



# The FP7 HPMC project:

## High-Performance Monte Carlo Reactor Core Calculations



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### Aim of the project

Developing and demonstrating

- **full-core** Monte Carlo calculations
- for safety analysis with
  - \* thermal-hydraulic feedback
  - \* time dependence
  - \* burnup
- using high performance computing

### Motivation

From the SNETP **Strategic Research Agenda**:  
"... 3D deterministic calculation scheme will be used after validation on reference Monte-Carlo calculations" (SRA, p. 50)

"Time dependent Monte Carlo methods taking into consideration thermal hydraulic feedback should be developed on the long term to provide reference solutions for time dependent deterministic calculations" (SRA, p. 70).

### Participants

- **KIT**, Germany  
Victor Sanchez, **Coordinator**  
Anton Travleev
- **DNC**, The Netherlands  
Eduard Hoogenboom, **Secretary**
- **VTT**, Finland  
Jaakko Leppänen
- **KTH**, Sweden  
Jan Dufek

### Project duration

- 3 years
- started October 1, 2011

### Budget

- total budget k€ 820
- EC subsidy k€ 551

### Work packages

- WP1: Optimum thermal-hydraulics coupling
- WP2: Optimum burnup integration
- WP3: Time dependent Monte Carlo
- WP4: Integration of high performance parallel computing
- WP5: Dissemination and training
- WP6: Management

### Computer codes

The following **Monte Carlo codes** will be extended and improved to meet the project aims

- MCNP (LANL)
- SERPENT (VTT)

**Thermal-hydraulics codes** to be coupled

- SubChanFlow (KIT)
- FLICA (CEA)
- PORFLO (VTT)

### Final results

The project will provide general tools for

- **full-core** Monte Carlo reference calculations
- including dynamics with TH feedback
- validation of deterministic safety calculations
- applicable to different reactor types

