Wolfgang Tichy

Address:	Science & Engineering Building, Room 432 Physics Department Florida Atlantic University 777 Glades Road Boca Raton, FL 33431
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Appointments:

2005-date Assistant Professor of Physics
Physics Department
Florida Atlantic University
Boca Raton, FL 33431, USA

Education:

2001 Ph.D. in Physics, Cornell University,
Ithaca, NY, USA

1996 Diplom in Physik, Universität Karlsruhe,
Karlsruhe, Germany

Professional Training:

2002-2004 Postdoctoral Scientist
Center for Gravitational Physics and Geometry & Center for Gravitational Wave Physics
Penn State University
State College, USA

- Numerical Relativity:
  - Numerical simulations of black hole binaries
  - Strongly hyperbolic formulations of Einstein's equations for black hole evolutions
  - Gauge conditions for binary black hole puncture data based on an approximate helical Killing vector

2001-2002 Postdoctoral Scientist
Albert-Einstein-Institut
Golm, Germany

- Numerical Relativity:
  - Constructing initial data for black hole mergers based on post-Newtonian data

1996-2001 Graduate Research Assistant for Professor É. Flanagan
Center for Radiophysics and Space Research
Cornell University, Ithaca, NY

- Ph.D. Thesis: *Topics in general relativity: Semiclassical relativity, post-Newtonian theory and radiation reaction*:

- Gravitational waves from compact binary inspirals:
  – General orbits of test particles around a Kerr black hole with radiation reaction
  – Improving the phasing of post-Newtonian search templates
- Post-Newtonian Theory:
  – Coordinate independent formulation of post-Newtonian theory
- Ambiguity in angular momentum and angular momentum flux definitions in perturbed Kerr spacetimes
- Semiclassical Relativity:
  – Uniqueness of the stress-energy tensor of massive scalar fields

1995-1996 Research Assistant for Professor Gerd Schön,
Institute for Theoretical Solid State Physics,
Universität Karlsruhe, Karlsruhe, Germany

- Diplom Thesis: *Transport in Mesoscopic Superconductors*:
  – Investigation of ultrasmall superconducting grains with finite energy level spacing

Publications and Preprints:

W. Tichy and É. É. Flanagan, "Coordinate independent formulation of post-1-Newtonian approximation to General Relativity", in preparation

P. Marronetti, W. Tichy, B. Brügmann, J. Gonzalez, and U. Sperhake, "High-spin binary black hole mergers", submitted to Phys. Rev. D, arXiv:0709.2160 [gr-qc]

B. Brügmann, J.A. Gonzalez, M. Hannam, S. Husa, U. Sperhake and W. Tichy, "Calibration of Moving Puncture Simulations", submitted to Phys. Rev. D, gr-qc/0610128

B. J. Kelly, W. Tichy, M. Campanelli and B. F. Whiting "Black hole puncture initial data with realistic gravitational wave content", Phys. Rev. **D 74**, 024008 (2007), arXiv:0704.0628 [gr-qc]

W. Tichy and P. Marronetti, "Binary black hole mergers: large kicks for generic spin orientations", Rapid Communication in Phys. Rev. **D 76**, 061502 (2007), gr-qc/0703075

P. Marronetti, W. Tichy, B. Brügmann, J. Gonzalez, M. Hannam, S. Husa, and U. Sperhake, "Binary black holes on a budget: Simulations using workstations", Class. Quant. Grav. **24**, S43-S58 (2007), gr-qc/0701123

B. Brügmann, J. González, M. Hannam, S. Husa, P. Marronetti, U. Sperhake, W. Tichy, "Gravitational Wave Signals from Simulations of Black Hole Dynamics", contribution to the 9th Results and Review Workshop of HLRS Computing Center, Stuttgart, Germany, Oct. 13–14 2006, published in "High Performance Computing in Science and Engineering 2006", Springer, 2006.

