

# AMD Unit: Overview of Network Activities

**Data Centres Network (DCN):** a collection of 12 national data centres for the collection, critical assessment (evaluation) and generation of fundamental data for fusion applications.

**Code Centres Network (CCN):** to gather and provide access to any information relevant for modellers in fusion plasma science. Its focus is on the modelling and calculation of data that are difficult to measure experimentally.

**Global Network for the Atomic and Molecular Physics of Plasmas (GNAMPP):** a consortium of research groups working in the area of fundamental atomic and molecular physics relevant to plasma processes, with a focus on promoting collaboration and communication between experimentalists and theoreticians.

# AMD Unit: Overview of DCN activities

## Data Centres Network


















- 26th biennial meeting held (in hybrid format) 1 – 3 September 2021
- Focus on:
  - Identification of gaps in available databases
  - Uncertainty quantification
  - The need for data standards for data exchange and comparison
- Next meeting: May 2023 (combined with APiP Conference)

# AMD Unit: Overview of DCN activities

## Data Centres Network

### Participants

18 participants from 10 countries.

*	Connor BALLANCE	 Queen's University Belfast, United Kingdom
*	Raúl BARRACHINA	 Centro Atómico Bariloche, Argentina
	James COLGAN	 Los Alamos National Laboratory, United States of America
*	Pavel R. GONCHAROV	 Peter the Great St. Petersburg Polytechnic University (SPbSTU), Russia
	Kalle HEINOLA	 IAEA
*	Duck-Hee KWON	 Korea Atomic Energy Research Institute, South Korea
*	Vincenzo LAPORTA	 CNR Bari, Italy
	János Zsolt MEZEI	 Institute for Nuclear Research, Hungarian Academy of Sciences (ATOMKI), Hungary
*	MURAKAMI Izumi	 National Institute for Fusion Science, Japan
*	Martin O'MULLANE	 Department of Physics, University of Strathclyde, United Kingdom
*	Yuri RALCHENKO	 National Institute of Standards and Technology, United States of America
	Detlev REITER	 Heinrich Heine University Düsseldorf, Germany
*	Mi-Young SONG	 Institute of Plasma Technology, KFE, South Korea
	Baoren WEI	 Fudan University, China
	Christian HILL	 IAEA
	NAKANO Tomohide	 National Institutes for Quantum and Radiological Science and Technology (QST), Japan
	DIPTI	 IAEA
	Christopher J. FONTES	 Los Alamos National Laboratory, United States of America

# AMD Unit: Overview of DCN activities

## Data Centres Network

- Status and recent developments of data centres
  - Future prospects
  - Cooperation in the maintenance of bibliographic databases
  - Requirements for the generation and validation of data
  - Priorities for database development
  - Uncertainty quantification of fundamental data
- 
- There exist significant gaps in databases of plasma collisional processes for  $H + A^{q+} \rightarrow p + A^{(q-1)+}$  charge-exchange recombination ( $A=N_2, Ne, Ar, Kr, \dots$ )
  - It has been estimated that even  $\sim 5\%$  uncertainties in the AM data can have a significant impact on the integrated modelling results of ITER divertor environment. Therefore, there is a clear need for data evaluation and uncertainty assessment activities

