

Phase Field Approach for Irradiated Alloys for Nuclear Applications

Four-day scientific training at CEA Saclay, France | 8-11 September 2026

DATE	LOCATION	PARTICIPANTS
8-11 September 2026	CEA Saclay - LA2M Laboratory, France	NCBJ/NOMATEN, CEA and VTT

As part of the activities of the NOMATEN project, CEA is organizing a four-day scientific training workshop at CEA Saclay in collaboration with NCBJ and VTT. The training is dedicated to the Phase Field approach for modelling microstructural evolution in irradiated alloys for nuclear applications and will bring together participants from the NOMATEN partner institutions for an intensive programme of lectures, tutorials and scientific discussion.

The workshop will focus on the Phase Field (PF) method, which is widely used to predict and model the evolution of material microstructures at and far from equilibrium. The training will introduce the principles behind the method and show how irradiation effects can be incorporated into multi-scale modelling approaches. Participants will also explore how PF simulations can support the interpretation of experimental observations of irradiated materials.

Training led by CEA experts

The scientific programme will be delivered by **David Simeone** and **Ludovic Luneville**, CEA experts in materials physics and numerical analysis who developed the MIC-PF code and have taught the subject at Orsay University. **Olivier Tissot** will contribute expertise linking Phase Field simulations with advanced experimental characterization, including diffraction and Atom Probe Tomography measurements.

Four-day programme

DAY	FOCUS
Day 1	Introduction to the formalism of Phase Field methods through macroscopic fluctuation theory including their main applications, benefits and limitations.
Day 2	Phase Field modelling of spinodal decomposition, nucleation and growth, combining lectures with a practical tutorial exercise.
Day 3	Introduction of irradiation damage into Phase Field methods and presentation of the MIC-PF code, followed by hands-on tutorials.
Day 4	Use of MIC-PF simulations to analyse experimental measurements obtained by Atom Probe Tomography (APT), transmission electron microscopy (TEM) and small-angle diffraction techniques.

From simulation to experiment

A key objective of the training is to connect modelling with experimental characterization. Participants will work with CEA computing resources during the tutorials and will examine how the MIC-PF approach can be used to understand microstructures generated under thermal processes and irradiation. The programme is designed for researchers working with numerical modelling as well as experimental techniques such as X-ray diffraction, grazing-incidence XRD and TEM.

Strengthening collaboration within NOMATEN

The September workshop will bring together researchers from NCBJ/NOMATEN, CEA and VTT, creating an opportunity to exchange expertise in computational materials science, irradiation effects and advanced characterization. Beyond the technical training, the event will support knowledge transfer between the NOMATEN partners and strengthen collaboration around the modelling and understanding of materials for demanding nuclear environments.

NOMATEN Centre of Excellence

The banner features a dark blue header with the NOMATEN logo and workshop title. Below this, a white section contains event details: dates (8-11 September 2026), location (CEA Saclay LA2M Laboratory, France), and four activity icons: expert lectures, hands-on tutorials, MIC-PF code, and a transition from simulations to experiments. The right side of the banner shows a 3D visualization of a material microstructure with a color gradient from blue to red, labeled 'MODELLING IRRADIATED MATERIALS'. The bottom of the banner is dark blue, displaying logos for NCBJ, VTT, and CEA, along with the text 'Participants from NCBJ, VTT and CEA' and the CEA slogan 'Science for a safer tomorrow'.

NOMATEN
Centre of Excellence in Multifunctional Materials
for Industrial and Medical Applications

SCIENTIFIC TRAINING
WORKSHOP

cea **SACLAY**
FROM RESEARCH TO A SUSTAINABLE FUTURE

Phase Field Approach for Irradiated Alloys for Nuclear Applications

8-11
September 2026

CEA Saclay
LA2M Laboratory
France

Expert lectures

Hands-on
tutorials

MIC-PF code

From simulations
to experiments

MODELLING
IRRADIATED
MATERIALS

Participants from
NCBJ, VTT and CEA

NCBJ **VTT** **cea**

*Science
for a safer
tomorrow*