N. Jansen, B. Brügmann and W. Tichy, "Numerical stability of the AA evolution system compared to the ADM and BSSN systems", Phys. Rev. **D 74**, 084022 (2006)

W. Tichy, "Black hole evolution with the BSSN system by pseudo-spectral methods", Phys. Rev. **D 74**, 084005 (2006), gr-qc/0609087

N. Yunes, and W. Tichy, "Improved initial data for black hole binaries by asymptotic matching of post-Newtonian and perturbed black hole solutions", Phys. Rev. **D 74**, 064013 (2006), gr-qc/0601046

N. Yunes, W. Tichy, B. J. Owen, and B. Brügmann, "Binary black hole initial data from matched asymptotic expansions", Phys. Rev. **D 74**, 104011 (2006), gr-qc/0503011.

M. Ansorg, B. Brügmann and W. Tichy, "A single-domain spectral method for black hole puncture data", Phys. Rev. **D 70**, 064011 (2004), gr-qc/0404056

B. Brügmann, W. Tichy and N. Jansen, "Numerical simulation of orbiting black holes", Phys. Rev. Lett. **92**, 211101 (2004), gr-qc/0312112

W. Tichy and B. Brügmann, "Quasi-equilibrium binary black hole sequences for puncture data derived from helical Killing vector conditions", Phys. Rev. **D 69**, 024006 (2004), gr-qc/0307027

W. Tichy, B. Brügmann and P. Laguna, "Gauge conditions for binary black hole puncture data based on an approximate helical Killing vector", Phys. Rev. **D 68**, 064008 (2003), gr-qc/0306020

W. Tichy, B. Brügmann, M. Campanelli and P. Diener, "Binary black hole initial data for numerical general relativity based on post-Newtonian data", Phys. Rev. **D 67**, 064008 (2003), gr-qc/0207011

W. Tichy and É. É. Flanagan, "Angular momentum ambiguities in asymptotically flat perturbed stationary spacetimes", Proceedings of the Ninth Marcel Grossmann Meeting on General Relativity, edited by V.G. Gurzadyan, R.T. Jantzen and R. Ruffini, World Scientific, Singapore, p. 1622, (2002)

W. Tichy and É. É. Flanagan, "Angular momentum ambiguities in asymptotically flat spacetimes which are perturbations of stationary spacetimes", Class. Quant. Grav. **18**, 3995 (2001)

W. Tichy, É. É. Flanagan and E. Poisson, "Can the post-Newtonian gravitational waveform of an inspiraling binary be improved by solving the energy balance equation numerically?", Phys. Rev. D **61**, 104015 (2000), gr-qc/9912075

W. Tichy and É. É. Flanagan, "How unique is the expected stress-energy tensor of a massive scalar field?", Phys. Rev. D **58**, 124007 (1998), gr-qc/9807015

J. von Delft, D. S. Golubev, W. Tichy and A. D. Zaikin, "Parity-Effected Superconductivity in Ultrasmall Metallic Grains", Phys. Rev. Lett. **77**, 3189-3192 (1996), cond-mat/9604072

Courses taught and developed:

- Fall 2007: Quantum Mechanics II, PHY 6646, 3 credits
- Spring 2007: Quantum Mechanics I, PHY 6645, 3 credits
- Fall 2006: Intermediate Mechanics, PHY 3221, 4 credits
- Spring 2006: Quantum Mechanics I, PHY 6645, 3 credits
- Fall 2005: Quantum Mechanics II, PHY 3221, 3 credits
- Spring 2005: Quantum Mechanics I, PHY 6645, 3 credits

Supervision of Students:

- Matthew Deluca, Spring 2005 to Fall 2005, student left FAU without finishing M.S.
- Nico Yunes at Penn State University, Fall 2004 to Spring 2006, (wrote two papers with Nico)

- Sean Goldberg, Fall 2007 to present

Invited Talks:

8/2007 "Black holes and gravitational waves"
Public Lecture
Astronomical Society of the Palm Beaches, West Palm Beach, FL

5/2007 "Binary black hole initial data with realistic gravitational wave content"
Institute for Gravitational Physics and Geometry
Penn State University, State College, PA

2/2007 "Binary black hole initial data at the interface between PN theory and numerical relativity"
NR meets 3PN: A Workshop on the Interface between Post-Newtonian Theory and Numerical Relativity
Washington University, St. Louis, MO

7/2006 "Approximate binary black hole initial data from matched asymptotic expansions"
New Frontiers in Numerical Relativity
Albert Einstein Institut, Golm, Germany

7/2006 "Constructing binary black hole initial data from approximations"
Physikalisch-Astronomische Fakultät
Friedrich-Schiller-Universität Jena, Germany

