



# 2025 ART-GCR Annual Review International Collaborations Overview

July 2025

*Changing the World's Energy Future*

David Alan Reger



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**July 2025**

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**GAS-COOLED REACTOR**

ADVANCED REACTOR TECHNOLOGIES PROGRAM

*July 30, 2025*

# Overview of International Collaborations

**David Reger**

*ART-GCR Methods Lead*

INL/MIS-25-86096



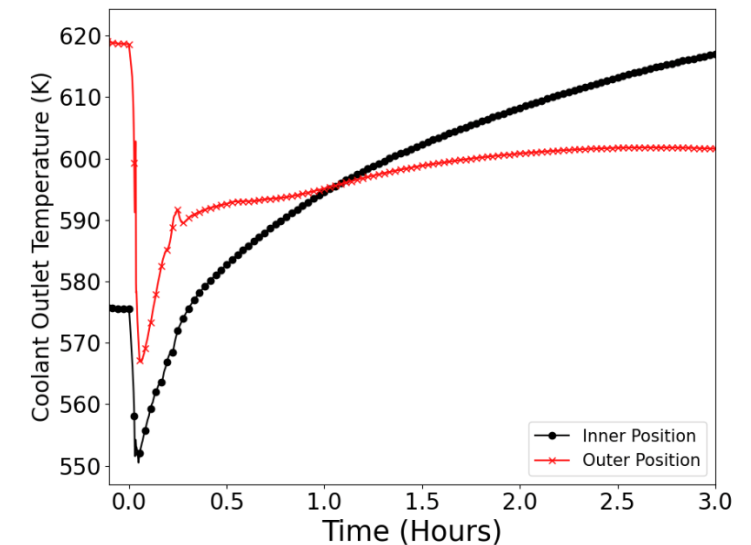
**DOE ART-GCR Review Meeting**

*Annual Review Meeting*

**July 29-30, 2025**

# High Temperature Test Reactor (HTTR) Loss of Forced Cooling (LOFC)

- 30MW Gas cooled prismatic reactor capable of reaching 950C (Max.) of helium outlet temperature at 4.0MPa.
- Multiphysics simulation of LOFC tests 1,2, and 3 using NEAMS tools (Pronghorn, Griffin, etc.)





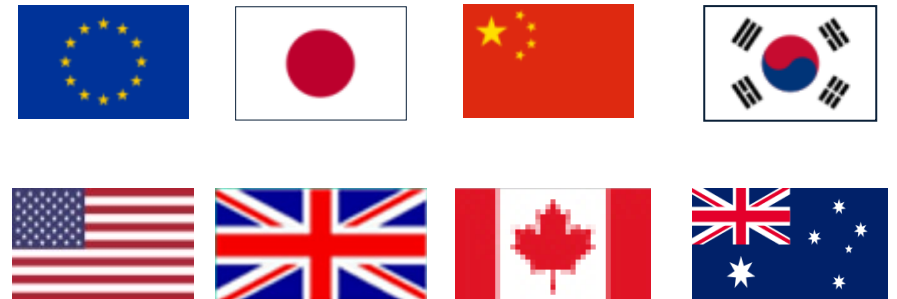
# Civil Nuclear Energy Research and Development Working Group (CNWG)

- From January to March, 2010, the JAEA ramped the reactor power of HTTR from zero to full power and back over 1800 hours.
- Tritium measurements, fluid temperatures, and control rod positions were measured
- NEAMS tools and MELCOR will be used to simulate HTTR and the compare with measured values



