

# 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: English and German (native), 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

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### Employments and Affiliations

Albert–Einstein–Institut, Germany	Postdoc	2003 – 2005
Louisiana State University, Center for Computation & Technology	Research Scientist (unlimited term)	2005 – 2008
Louisiana State University, Department of Physics & Astronomy	Gratis Appointment	2007 – 2008
Louisiana State University, Center for Computation & Technology / Department of Physics & Astronomy	Assistant Research Professor	since 2008

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### Scientific Interests

- Efficient computational infrastructure for petascale computing, including adaptive mesh refinement and multi-block methods
- Numerical methods for solving partial differential equations, including higher order methods, mimetic discretisations, and automated code generation for such systems
- Application-level (high-level) tools for correctness and performance analysis for numerical simulations
- Software frameworks for high performance computing, enabling distributed development and remote collaboration
- (Long-soft) Gamma Ray Bursts in astrophysics, in particular the collapsar model, including general relativistic magneto-hydrodynamics, realistic equations of state, and radiative transport processes



## Key Scientific Achievements

- Developed an efficient adaptive mesh refinement and multi-block infrastructure, which is now used by many relativistic astrophysics groups for black hole and neutron star simulations in to date (January 2009) 46 refereed publications and 12 student theses
- 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
- Examined the collapse of rotating neutron stars and stellar iron cores in 3D, including the first calculations of the gravitational waveforms of such systems

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## Current Grants

Principal investigator on the NSF grant *SDCI HPC Improvement: Cactus Tools for Application Level Performance and Correctness Analysis (Alpaca)*. Alpaca researches and develops high-level debugging and profiling tools for large-scale parallel scientific applications (3 years, \$590k).

Co-principal investigator on the NSF PIF grant *Collaborative Research: XiRel, a Next Generation Infrastructure for Numerical Relativity*. XiRel is a collaboration spanning three sites in the US to research and improve adaptive mesh refinement infrastructure and cyberinfrastructure technologies in the numerical relativity community (3 years, in total \$360k).

Co-principal investigator on the NASA STTR grant *Interfacing the Paramesh Computational Libraries to the Cactus Computational Framework (ParCa)*. ParCa is a collaboration spanning four sites in the US, including the company Decisive Analytics Corporation, to improve mesh refinement capabilities in Cactus and to create a general relativistic magneto-hydrodynamics code (2 years, \$210k at LSU).

Senior investigator in the Blue Waters project, which will provide a computational system capable of sustained petaflop performance, going online in 2011.

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## Synergistic Activities

I am employed as assistant research professor at the Center for Computation & Technology (CCT) at LSU to research and develop computational infrastructure for a range of inter-disciplinary projects as software architect of the *Cactus* project, and to perform research in numerical relativity as senior member of the LSU numerical relativity group. I am also an assistant research professor at LSU's Department of Physics & Astronomy.

I participate in the NSF EPSCoR project *Elevating Louisiana's Future Research and Development Enterprise* in the CyberTools work package "Application Services and Toolkits", which supports development of codes for all science drivers in this project. Science drivers include modelling biosensor development and bio-/environmental transport processes.

I am the original author and the project leader of *Carpet*, the adaptive mesh refinement and multi-block driver for Cactus. Carpet is prominently used by collaboration partners and by two competing major numerical relativity groups, and also at a number of smaller sites.

I participate in the highly successful AEI–CCT Binary Black Hole collaboration, which has laid the foundations for many of the recent breakthroughs in simulation black holes, and which is one of the currently leading binary black hole physics groups.

I have organized several workshops and tutorials for numerical relativity, performance optimisation, visualisation, and for Carpet and Cactus. I gave a series of lectures on numerical relativity at the 2007 KISTI numerical relativity summer school in Pohang, South Korea.

I have contributed to and was senior investigator on multiple track 2 proposals answering the NSF call *High Performance Computing System Acquisition: Towards a Petascale Computing Environment for Science and Engineering*, for more than \$70M each.

My publication *A multi-block infrastructure for three-dimensional time-dependent numerical relativity*, by E. Schnetter, P. Diener, E. N. Dorband, and M. Tiglio, *Class. Quantum Grav.* **23**, S553-S578 (2006) was selected as a Research Highlight of 2006 and 2007 by the Editorial Board of Classical and Quantum Gravity.

I have 50 publications and 759 citations as reported on ADS (as of January 9, 2009). My ADS *h*-index is 16.

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### Professional Memberships

International Society on General Relativity and Gravitation	since 2004
American Physical Society	since 2007
Deutsche Physikalische Gesellschaft	since 2008
IEEE Society	since 2009