5/2006 "Binary black hole evolutions with moving punctures"
Astrophysical Applications of Numerical Relativity Workshop
Guanajuato, Mexico

3/2006 "Approximate binary black hole initial data from matched asymptotic expansions"
2nd Annual Gulf Coast Gravity Meeting
Florida Atlantic University, Boca Raton, FL

11/2005 "Simulations of orbiting black holes"
Numerical Relativity 2005: Compact Binaries
NASA Goddard Space Flight Center

7/2005 "Towards realistic binary black hole initial data"
Physikalisch-Astronomische Fakultät
Friedrich-Schiller-Universität Jena, Germany

2/2005 "On the construction of realistic initial data for binary black hole systems"
Department of Physics
Florida Atlantic University, Boca Raton, FL

11/2004 "Constructing Realistic Initial Data for Binary Black Hole Systems"
IGPG Seminar at the Institute for Gravitational Physics and Geometry
Penn State University, State College, PA

5/2004 "Binary black hole initial data and approximate helical Killing vectors"
Center for Gravitational Wave Astronomy
University of Texas at Brownsville, Brownsville, TX

11/2003 "Binary black hole initial data sequences derived from helical Killing vector conditions"
Department of Physics
University of Florida, Gainesville, FL

06/2003 "Binary black hole initial data based on post-Newtonian data"
Gravitation: A Decennial Perspective
Center for Gravitational Physics and Geometry
Penn State University, State College, PA

05/2003 "Post-Newtonian initial data for black hole collisions"
Department of Physics & Astronomy
University of Texas at Brownsville, Brownsville, TX

12/1999 "On the uniqueness of the expected stress-energy tensor of a massive scalar field"
Max-Planck-Institut für Gravitationsphysik
Albert-Einstein-Institut, Golm, Germany

Talks given at International Conferences:

07/2007 "Kicks due to mergers of spinning black holes"
GR18/Amaldi 7 conference, Sydney, Australia

04/2007 "Efficient binary black hole simulations: large kicks for generic spin orientations"
APS April Meeting, Jacksonville, FL

04/2006 "Binary Black Hole Evolutions with Moving Punctures: Progress report on final orbits and merger"
APS April Meeting, Dallas, TX

03/2006 "Approximate binary black hole initial data from matched asymptotic expansions"
Second annual Gulf Coast Gravity Meeting
Florida Atlantic University, Boca Raton, FL

04/2005 "Approximate binary black hole initial data from matched asymptotic expansions"
APS April Meeting, Tampa, FL

09/2003 "Gauge conditions for binary black hole puncture data based on an approximate helical Killing vector"
Advanced School & Conference on Gravitational Waves
ICTP, Trieste, Italy

04/2003 "Binary black hole initial data based on post-Newtonian data"
APS April Meeting, Philadelphia, PA

01/2002 "Constructing initial data for black hole inspirals based on post-Newtonian data"
Third EU Network meeting on sources of gravitational waves
Southampton University, Southampton, UK

07/2000 "General orbits of test particles around a Kerr black hole with radiation reaction"
Ninth Marcel Grossmann Meeting
University of Rome La Sapienza*, Rome, Italy*

07/2000 "General orbits of test particles around a Kerr black hole with radiation reaction"
Third International LISA Symposium
Albert-Einstein-Institut, Golm, Germany

11/1999 "Can the post-Newtonian gravitational waveform of an inspiraling binary be improved by solving the energy balance equation numerically?"
Ninth Midwest Relativity Meeting
University of Illinois, Urbana-Champaign, IL

03/1999 "Coordinate independent formulation of post-1-Newtonian general relativity"
Third Eastern Gravity Meeting
Cornell University, Ithaca, NY

03/1998 "How unique is the expected stress-energy tensor of a massive scalar field?"
Second Eastern Gravity Meeting
University of Syracuse, Syracuse, NY

Other Science related Activities:

- Co-developed and refined the BAM code for the numerical simulation of the Einstein Equations
- Developed the SGRID code to simulate the Einstein Equations using pseudo-spectral methods
- Member of the Florida Atlantic University SpaceTime (FAUST) group
- Member of the American Physical Society (APS)
- Member in the LA Grid (Latin American Grid) Research Community