

# Greetings from the Serpent developer team

9th International Serpent UGM

Atlanta, GA, USA, Oct. 14–17, 2019

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Serpent is a continuous-energy Monte Carlo neutron and photon transport code, developed at VTT since 2004. Development is currently divided into three focus areas:

### **Traditional reactor physics:**

- ▶ Built-in depletion solver and routines for automated group constant generation
- ▶ Production of cross sections for reduced-order codes (DYN3D, PARCS, Apros, Ants, ...)
- ▶ Research reactor modeling, criticality safety, fuel cycle studies, ...

### **Coupled multi-physics applications:**

- ▶ Multi-physics interface for passing data between different physics solvers
- ▶ Coupling to CFD, thermal hydraulics and fuel performance codes

### **Radiation transport:**

- ▶ New applications in fusion research, radiation shielding, etc.
- ▶ Advanced geometry types (CAD, mesh), variance reduction capabilities, etc. under development

Serpent development:

- ▶ Jaakko Leppänen
- ▶ Ville Valtavirta
- ▶ Riku Tuominen
- ▶ Toni Kaltiaisenaho
- ▶ No longer at VTT: Maria Pusa, Tuomas Viitanen
- ▶ Significant contribution from the user community

Two main funding sources:

- ▶ LONKERO and RACSA projects in the SAFIR 2022 Finnish National Research Programme on Nuclear Power Plant Safety
- ▶ McSAFE project in EU Horizon 2020

## User community in numbers:<sup>1</sup>

- ▶ 962 registered users on mailing list
- ▶ 224 organizations (48% universities)
- ▶ 44 countries
- ▶ Typical user: MSc or PhD student
- ▶ 180 theses on Serpent-related topics since 2007
- ▶ 810 peer-reviewed journal and conference papers since 2005

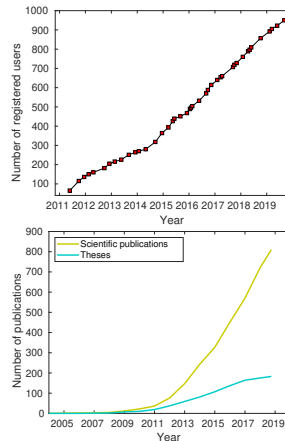
Serpent website: <http://montecarlo.vtt.fi>

Serpent discussion forum: <http://ttuki.vtt.fi/serpent>

Serpent Wiki: [serpent.vtt.fi/mediawiki/](http://serpent.vtt.fi/mediawiki/)<sup>2</sup>

<sup>1</sup> Previous UGM in Espoo (May 2018): 809 users, 201 organizations, 42 countries

<sup>2</sup> Serpent wiki has useful resources for users, including an on-line tutorial – <http://serpent.vtt.fi/mediawiki/index.php/Tutorial>





Two code versions:

- ▶ Serpent 1 – no longer supported
- ▶ Serpent 2 – “beta version”, current update 2.1.31 (May 2019)

Public distribution:

- ▶ Serpent 1 distributed by OECD/NEA Data Bank and RSICC
- ▶ Serpent 2 distributed with a separate SLA for registered users of Serpent 1
- ▶ Standard SLA covers non-commercial research and educational use
- ▶ Updates distributed by ShareFile link

Commercial SLA:

- ▶ Revokes limitations on non-commercial use
- ▶ All commercial SLA's expire by the end of 2019

New base version 2.2.0 is scheduled to be released in early 2020:

- ▶ Single-user licenses for both RSICC and OECD/NEA
- ▶ Distribution to non-member countries by NEA/IAEA agreement
- ▶ Updates by user-specific ShareFile account (?)
- ▶ Update 2.1.32 will be the same as 2.2.0 (?), but the support for the beta version (2.1.x) will end

Commercial use:

- ▶ Commercial SLA being drafted by our legal team
- ▶ Project-based licensing
- ▶ License fee based on the length of the contract and number of users

### Previous International Serpent User Group Meetings:

- 2011** Dresden, Germany – 2 days, 33 participants, 16 presentations
- 2012** Madrid, Spain – 3 days, 40 participants, 20 presentations
- 2013** Berkeley, USA – 3 days, 35 participants, 24 presentations
- 2014** Cambridge, UK – 3 days, 34 participants, 24 presentations
- 2015** Knoxville, USA – 3 + 1 days, 41 participants, 28 presentations
- 2016** Milan, Italy – 3 + 1 days, 40 participants, 26 presentations
- 2017** Gainesville, USA – 3 + 1 days, 28 participants, 28 presentations
- 2018** Espoo, Finland – 3 + 1 days, 39 participants, 26 presentations

### This meeting:

- ▶ 3 + 1 days, 35 participants, 25 technical presentations
- ▶ ~ 30 minutes reserved for presentation, questions and discussion, but the schedule is flexible
- ▶ Presentations collected at a website after the meeting (send pdf to [Jaakko.Leppanen@vtt.fi](mailto:Jaakko.Leppanen@vtt.fi))



Group photos from previous International Serpent User Group Meetings: Dresden, 2011; Madrid, 2012; Berkeley, 2013; Cambridge, 2014; Knoxville, 2015; Milan, 2016; Gainesville, 2017; Espoo, 2018.

Group photo for this meeting is tomorrow before the lunch break.

**Enjoy the 9th International Serpent User Group Meeting!**

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<http://montecarlo.vtt.fi>