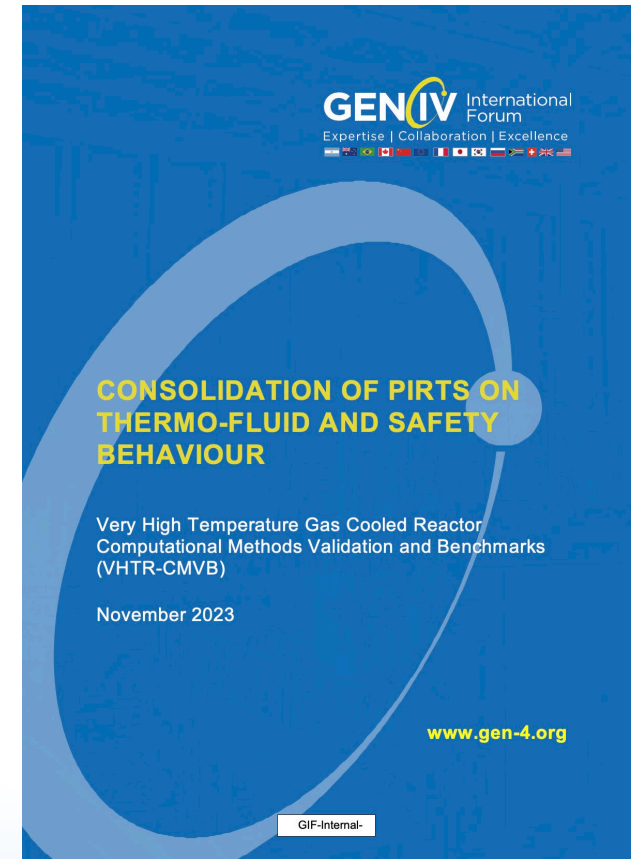
# Gen-IV Forum VHTR Computational Methods, Validation, and Benchmarking (CMVB)

- 5 work packages
  - PIRT
  - CFD
  - Reactor Physics
  - Chemistry and Transport
  - Plant Dynamics
- 8 participating countries
  - EU, JP, CN, KR, US, UK, CA, AU



# GIF VHTR CMVB – Work Package 1

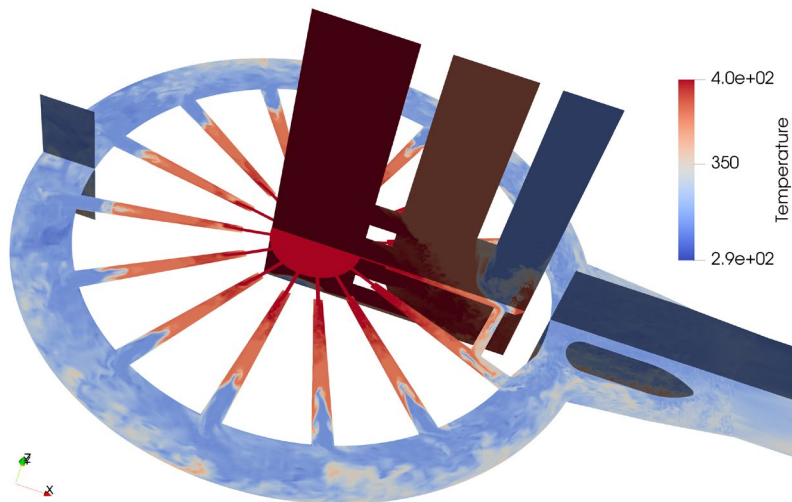
- Consolidate knowledge about important phenomena in HTGRs, identify poorly understood phenomena
- Development of a Phenomena Identification and Ranking Table (PIRT) for thermal fluid and core safety phenomena in HTGRs



