

## Marwan M. Rihaoui

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### Education

Ph.D. Physics, Northern Illinois University, 2010 (Expected)

M.S Physics, Northern Illinois University, 2007

B.S. Physics, Winona State University, 2003, *Summa Cum Laude*

### Research Experience

Research Assistant 2006-present  
Dr. Philippe Piot Northern Illinois University & Argonne National  
Laboratory  
Explore the impact of well-defined transverse perturbation modes on the evolution of the electron beam phase space. Planning for the transverse to longitudinal emittance exchange experiment at the Advance Wakefield Accelerator (AWA) at Argonne National Laboratory.

Research Assistant 2005  
Dr. Courtlandt Bohn Northern Illinois University  
Numerical solution of Vlasov equation (system of nonlinear partial differential equation). Working on color noise,

Research Assistant 2003  
Dr. Peter Vologov Los Alamos National Laboratory  
Investigation of the gradient field in the MRI and imaging techniques.

Research Assistant 2002  
Dr. J. Carl Kumaradas Los Alamos National Laboratory  
Working on Magnetocarcinotherapy (Treating Cancer with magnetic field) and study the dipole-dipole effect of the nanomagnetic particles on the heating efficiency of the tumor. Simulations and modeling in MATLAB.

### Teaching Experience

Teaching Assistant of Physics 200 level for Physics and Engineering majors, 2004.

### Publications

Marwan Rihaoui and J. Carl Kumaradas , Dipole-Dipole Interactions in Magnetocarcinotherapy . Los Alamos Summer School Research Report 2003 Volume 6. Los Alamos, New Mexico.

Y.-E Sun, J. G. Power, K.-J. Kim, P. Piot, M. M. Rihaoui, Design study of a transverse-to-longitudinal emittance exchange proof-of-principle, Proceedings of the 22nd Particle Accelerator Conference (PAC'07), Albuquerque, New Mexico (25-29 June, 2007)

J. G. Power, M. E. Conde, W. Gai, F. Gao, R. Konecny, W. Liu, Z. Yusof, P. Piot, M. Rihaoui, Pepper-pot based emittance measurement of the AWA photoinjector, Proceedings of the 22nd Particle Accelerator Conference (PAC'07), Albuquerque, New Mexico (25-29 June, 2007)

M. Rihaoui, W. Gai, P. Piot, J.G. Power, Z. Yusof, Observation of transverse space charge effects in a multi-beamlet electron bunch produced in a photo-emission electron source, Proceedings of the 13th Advanced Accelerator Concept Workshop (AAC08), Santa Cruz, CA (27 July- 2 August, 2008) [in press]; talk in working group on charged-particle sources

M. Rihaoui, W. Gai, P. Piot, J.G. Power, Observation and Simulation of Space-charge effects in a radio-frequency photoinjector using a transverse multi-beamlet distribution, being submitted to Physical Review Special Topics Accelerator & Beams

M. Rihaoui, W. Gai, K.-J. Kim, P. Piot, J.G. Power and Y.-E Sun Beam dynamics simulations of the transverse-to-longitudinal emittance exchange proof-of-principle experiment at the Argonne Wakefield Accelerator, Proceedings of the 13th Advanced Accelerator Concept Workshop (AAC08), Santa Cruz, CA, (27 July- 2 August, 2008) [in press]; talk in student prize plenary session (won best student paper in simulation category)

P. Piot, Y.-E Sun and M. Rihaoui, Production of Relativistic Electron Bunch with Tunable Current Distribution, Proceedings of the 13th Advanced Accelerator Concept Workshop (AAC08), Santa Cruz, CA, Italy (27 July- 2 August, 2008) [in press]

#### **Submitted abstract & papers in preparation**

M. Rihaoui, P. Piot, J.G. Power, W. Gai, Verification of the AWA photoinjector beam parameters required for a transverse-to-longitudinal emittance exchange experiment. Abstract submitted to 23rd Particle Accelerator Conference (PAC'09), Vancouver, Canada (May 2009)

M. Rihaoui, P. Piot, J.G. Power, W. Gai, Limiting Effects in the Transverse-to-Longitudinal Emittance Exchange for Low Energy Relativistic Electron Beams. Abstract submitted to 23rd Particle Accelerator Conference (PAC'09), Vancouver, Canada (May 2009)

M. Rihaoui, W. Gai, P. Piot, J.G. Power, Z. Yusof, Measurement and Simulation of Space Charge Effects in a Multi-Beam Electron Bunch from an RF Photoinjector. Abstract submitted to 23rd Particle Accelerator Conference (PAC'09), Vancouver, Canada (May 2009)

P. Piot, V. Demir, T. Maxwell, M. Rihaoui, J.G. Power, C. Jing, Longitudinal Beam Diagnostics for the ILC Injectors and Bunch Compressors. Abstract submitted to 23rd Particle Accelerator Conference (PAC'09), Vancouver, Canada (May 2009)

P. Piot, Y.-E Sun, J. Power and M. Rihaoui, Generation of Relativistic Electron Bunch with Arbitrary Current Distribution via Longitudinal-to-Transverse Phase Space Exchange, in preparation

## **Marwan M. Rihaoui**

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### **Computer Skills**

MATLAB, Mathematica, Python, C, PC, Windows, UNIX, MS office. Able to quickly adapt and use needed software.

### **Coursework**

*Graduate:* Quantum Mechanics (1), Quantum Mechanics (2), Classical Electrodynamics (1), Classical Electrodynamics (2), Classical Mechanics, Statistical Dynamics, Statistical Physics. Technique of material science, Beam Physics, Methods of Mathematical Physics, Theoretical Astrophysics, Introduction to high energy physics and Astrophysics.

*Undergraduate:* Electrodynamics, Quantum Mechanics, Classical Mechanics, Control Theory, Differential Equations, Electronics, Electrical circuits.

### **Service**

Vice President, Undergraduate Physics Committee, Winona State University, 2002–2003

Treasurer, Physics Graduate Student Committee, Northern Illinois University, 2005–2006

### **Honors & Awards**

Won all merit Scholarship during undergraduate studies.

One of the top five students in the class in all the graduate course work.

### **Citizenship & language**

Lebanese, Arabic and English.