

Rama R. Calaga

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PERMANENT ADDRESS

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EDUCATION

Truman State University, Kirksville, MO 63501
Bachelor of Science, May 2000
Physics and Minor in Mathematics, G.P.A. 3.30/4.0

State University of New York, Stony Brook, NY 11794
Ph.D. in Physics, May 2006 (Defended March 16, 2006)
Accelerator and Beam Physics, G.P.A. 3.67/4.0

RESEARCH

- **Crab Cavities for LHC IR Upgrade, 2006-present:** Feasibility study, design and development of crab cavities for LHC luminosity IR upgrade.
Collaborator: Dr. Rogelio Tomás & Dr. Frank Zimmermann, Accelerator Physics, CERN.
- **Magnetic Optics Errors, Coupling and Correction, 2004-present:** Response matrix and closed beta bump technique to correct quadrupole errors (beta-beating & dispersion-beating) and coupling compensation in an high energy accelerator lattices (RHIC,SPS, & LHC).
Collaborator: Dr. Rogelio Tomás, Accelerator Physics, CERN.
- **Long Range Beam-Beam Effects, 2005-present:** Long range beam-beam effects and wire compensation techniques at RHIC and LHC including simulations and beam studies.
Collaborator: Dr. Wolfram Fischer, Collider Accelerator Dept., BNL
- **Superconducting RF Cavities, 2003-2006:** Design and development of high current energy recovery superconducting linac and superconducting gun.
Adviser: Dr. Ilan Ben-Zvi, Collider Accelerator Dept., BNL
- **Transverse Beam Dynamics, 2003-2006:** Linear optics, transverse coupling and beam position monitor diagnostics using ac dipole and numerical techniques.
Adviser: Dr. Stephen Peggs, Collider Accelerator Dept., BNL
- **D0 Calorimeter, 2001-2002:** Calorimeter research at FermiLab on the D0 high-energy physics experiment.
Adviser: Prof. Robert McCarthy, High-Energy Physics group, Stony Brook
- **CP-Violation, Rare Decays and Mixing in Beauty and Charm Particle Decays, Summer 1999:** Simulations on the fast tracking program to determine the most efficient stereo angles for the Forward Tracker (Silicon Micro Strips) of the BTeV detector.
Adviser: Prof. Tom Handler, High-Energy Physics group, University of Tennessee
- **Acoustic Imaging of Biological Tissues using Ultrasonic Waves, 1999-2000:** Non-destructive imaging of biological samples using ultrasonic imaging methods.
Adviser: Prof. Samiullah Mohammed, Physics Department, Truman State University
- **The Fine Structure of Damped and Driven Harmonic Oscillations, 1997-98:** Damped and driven harmonic oscillation using spring models to accurately measure resonant frequencies, decay constants and other parameters of mechanical models.
Adviser: Prof. Kenneth Hahn, Physics Department, Truman State University

HONORS, AWARDS, & NOMINATIONS

- Recipient of the TOOHIGH postdoctoral fellowship (LARP), 2006-2009.
- Recipient of the President's Award to Distinguished Doctoral Students, Stony Brook University, 2006.
- Recipient of the NPSS-IEEE Graduate Scholarship Award, 2005.
- Student Grants for Conferences, Workshops, and Schools
 - 1st International Accelerator School for Linear Colliders, Sokendai, Japan, 2006.
 - 12th Workshop of RF Superconductivity, Ithaca, 2005.
 - Particle Accelerator Conference, Knoxville, TN, 2005.
 - European Particle Accelerator Conference, Switzerland, 2004.
 - 11th Workshop of RF Superconductivity, Germany, 2003.
 - Joint Accelerator School, Long Beach, CA, 2002.
 - U.S. Particle Accelerator School (Jan. 2003, June 2003, Jan 2004, Jan 2005).
- Dean's List: Fall 1997, Spring & Fall 1998, Spring & Fall 1999, *Truman State University*
- Member of the National Physics Honor Society, ΣΠΣ, *Truman State University*, 2000.
- New Student Leader Award, *Truman State University*, 1996-97
- College Bowl Champions (Intramural competition), *Truman State University*, 1999
- President Honorary Scholarship, *Truman State University*, 1996-2000
- International Merit Scholarship, *Truman State University*, 1996-1999
- Nominated twice for Ron & Elsie Gaber Achievement Award, *Truman State Univ.*, 1996-98
- Best Programming Award Recipient for Residential Colleges, *Truman State University*, 1997

