Curriculum Vitae

Dr. rer. nat. Erik Schnetter

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Biographical Data

Birth date: August 7, 1970
Birth place: Letmathe, Germany
Citizenship: Germany
Languages: German (native), English, basic French and Spanish

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Education

Universität Tübingen, Germany	Physics	Diplom 1998
Penn State University, USA	Physics	
Universität Tübingen, Germany	Physics and Mathematics	PhD 2003

Employments and Affiliations

Albert–Einstein–Institut, Germany	Postdoc	2003 – 2005
Louisiana State University, Center for Computation & Technology	Research Staff	2005 – 2008
Louisiana State University, Department of Physics & Astronomy	Assistant Research Professor	2008 – 2012
Louisiana State University, Center for Computation & Technology	Assistant Research Professor	2008 – 2012
Perimeter Institute for Theoretical Physics	Research Technologies Group Lead	since 2010
University of Guelph, Department of Physics	Adjunct Faculty	since 2011
Louisiana State University, Center for Computation & Technology	Adjunct Assistant Professor	since 2012

Scientific Interests

- Computational science, in particular computational physics in general, the interdisciplinary area between physics and computer science
- High-Performance Computing (HPC), both at the high end where non-traditional system architectures need to be exploited ("exascale"), as well as at the low-end where non-trivial distributed computing needs to be made accessible to a much larger set of users
- Numerical analysis, improved discretization methods, automated code generation, and novel methods to efficiently solve large systems of Partial Differential Equations (PDEs)
- Computational Relativistic Astrophysics, involving e.g. black holes, neutron stars, or core-collapse supernovae, and the observable radiation they emit
- Tools and platforms enabling large-scale and remote scientific collaboration, including tools to ensure repeatability and verifiability of computational results

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Key Scientific Achievements

- Developed an adaptive mesh refinement infrastructure *Carpet* which is now used by many numerical relativity groups world-wide for black hole, neutron star, and stellar core collapse simulations
- Examined the collapse of rotating neutron stars and stellar iron cores in 3D, including the first calculations of the gravitational waveforms of such systems
- Introduced Isolated and Dynamical Horizons to the numerical relativity community, including a novel method to calculate the spin of rotating black holes in a coordinate independent and highly accurate manner

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Current Grants

Principal investigator on the NSF PetaApps grant *PetaCactus: Unraveling the Supernova – Gamma-Ray Burst Mystery*. PetaCactus researches the collapsar Gamma-Ray Burst model, including implementing new microphysics (2009-2015, USD 1.4M).

Principal investigator on the NSERC Discovery grant *Compact Object Studies in Computational Relativistic Astrophysics via Discontinuous Galerkin Finite Element Methods*. This grant allows me to develop novel, efficient implementations for modern numerical methods suitable for petascale computing architectures. I expect these to have applications in relativistic astrophysics and beyond (2012-2017, CAD 125k).

Co-principal investigator on the NSF PIF grant *The Einstein Toolkit – An Open-Source General Relativistic Multi-Physics Infrastructure for Relativistic Astrophysics* (2012-2015, USD 490k in total, USD 160k at LSU).

Synergistic Activities

I am employed as Research Technologies Group Lead at the Perimeter Institute. I provide expertise on numerical and computational methods to other researchers at Perimeter, and act as liaison between researchers and the IT department.

I am the original author and the project lead of *Carpet*, an adaptive mesh refinement (AMR) and multi-block driver for Cactus. Carpet is prominently used by several major numerical relativity groups, and also by many smaller sites. To date (September 2014), Carpet was used in more than 90 publications and in more than 15 student theses.

I am a founding member and one of the maintainers of the *Einstein Toolkit*, a collection of software components and tools for simulating and analysing general relativistic astrophysical systems. The Einstein Toolkit is available as open source and provides well-tested software implementing high-quality methods that are used by many numerical relativity groups as basis for their research.

I am member of the winning team of the Second IEEE International Scalable Computing Challenge (SCALE 2009), Shanghai, May 2009, for *Large Scale Problem Solving Using Automatic Code Generation and Distributed Visualization.*

I have 91 publications and 2418 citations (as of September 18, 2014) as reported on ADS, which does not include computer science publications. My ADS h-index is 29.

Professional Memberships

International Society on General Relativity and Gravitation	since 2004
American Physical Society	since 2007