# AMD Unit: Overview of CCN activities

## Code Centres Network

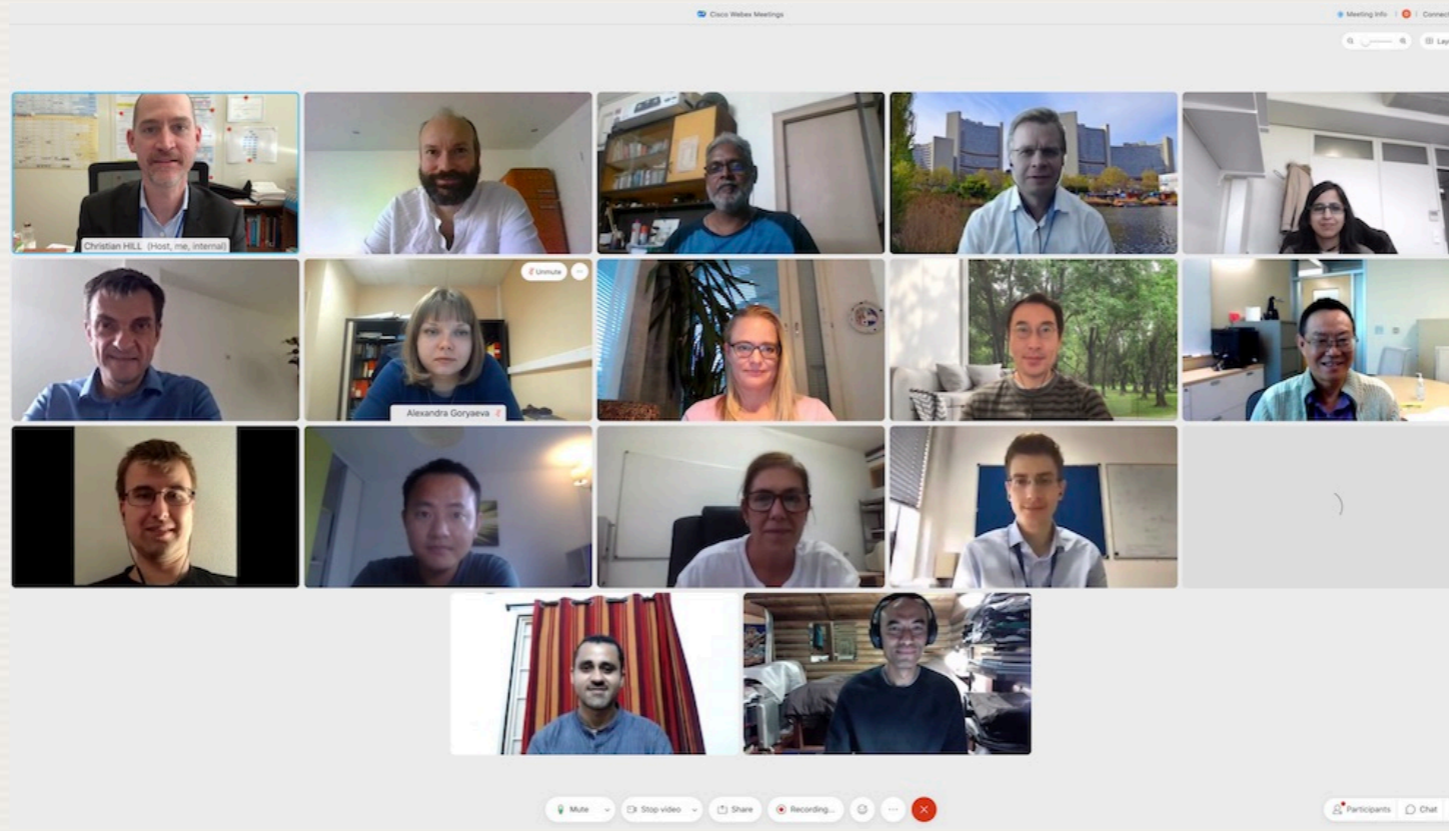
- 7th biennial meeting held (virtually) 18 – 20 October 2021
- Focus on:
  - Collisional-cascade simulations of neutron-induced damage to fusion materials: **CascadesDB**
  - DFT calculations of radiation-induced defects in nuclear materials: **DefectDB**
- Next meeting: October 2023 (TBC)



# AMD Unit: Overview of CCN activities

## Code Centres Network

- Visualization tools for CascadesDB (CSaransh)
- Data formats to facilitate machine learning on CascadesDB datasets
- Extension to datasets on high-dose radiation damage
- Interaction between CascadesDB / DefectDB and ENTENTE



# AMD Unit: Overview of CCN activities

## Other Codes

- HEAVY: excitation and CX for collisions between hydrogen and bare ions
  - Improvements by group of Raúl Barrachina at Bariloche Atomic Centre - work to clean up the code and add a web-based interface is at an early stage
- LANL Physics Codes: offline, and have been for some time. No recent update from Chris Fontes
- FLYCHK: we provide a portal to request access to an online interface to the code hosted at NIST and archive some precomputed data
- FAC: we provide a link to the code on GitHub and archive some precomputed data

# AMD Unit: Overview of GNAMPP activities

## Global Network for the Atomic and Molecular Physics of Plasmas

- 2nd biennial meeting held (virtually) 6 – 9 December 2021
- Focus on:
  - aspects of the collisional-radiative properties of tungsten and hydrogen in the edge plasma of fusion devices
  - a follow-up to the 29 March – 1 April 2021 TM
- <https://amdis.iaea.org/meetings/gnampp-2/>
- Large meeting (68 participants from 21 Member States), incl.
  - ITER, IPP Garching, KAERI, UKAEA, NIFS, NIST, FZJ, DIFFER, NNU, Fudan, IIT(ISM).



# AMD Unit: Overview of GNAMPP activities

## Global Network for the Atomic and Molecular Physics of Plasmas

- Working Groups:
  - WG1: Atomic and Molecular Data Recommendation and Validation with CR Models
  - WG2a: Plasma Experiments and Comparison Activities with CR Models: W and Hydrogen Experiments with Fusion Devices and Linear Plasma Devices
  - WG2b: Plasma Experiments and Comparison Activities with CR Models: Photon Opacity Models of Hydrogenic Atomic and Molecular Species