INVITED TALKS

1. Crab Crossing for the LHC Luminosity Upgrade
 - Deflecting Cavity Workshop, Shanghai, China, (April 2008).
 - BNL-LARP-CARE Workshop, LHC-CC08, BNL, NY, (Feb 2008).
 - CARE-HHH Workshop, IR07, Frascati, Italy, 2007.
 - Emittance Growth Issues, BEAM07, CERN, Geneva, 2007.
 - Daresbury Lab & Cockcroft Institute Seminar, Daresbury, UK, 2007.
 - KEK-B Seminar, Tsukuba, Japan, 2007.
 - Collider Accelerator Seminar, BNL, NY, 2007.
2. Beam experiments and LHC studies at CERN, LARP Collaboration Meeting, Port Jefferson, NY, 2006.
3. Crab cavities for LHC IR Upgrade, CARE-HHH-LUMI06, Valencia, Spain, 2006.
4. Local transverse coupling measurements and compensation at RHIC, 10th European accelerator conference, Scotland, 2006.
5. beta-beating and dispersion-beating compensation for LHC injection, LHC optics commissioning meeting, CERN, 2006.
6. ERL Cavity for High Currents, 12th Workshop of RF Superconductivity, Ithaca, NY, 2005.
7. Optimizing the cavity shape for ERLs, The 32nd Advanced ICFA Beam Dynamics Workshop on ERLs, Jefferson Lab, Virginia, 2005.
8. The Design of a High-Current ERL Cavity, 2nd Electron-Ion Collider Workshop Jefferson Lab, Newport News, Virginia, 2004.

JOURNAL PUBLICATIONS

Primary Author

R. Calaga, I. Ben-Zvi, M. Blaskiewicz, X. Chang, D. Kayran, V. Litvinenko, "High Current Superconducting Gun at 703.75 MHz, Physica C 441 (2006) 159-172."

R. Calaga, et al., "Ampere Class Linacs: Status Report on the BNL Cryomodule, NIM-A 557 (2006) 243-249".

R. Calaga, R. Tomás and A. Franchi, "Betatron coupling: Merging the Hamiltonian and Matrix approaches", Phys. Rev. ST Accel. Beams 8, 034001 (2005).

R. Calaga and R. Tomás "Statistical analysis of RHIC beam position monitors performance", Phys. Rev. ST Accel Beams, volume 7, 042801 (2004).

Co-Author

G. Rumolo, G. Arduini, E. Metral, E. Shaposhnikova, E. Benedetto, R. Calaga, G. Papotti, B. Salvant, The Anomalous Scaling Law of the Electron Cloud Instability with the Beam Energy, (submitted to Phys. Rev. Lett), 2008.

R. Tomás, M. Bai, R. Calaga, W. Fischer, A. Franchi and G. Rumolo, "Measurement of global and local resonance terms", Phys. Rev. ST Accel. Beams 8, issue 2, 024001 (2005).

I. Ben-Zvi et.al., "R&D towards cooling of the RHIC Collider", NIM-A: Volume 532, Issues 1-2, 11 October 2004 (p. 177-183).

CONFERENCE PUBLICATIONS

Primary Author

R. Calaga, K. Akai, K. Ohmi, K. Oide, U. Dorda, R. Tomas, F. Zimmermann, Small Angle Crab Compensation for LHC IR Upgrade, in the proceedings of PAC07, 2007.

R. Calaga, R. Tomas, F. Zimmermann, BPM Calibration Independent LHC Optics Correction, in the proceedings of PAC07, 2007.

R. Calaga, A. Franchi, R. Tomas, Global and Local Coupling Compensation in RHIC using AC Dipoles, EPAC06, Edinburg, Scotland, 2006.

R. Calaga, R. Tomás, F. Zimmermann, Crabs in LHC, CARE-HHH-LUMI06, Valencia, 2006.

R. Calaga, R. Tomás, S. Abeytunge, M. Bai, W. Fischer, A. Franchi, "Measurement and optimization of local coupling from RHIC BPM data" PAC 2005.

R. Calaga and R. Tomás, "RHIC BPM PERFORMANCE: COMPARISON OF RUN 2003 AND 2004", Proceedings of EPAC 2004, Lucerne, Switzerland, 2004.