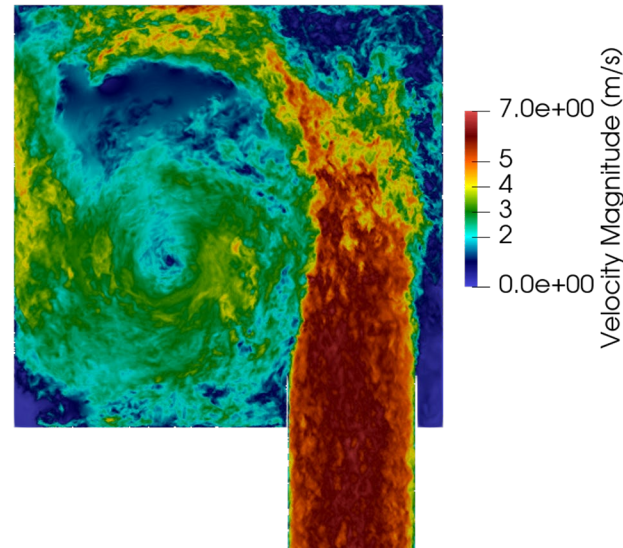
# GIF VHTR CMVB – Work Package 2

- Focuses on validation and benchmarking of CFD tools for several VHTR phenomena

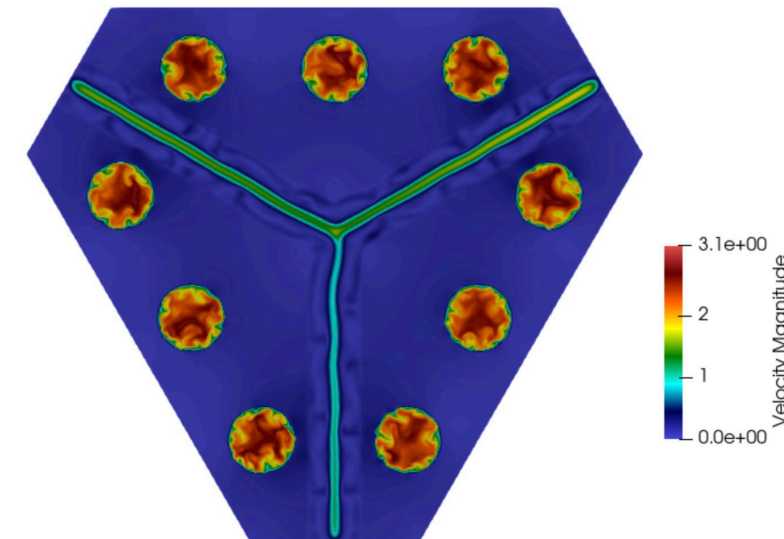
Lower plenum mixing  
INET



RCCS Performance  
University of Wisconsin - Madison



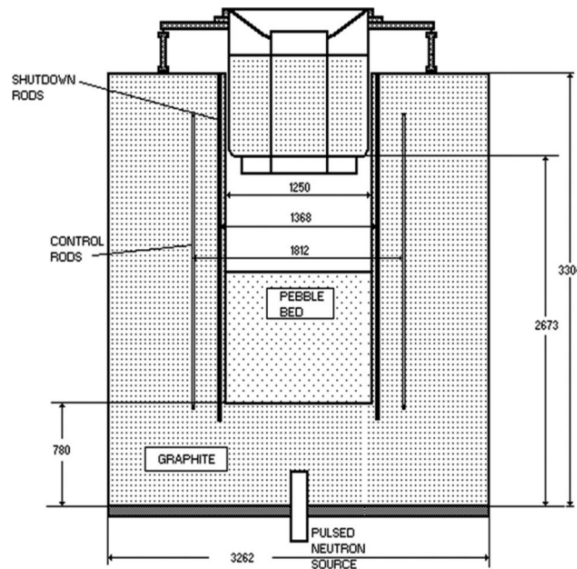
Core Bypass Flow  
INL and KAERI



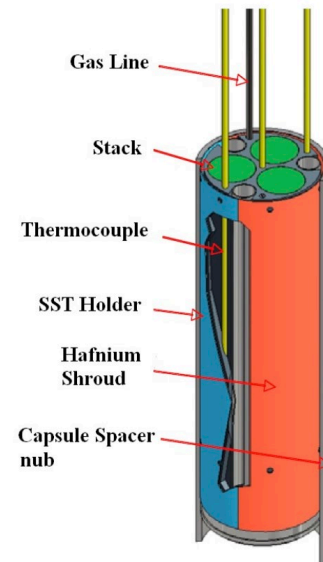
# GIF VHTR CMVB – Work Package 3

- Focused on validation and benchmarking of reactor physics tools

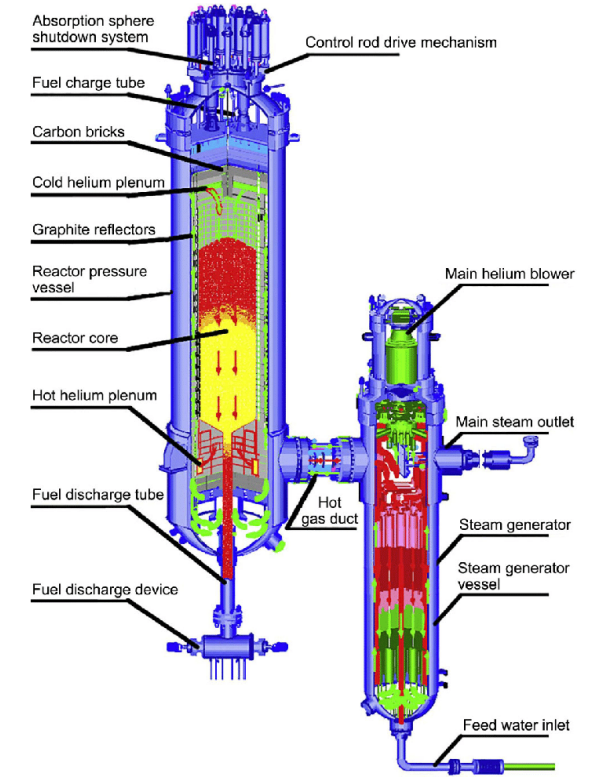
HTR-Proteus  
Paul Scherrer Institute



AGR-1 and 2  
INL



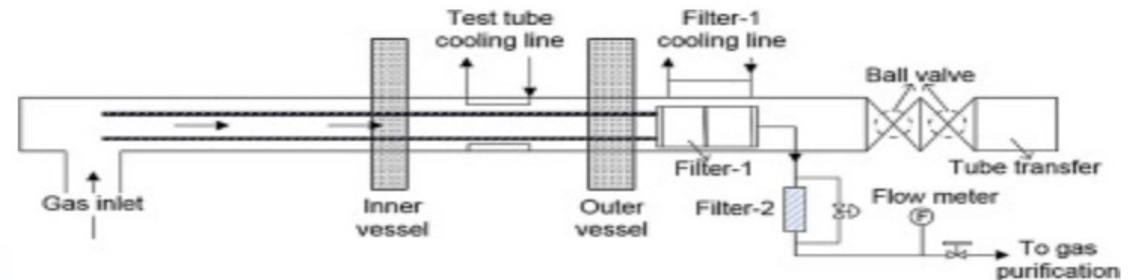
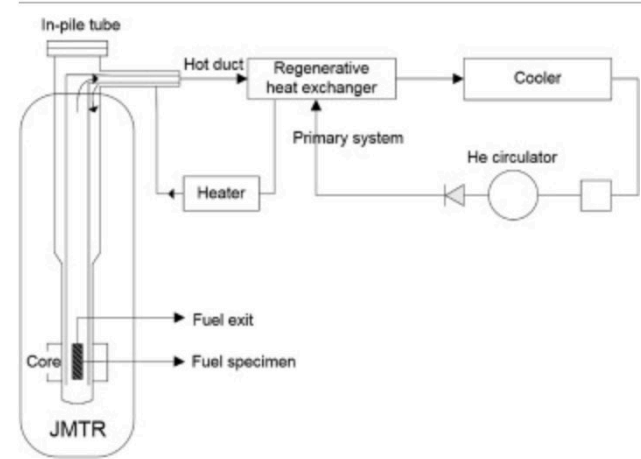
