



Dr. Roger Käppeli

Education

- November 2011 **Ph.D. in Theoretical Physics**, *Universität Basel*, Basel, 6.0 out of 6.0 (Summa Cum Laude).
PhD thesis: *Numerical Methods for 3D Magneto-Rotational Core-Collapse Supernova Simulation with Jet Formation*
Supervisors: Prof. M. Liebendörfer, Prof. F.-K. Thielemann
External expert: Prof. S. Mishra
- January 2008 **M.Sc. in Physics**, *Universität Basel*, Basel, 6.0 out of 6.0 (Summa Cum Laude).
Master thesis: *3D Hydrodynamics with Adaptive Mesh for Supernova Models*
Supervision: Prof. M. Liebendörfer
Master exam: *Computational Astrophysics and Computational Physics*
Examiners: Prof. M. Liebendörfer, Prof. S. Goedecker
- Fall 2005 **B.Sc. in Physics**, *Universität Basel*, Basel, 5.6 out of 6.0.
- July 2002 **Baccalauréat**, *Lycée cantonal de Porrentruy*, Porrentruy.
Matura type C, scope: sciences

Employment

- June 2020 - **Senior Scientist**, *Seminar für Angewandte Mathematik*, ETH, Zürich.
- May - October 2019 **Visiting Scientist**, *Flash Center for Computational Science, Department of Astronomy and Astrophysics*, University of Chicago, Chicago, USA.
- January 2016 - **Senior Assistant**, *Seminar für Angewandte Mathematik*, ETH, Zürich.
May 2020
- January 2012 - **Postdoc**, *Seminar für Angewandte Mathematik*, ETH, Zürich.
December 2015
- December 2011 **Postdoc**, *Departement Physik*, Universität Basel, Basel.

Languages

German	Excellent	<i>Native</i>
French	Excellent	<i>Matura in French</i>
English	Fluent	

Computing Skills

- Programming languages FORTRAN, C and C++
- Parallel programming OpenMP (shared memory)
Message Passing Interface (MPI) (distributed memory)
Coarray Fortran (Partitioned Global Address Space language)
- Accelerator programming NVIDIA CUDA, OpenACC
- Parallel I/O MPI-IO, HDF5
- Scripting languages Python, Matlab, Octave, Scilab, Bash, Perl

Visualization Matplotlib, ParaView, VisIt, VTK
Cluster Operating System (Linux)
administration Cluster Configuration and Application Deployment (Rocks Cluster Distribution)
Scheduler (Sun Grid Engine, TORQUE, SLURM)

Teaching experience

I have taught several large university level courses and supervised BSc and MSc theses. For more information see <http://www.sam.math.ethz.ch/~karoger/teaching.html>.

Research interests

- **Computational astrophysics** (Core-Collapse Supernovae, Neutron Star Merger, Multidimensional Stellar Evolution, Exoplanets Climate)
- **Numerical methods** (FV/FD/DG Methods for (Magneto-) Hydrodynamics and Computational Electrodynamics, Well-Balancing, Structure Preservation)
- **High Performance Computing** (Shared/Distributed Memory Parallelization, GPGPU, Hybrid Parallelization)

Funding record

- Swiss NSF grant, 177K CHF, Number 169631, 01.02.2017 - 31.01.2020, Co-applicant with Prof. S. Mishra

High Performance Computing and CPU time allocations

I have co-developed a parallel radiation-magnetohydrodynamics code for astrophysical applications such as the core-collapse of massive stars and binary neutron star mergers. The code featured a novel hybrid MPI/OpenMP parallelization scaling to $> 10^4$ cores.

I am a (principal and co-) investigator on a number of projects at the Swiss National Supercomputing Centre (CSCS) having been granted a total of \sim **97.61 million CPU-hours** since 2008.

Publications and Talks

21 published/accepted refereed publications; 34 talks at international conferences and invited colloquia. For a detailed list see <http://www.sam.math.ethz.ch/~karoger/research.html>.