R. Calaga, I. Ben-Zvi, J. Sekutowicz, Y. Zhao, High Current Superconducting Cavities at RHIC, Proceedings of EPAC 2004, Lucerne, Switzerland, 2004.

R. Calaga, M. Bai, S. Peggs, T. Roser, T. Satogata, RHIC Optics Measurements at Different Working Point, Proceedings of EPAC 2004, Lucerne, Switzerland, 2004.

R. Calaga, I. Ben-Zvi, J. Sekutowicz, D. Wang, Y. Zhao, "Study of Higher Order Modes in 5-Cell SRF Cavity for E-Cooling at RHIC", Proceedings of the 11th Workshop on RF Superconductivity (SRF 2003), Travemünde/Lübeck, Germany, 2003.

Co-Author

- Y. Luo, M. Bai, J. Bengtsson, R. Calaga, W. Fischer, N. Malitsky, F. Pilat, T. Satogata, Measurement and Correction of Third Resonance Driving Term in the RHIC, in the proceedings of PAC07, 2007.
- R. Tomas, G. Arduini, G. Rumolo, F. Zimmermann, R. Calaga, A. Faus-Golfe, Improved Algorithms to Determine Non-Linear Optics Model of the SPS from Non-Linear Chromaticity, in the proceedings of PAC07, 2007.
- W. Fischer, R. Calaga, Experiments with a DC Wire in RHIC, in the proceedings of PAC07, 2007.
- W. Fischer, M. Blaskiewicz, R. Calaga, P. Cameron, Y. Luo, T. Pieloni, Transverse Beam Transfer Functions of Colliding Beams in RHIC, in the proceedings of PAC07, 2007.
- K. Ohmi, R. Calaga, W. Hofle, R. Tomas, F. Zimmermann, Beam-beam Effects With an External Noise in LHC, in the proceedings of PAC07, 2007.
- W. Fischer, R. Calaga, et al., Observation of the Long-range Beam-beam Effect in RHIC and Plans for Compensation, EPAC06, Edinburg, Scotland, 2006.
- R. Calaga, A. Franchi, R. Tomas, Fast Compensation of Global Linear Coupling in RHIC using AC Dipoles, EPAC06, Edinburg, Scotland, 2006.
- R. Tomas, O. Brning, R. Calaga, S. Fartoukh, M. Giovannozzi, Y. Papaphilippou, S. Peggs, F. Zimmermann, Procedures and Accuracy Estimates for Beta-beat Correction in the LHC, EPAC06, Edinburg, Scotland, 2006.
- R. Tomás, R. Calaga, F. Zimmermann, Crab Cavity IR Optics for 8 mrad, CARE-HHH-LUMI06, Valencia, 2006.
- I. Ben-Zvi et.al., “Extremely High Current, High-Brightness Energy Recovery Linac”, PAC 2005.
- I. Ben-Zvi et.al., “Electron Cooling of RHIC”, PAC 2005.
- V. Litvinenko et.al., “High Current Energy Recovery Linac at BNL”, PAC 2005.
- V. Litvinenko et.al., “ERL Based Electron-Ion Collider eRHIC”, PAC 2005.
- A. Todd et.al., “State-of-the-Art Electron Guns and Injector Designs for Energy Recovery Linacs (ERL)”, PAC 2005 (Submitted).
- D. Kayran et al., “Optics for High Brightness and High Current ERL Project at BNL”, PAC 2005 (Submitted).
- T. Satogata et al., “RHIC BPM System Modifications and Performance”, PAC 2005 (Submitted).
- I. Ben-Zvi et. al., “Ampere Average Current Photoinjector and Energy Recovery Linac”, Proceedings of the 26th FEL Conference & 11th FEL Users Workshop, Trieste, Italy, 2004.
- V. Litvinenko et.al., “High Current Energy Recovery Linac at BNL”, Proceedings of the 26th FEL Conference & 11th FEL Users Workshop, Trieste, Italy, 2004.
- C. X. Wang, R. Calaga, Transverse Coupling Measurement using SVD Modes from Beam Histories, Proceedings of EPAC 2004, Lucerne, Switzerland, 2004.
- W. Fischer et.al., Luminosity Increases in Gold-gold Operation in RHIC, Proceedings of EPAC 2004,

Lucerne, Switzerland, 2004.

