants are hereby informed that the personal data they submit will be processed in line with the Agency's Personal Data and Privacy Policy and is collected solely for the purpose(s) of reviewing and assessing the application and to complete logistical arrangements where required. The IAEA may also use the contact details of Applicants to inform them of the IAEA's scientific and technical publications, or the latest employment opportunities and current open vacancies at the IAEA. These secondary purposes are consistent with the IAEA's mandate. Further information can be found in the Data Processing Notice concerning the IAEA InTouch+ platform.

Papers and Presentations

The IAEA encourages participants to give presentations on the work of their respective institutions that falls under the topics listed in above Topics Section.

Participants who wish to give presentations are requested to submit an abstract of their work. The abstract will be reviewed as part of the selection process for presentations. The abstract should be in A4 page format, should extend to no more than one page (excluding figures and tables). It should be sent electronically through the event web page (see link under 'Event web page' section) or directly to Mr Kalle Heinola, the Scientific Secretary of the event (see contact details in below Visas Section), not later than **27th July 2026.**

Expenditures and Grants

No registration fee is charged to participants.

The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants. Upon specific request, such assistance may be offered to normally one participant per country, provided that, in the IAEA's view, the participant will make an important contribution to the event.

The application for financial support should be made, together with the submission of the application, by **27th July 2026.**

Venue

ITER Organization
Route de Vinon-sur-Verdon - CS 90 046
13067 St Paul Lez Durance Cedex
France

Visas

Participants who require a visa to enter France should submit the necessary application as soon as possible to the nearest diplomatic or consular representative of France.

IAEA Contacts

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Subsequent correspondence on scientific matters should be sent to the Scientific Secretary/Secretaries and correspondence on other matters related to the event to the Administrative Secretary.

Event Web Page

Please visit the following IAEA web page regularly for new information regarding this event:

https://conferences.iaea.org/e/tm-W-H-3