

MAY 13-19, 2018, LUCCA, ITALY

# BEPU 2018



BEST ESTIMATE PLUS UNCERTAINTY INTERNATIONAL CONFERENCE

[www.nineeng.com/bepu](http://www.nineeng.com/bepu)

## CALL FOR PAPERS

### IMPORTANT DATES

**Abstract Submission: July 24, 2017**

**Abstract Acceptance: August 28, 2017**

**Draft Papers Submission: November 17, 2017**

**End of Review-1: January 12, 2018**

**Final Papers Submission: February 28, 2018**

**End of Review-2: March 31, 2018**

**Camera Ready: April 30, 2018**

The proceeding materials will be distributed in a flash drive. The **abstract** shall be about 250 to 400 words and anyway limited to one page only. The limit for BEPU-2018 **paper** submissions is 14 pages and shall be supplemented with a file size less than 10MB. Selected papers will be published in the Special issues of NED (Nuclear Engineering and Design), NT (Nuclear Technology), etc. Latest news about the conference can be found at: [www.nineeng.com/bepu](http://www.nineeng.com/bepu)

### ABOUT THE CONFERENCE

**Foreword:** The revised rule on the acceptance of emergency core cooling system performance in 1988 triggered a significant interest in the development of codes and methodologies based on best estimate and uncertainty evaluation (BEPU). Initially, the interest was focused only on loss-of-coolant accident analyses and has nowadays moved to include other accident scenarios and disciplines other than thermal-hydraulics. Starting from the list of requirements developed by USNRC and constituted by the CSAU (code scaling, applicability, and uncertainty evaluation) methodology, several BEPU methods were developed and applied around the world. Although 30 years have passed since the approval of the ECCS revised rule, and the numerous efforts made by different organizations, the BEPU methodologies still suffer to not be fully systematic and capable to deal with multi-physics and multi-scale issues.

**Objective:** The objective of the Conference is to provide a forum to exchange experience and views among professionals in the nuclear industry, specifically in development and use of Best Estimate Plus Uncertainty (BEPU) methods in safety analyses and design of nuclear installations. The Conference will address a broader spectrum of methods (in respect to the past when the focus was primarily on thermal-hydraulic system codes) and also include reactor physics, fuel performance, severe accidents, fission product transport and chemistry, dispersion, etc. Generally speaking the multi-physics of the problems will be addressed, as well the numerics and computational platforms including distributed computing. The BEPU 2018 will include also CFD codes, simulators and problems of modeling I&C in systems safety analyses. Another issue which will be addressed is the problem of the verification and validation of methods and of the supporting experimental programs. The Conference will consider applications mainly to Light Water Reactors including Small Modular Reactors, even though the liquid metal cooled, gas cooled, molten salt (cooled and homogeneous reactors) and other types that are in development will be included as well as the research reactors.

**Expected Outcome:** The expected outcome of the Conference is an overview of state of the art of BEPU methods. The Conference shall identify problems related to development of BEPU methods, provide insights into use of BEPU in licensing, design and safety evaluation, highlight issues related verification and validation including supporting experimental programme and fidelity of experimental measurements and identify related needs of the stakeholders. We also expect some practical views and guidance on the future of BEPU methods.

**Structure of the conference:** The Conference is organized in Plenary Sessions, Regular Sessions, and Panel Discussions Sessions to promote intensive interactions among all conference participants. Also poster and student sessions are envisaged.

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## BEST ESTIMATE PLUS UNCERTAINTY INTERNATIONAL CONFERENCE

### TOPICS AND SESSIONS

#### PLENARY SESSIONS

- BEPU Methodologies: Technical, Licensing, and Regulatory Requirements
- BEPU Methodologies and V&V Process
- BEPU in Thermal-Hydraulics: Current issues, Challenges and Future Perspectives
- BEPU in Reactor Physics: Current issues, Challenges and Future Perspectives
- BEPU in Fuel Behavior Analysis: Current issues, Challenges and Future Perspectives
- Multi-physics and Multi-scale Simulation Tools: are the “Traditional” BEPU Methodologies enough?

#### PANEL DISCUSSION SESSIONS

- Are Best Estimate Methodologies also Best-Efforts?
- Methodologies for Uncertainty Evaluation of BE Results: Advantages and Disadvantages
- Role of I&C in BEPU Simulations
- Interrelations between Thermal-hydraulics, Reactor Physics and Fuel Behavior modelling in BEPU methodology
- International Program Findings and Recommendations
- Methodologies for Uncertainty Quantification in Non-Nuclear Disciplines

#### CONFERENCE SESSIONS (Including Student and Poster Sessions)

##### A. BEPU METHODOLOGY: TECHNICAL AND REGULATORY REQUIREMENTS

- A1. Licensing and Regulatory Requirements for BEPU
- A2. V&V and BEPU
- A3. Scaling Issue and BEPU
- A4. Experimental Measurement Uncertainties and BEPU

##### B. UNCERTAINTY METHODOLOGY DEVELOPMENTS

- B1. Statistical Methods
- B2. Bayesian Methods
- B3. Hybrid Methods

##### C. BEPU FOR MULTIPHYSICS (MP) APPLICATIONS

- C1. Thermal-Hydraulics (and I&C simulators) and Reactor Physics
- C2. Reactor Physics and Fuel Performance
- C3. Thermal-Hydraulics, Reactor Physics and Fuel Performance
- C4. BEPU and Distributed Computing for MP
- C5. Role of CFD and of Structural Mechanics for MP BEPU
- C6. BEPU Challenges for MP Applications and Numerical Issues
- C7. Best-Estimate for Design Extension Condition (DEC) including Severe Accidents and Uncertainty Evaluation

##### D. BEPU APPLICATIONS IN SAFETY ANALYSIS AND LICENSING FRAMEWORK

- D1. Light Water Reactor (PWR, WWER and BWR)
- D2. Heavy Water Reactors (CANDU, PHWR)
- D3. Small Modular Reactors

##### E. OTHER BEPU APPLICATION RESULTS

- E1. BEPU Methods & Results for Passive System Applications
- E2. BEPU Methods & Results for GEN-IV & Other New Designs
- E3. BEPU Methods and Results for Design Extension Conditions
- E4. BEPU Methods & Results for Research Reactor
- E5. BEPU Methods & Results for Simulator Applications

##### F. RECOMMENDATIONS AND FINDINGS FOR DEVELOPING FUTURE BEPU METHODOLOGIES

- F1. International Program Findings and Recommendations
- F2. Methodologies for Uncertainty Quantification in Non-Nuclear Disciplines
- F3. Requirements for BEPU from Multi-physics and Multi-scale Simulation Tools

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