V. Ptitsyn et.al., eRHIC, Future Electron-ion Collider at BNL, Proceedings of EPAC 2004, Lucerne, Switzerland, 2004.

I. Ben-Zvi et.al., R&D towards Cooling of the RHIC Collider, Proceedings of PAC 2003, Portland, Oregon, 2003 (p. 39).

N. Malitsky et.al., Towards the UAL Open Source Project, Proceedings of PAC 2003, Portland, Oregon, 2003 (p. 272).

M. Bai et.al., Measurement of Linear Coupling Resonance in RHIC, Proceedings of PAC 2003, Portland, Oregon, 2003 (p. 2207).

Reports

I. Ben-Zvi et.al., Electron Cooling of RHIC, Zero Design Report, Feb. 3, 2005.

I. Ben-Zvi et.al., eRHIC (Linac-Ring Option), Zero Design Report (Appendix A), May 2004.

COMPUTER SKILLS

- **Operating Systems:** UNIX/Linux, Windows and MSDOS.
- **Programming Languages:** Python, Limited experience with C, C++, Fortran, Shell-scripts, HTML.
- **Application Software:** Maple, Mathematica, Gnuplot, Xmgr, LaTeX, Windows environment, Microsoft Office, Limited experience with ANSYS.
- **Accelerator Software:** MADX, UAL, Multipac, RHIC Controls Software.
- **Electromagnetic Software:** Superfish, MAFIA, Microwave Studio, ABCI.

WORK EXPERIENCE

Teaching Assistant	US Particle Accelerator School Cornell University, Ithaca, NY	Summer-2005
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TA for the graduate level accelerator physics course which included classroom, computer lab, exams, and homework activities for a period of two weeks. Also tutored the RF lab for the undergraduate accelerator physics course.

Teaching Assistant	State University of New York Stony Brook, NY	2000-2001
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Taught two lab courses each semester in introductory physics (Classical Mechanics & Electromagnetism) for 48 undergraduate.

System Administrator	Financial Planning Consultants, Inc. St. Louis, MO	1998-99
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Network and system administration, hardware and software installation and repair, database Management for Stocks and Mutual Funds.

Resident Advisor	Truman State University Kirksville, MO	1997-99
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Responsible for maintaining security, safety and monitoring about 20 students and enforcing residential life and college policies. Facilitated counseling and mediation among residents and staff members. Provided academic advising and initiated and organized several programs to develop social, educational, cultural and wellness experience in the residential colleges.

Student Assistant	Truman State University Kirksville, MO	1997
Assisting the Director of Residential Living, and helped in administrative work.		
Lab Consultant	Truman State University Kirksville, MO	1996-2000
Software installation and repair maintenance for campus computers Help students with software and hardware related problems.		
Counselor	YMCA Camp Lake Wood, MO	1997
Organized physical and social activities for children between 8-14 years of age. Enforced disciplinary policies and procedures and ensured safety and security for 15 children. Worked with children having asthma to help them participate in camp activities		
Mover & Electrical Worker	Truman State University Kirksville, MO	1996
Preceptor for Freshman Week	Truman State University Kirksville, MO	1997-98
Act as a liaison between the faculty and the freshman students. Mentor the incoming freshman class through freshman week activities and work with a professor to provide a flavor of college life and system and building a community in the freshman class		
President of International Club	Truman State University Kirksville, MO	1997-98
Served as a student leader for 200 international students. Presided over club and executive member meetings. Organized annual programs to enhance cultural diversity and awareness on campus like international dinner, international week, fund-raisers and social trips.		

EXTRACURRICULAR ACTIVITIES

- **Society of Physics Students:** Member (1997-2000) & web master (1997-98) for SPS chapter at Truman State University.
- **Student Representative for The Missouri Department of Mental Health Panel Discussion, 1998:** Represented students of Truman State University in the panel discussion for alcohol and drug abuse in Missouri department of Mental Health Conference.
- **Resident Advisory Council Member, Truman State University, 1997-98:** Acted as a liaison between Resident Advisers and Professional Staff * Coordinated in planning and organizing staff training for approximately 125 Resident Advisers.
- **Time-Out Representative, Truman State University, 1996-97:** Initiated and organized a number of programs focusing on effective communication and cultural awareness between students in residential halls and developing a multicultural environment in the dorms. Maintained a bulletin board for passive programming to enhance the efforts in developing multicultural environment in residence halls.
- **Representative at the National Conference for Resident Advisor's, University of Iowa, 1999:**
- **Physics Tutor for the Society of Physics Students, Truman State University, 1998-2000:**