

## Aushang

### Institut für Neutronenphysik und Reaktortechnik

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### Einladung zum Seminar über „Nukleare Energieerzeugung“

**Zeit:** Montag, 2. Juni 2025, 11:00 Uhr

**Ort:** Karlsruher Institut für Technologie, Hermann-von-Helmholtz-Platz 1  
76344 Eggenstein-Leopoldshafen, INR, Bau 521, Raum 302

**Referent:** Frau Zaira Jiménez Balbuena, Karlsruher Institut für Technologie, INR

**Titel:** Extensions of ASTEC for Severe accident analysis of WC-SMRs

#### Abstract:

FeCrAl alloys of nuclear grade, composed of iron, chromium, and aluminum, are a type of Accident-Tolerant Fuel (ATF) technology currently being studied for their potential to enhance safety at Nuclear Power Plants (NPPs). Promising technologies because their application in nuclear reactors would offer improved performance during normal operation, transient conditions, and accident scenarios. Based on that, it is crucial to understand the oxidation process of FeCrAl alloy claddings and to develop a mathematical model that analytically represents this process based on the primary physical mechanisms involved. Depending on the temperature range, the model presented here calculates the mass gain rate according to a parabolic law and applies different oxidation kinetic coefficients, allowing the prediction of material behavior in a steam environment. The complex transition between stable aluminum oxidation and the catastrophic oxidation of iron in FeCrAl alloys presents a challenge. It limits the applicability of the model up to the melting temperature.

The model is implemented in the Accident Source Term Evaluation Code (ASTEC), an integral code used to evaluate severe accidents. The goal is to enhance the code and allow users to simulate ATFs. Until now, the code has been suitable for estimating parameters such as oxygen mass gain, oxide layer thickness, and hydrogen production in advance, which is a critical factor in predicting and preventing accidents. The development and validation of the model are made possible by experiments conducted by the QUENCH team at the Karlsruhe Institute of Technology.

**Hinweis:** Alle auswärtigen Besucher des Seminars werden gebeten, ihren gültigen Personalausweis oder Reisepass mitzubringen