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

Universitt Tbingen, Germany	Physics	Diplom 1998
Penn State University, USA	Physics	
Universitt Tbingen, Germany	Physics and Mathematics	PhD 2003

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

Scientific Interests

- Binary Black Hole systems and the gravitational radiation they create, in particular as will be detected by LIGO, GEO600, and LISA
- Black Hole horizons, their dynamic properties, practical algorithms to measure these numerically, and their topology
- (Long-soft) Gamma Ray Bursts, in particular the collapsar model, including general relativistic magneto-hydrodynamics, realistic equations of state, and radiative transport processes
- Numerical methods supporting the research above, including adaptive mesh refinement, multi-block methods, and mimetic discretisations
- Efficient computational infrastructure for petascale computing, also supporting the research above

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Key Scientific Achievements

- 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
- Developed an adaptive mesh refinement infrastructure *Carpet* which is now used by many numerical relativity groups 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

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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 will research and develop debugging and profiling tools for large-scale parallel scientific applications (2007-2010, $590k).

Principal investigator on the NSF PetaApps grant *PetaCactus; Unraveling the Supernova – Gamma-Ray Burst Mystery.* PetaCactus will research the collapsar Gamma-Ray Burst model, including implementing new microphysics (2009-2014, $1.4M).

Principal investigator on the NSF PRAC grant *Enabling Science at the Petascale: From Binary Systems and Stellar Core Collapse To Gamma-Ray Bursts.* This PRAC grant will improve my computational infrastructure to be able to make efficient use of petascale architectures (2009-2012, $36k).

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 (2007-2010, 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 (2008-2010, $210k at LSU).

Co-principal investigator on the NSF Track 1 grant *Leadership-Class Scientific and Engineering Computing: Breaking Through the Limits* (Blue Waters). The Blue Waters project will provide a computational system capable of sustained petaflop performance on a range of science and engineering applications (currently funded until 2010, $168k at LSU).

Co-principal investigator on the NSF PIF grant *Collaborative Research: Community Infrastructure for General Relativistic MHD (CIGR).* CIGR is a collaboration spanning three sites in the US to develop an open and extensible infrastructure for GRMHD simulations (2009-2012, $1M in total, $400k at LSU).

Synergistic Activities

I am employed as assistant research professor at the Center for Computation & Technology (CCT) at LSU to perform research in numerical relativity, and to develop numerical relativity infrastructure for *Cactus* to support our group in that research.

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

I am one of the main authors of *CCATIE*, the AEI–CCT spacetime evolution code solving the Einstein equations. CCATIE was instrumental in several of the recent advances in binary black hole simulations. CCATIE is also used as spacetime solver for the *Whisky* general relativistic hydrodynamics code.

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 at collaboration partners and by several competing major numerical relativity groups, and also at a number of smaller sites. I am also the Cactus software architect of the LSU relativity group.

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, and at the 2009 NBI computational relativistic astrophysics school in Copenhagen, Denmark.

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

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 refereed manuscripts for the Canadian Journal of Physics (CJP), Classical and Quantum Gravity (CQG), the International Journal of Modern Physics D (IJMPD), Physics Review D (PRD), and Physics Review Letters (PRL).

I have 55 publications and 1037 citations as reported on ADS (as of November 15, 2009). My ADS h-index is 19.

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