



# 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	Native
French	Excellent	Matura in French
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 (Project funding scheme), 177K CHF, Number 169631, 01.02.2017 - 31.01.2020, Co-applicant with Prof. S. Mishra
- Swiss NSF grant (Weave/Lead Agency funding scheme), 349K CHF, Number 10001228, 01.06.2014 - 31.05.2027, together with Prof. D. Balsara (University of Notre Dame du Lac, IN, USA) and Prof. C.-W. Shu (Brown University, RI, USA).

## 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

25 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>.