HTR-PM First Criticality  
INET



# GIF VHTR CMVB – Work Package 4

- Identify the chemistry and transport scenarios of important radionuclides
- Dust transport and plate out, tritium transport, C-14 transport
- HTR-10, OGL-1, VAMPYR-1 facilities

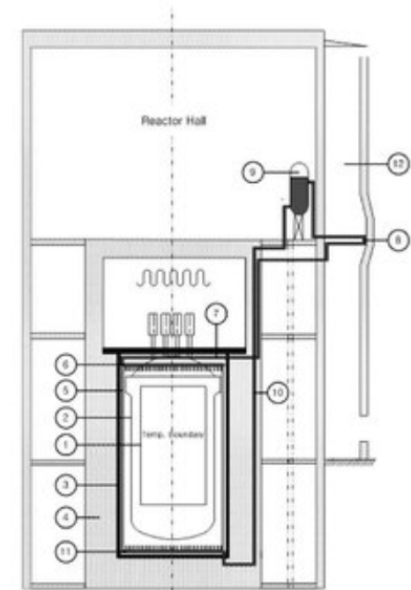
OGL-1 experiment



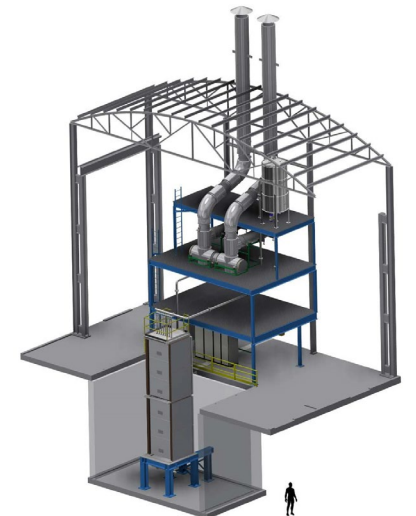
VAMPYR-I experiment

# GIF VHTR CMVB – Work Package 5

- Perform validation and benchmarking of system-level models
- Data from HTR-10, HTTF, NSTF, and other large-scale facilities
- Code-to-code benchmarking with participating countries



HTR-10 RCCS



NSTF test facility



# Thank you!

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