

CURRICULUM VITAE

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Date : 25/08/2008

IDENTIFICATION

Family name:	Martin	CFI PIN: 31695
Given name and initials:	Jeffery W	
Position:	Assistant Professor	
Institution:	The University of Winnipeg	
Department:	Physics	

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I wish to receive correspondence in: <input checked="" type="radio"/> English <input type="radio"/> French			

ACADEMIC BACKGROUND

Degree type	Year received or expected	Discipline/Field/Speciality	Institution and Country
Doctorate	2000	Experimental Nuclear Physics	Massachusetts Institute of Technology UNITED STATES
Bachelor's	1995	Physics (Honours)	University of Manitoba CANADA

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AREA(S) OF EXPERTISE

List up to ten keywords that best correspond to your areas of expertise in research, creation, instrumentation and techniques.

nuclear physics, particle physics, fundamental symmetries, nucleon structure, weak interactions, parity violation, electron scattering, elastic scattering, neutron decay, Delta resonance

Specify up to three discipline/subdiscipline code(s) for your research.

Discipline: PHYSICS

Subdiscipline: Nuclear Physics

Discipline: PHYSICS

Subdiscipline: Weak Interactions

Discipline: PHYSICS

Subdiscipline: Intermediate Energy Reactions

PROFESSIONAL EXPERIENCE

Position / Organization	Department / Division	Period	
		Start date	End date
Assistant Professor University of Winnipeg	Physics	2004	
Postdoctoral Scholar California Institute of Technology	Physics	1999	2004
Research Assistant Massachusetts Institute of Technology	Physics	1995	1999
Summer Student Tri-University Meson Facility		1993	1994

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RESEARCH/TECHNOLOGY DEVELOPMENT CONTRIBUTIONS IN THE LAST FIVE YEARS

Describe:

- your **most significant** contributions to research/technology development (refereed articles, monographs, books, patents, copyright, products, services, technology transfer, other forms of research output). For your most important contributions, describe the significance in terms of influence and impact on the target community; and
- other activities that show the impact of your work, such as research training, awards, consulting, contributions to professional practice or public policy, and membership on committees, boards, or policy-making bodies.

A. A new world record for the production of ultracold neutrons:

The ultracold neutron source at Los Alamos National Lab (LANL, Los Alamos, NM) was the first to use a pulsed spallation-driven source of neutrons, moderated by solid deuterium, and I was deeply involved. The LANL UCN source is a lower-flux progenitor of the Canadian Spallation UCN source, and was the first source to successfully demonstrate the so-called "superthermal" technique of UCN production.

[1] "Demonstration of a Solid Deuterium Source of Ultracold Neutrons," A. Saunders et al, Phys. Lett. B 593, 55-60 (2004).

B. Detector development for the decay of polarized ultracold neutrons:

The UCNA experiment at Los Alamos National Lab (LANL, Los Alamos, NM) will accurately measure the A-coefficient in the beta-decay of polarized ultracold neutrons (UCN). The A-coefficient is directly related to the ratio of axial-vector to vector couplings for the neutron. Such a precise measurement of A, when combined with information on the lifetime of the neutron, can be used to extract the Cabibbo-Kobayashi-Maskawa (CKM) matrix element V_{ud} , important for tests of the unitarity of the matrix and Standard Model tests. UCN source commissioning and UCN guide tests have been ongoing through 2007. Runs aiming for 1% extraction of A are scheduled for 2007. My role has been the construction and characterization of the beta detectors for the experiment. Part of this work was the measurement of electron backscattering from the surfaces of materials, in order to reduce systematic uncertainties for UCNA. In addition, I developed a new physics proposal related to more precise measurements of the energy-dependence of beta-decay. Excellent energy resolution would be achieved with silicon detectors which I also designed and prototyped.

[2] "New Measurements and Quantitative Analysis of Electron Backscattering in the Energy Range of Neutron Decay," J.W. Martin et al, Phys. Rev. C 73, 015501/1-7 (2006).

[3] "Proposal for Silicon Detector Array for UCNA," J.W. Martin and B.W. Filippone, white paper presented to Nuclear Science Advisory Committee, Neutron Review Subcommittee Apr. 17, 2003, Los Alamos, NM (unpublished).

C. Research and development towards the measurement of the proton's weak charge:

Parity-violation in elastic electron-proton scattering at forward angles can be used to determine the weak charge of the proton. At tree level in the standard model, the weak charge is directly related to the weak mixing angle, a fundamental parameter governing mixing in electroweak theory. The Q-weak experiment at Jefferson Lab (JLab, Newport News, VA) aims to make the most precise determination of the weak mixing angle at low energy. When compared with very precise measurements performed at the Z-pole, the running of weak mixing angle with energy can be tested. A discrepancy from the Standard Model running would indicate new physics arising in the form of loop corrections. My role on the experiment has been to lead the development of the focal plane scanner for the experiment, used in the determination of systematic uncertainties arising from tracking.

[4] "Parity Violation in Electron-Proton Scattering," J.W. Martin invited talk at the Winter Nuclear and Particle Physics Conference, Feb. 17-19, 2006, Banff, AB.

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RESEARCH/TECHNOLOGY DEVELOPMENT CONTRIBUTIONS IN THE LAST FIVE YEARS

D. Accurate electron beam polarimetry for Qweak: The Qweak experiment is an example of an experiment that requires the accurate determination of the polarization of a highly polarized high-energy electron beam (at the 1% level). I have been a leader in the development of a new beam polarimeter for the experiment, based on scattering the electron beam from a laser beam (a technique known as Compton polarimetry). I am the principle investigator on the development of a diamond microstrip detector to sense the scattered electrons. The detector development was conducted in the CFI-funded subatomic physics detector laboratory at U. Winnipeg.

[5] "The Hall C Compton Polarimeter: a new Compton for JLab," J.W. Martin invited talk at the workshop on "Precision Electron Beam Polarimetry for the Electron Ion Collider", at University of Michigan, Ann Arbor, MI, August 23-24, 2007.

E. The contribution of strange quark-antiquark pairs to the electromagnetic form factors may be determined from parity-violating elastic electron-proton scattering. It is the aim of the G0 experiment at JLab to extend the work of previous experiments to the broadest range of kinematics ever accessed. The G0 forward-angle measurements were completed in 2004 and had a large impact on this field. The G0 backward-angle measurements were completed in early 2007 and the data are being analyzed.

[6] "Strange-Quark Contributions to Parity-Violating Asymmetries in the Forward G0 Electron-Proton Scattering Experiment," D.S. Armstrong et al (the G0 Collaboration), Phys. Rev. Lett. 95, 092001/1-4 (2005). See also: Phys. Rev. Focus 16, story 7 (2005).

Other Contributions:

- Presentations relating to Canadian Spallation UCN Source by J.W. Martin to committees at TRIUMF: a. Agency Committee on TRIUMF (ACOT) May 9, 2008. b. TRIUMF Special Experimental Evaluation Committee, Mar. 26, 2008. c. ACOT, Nov. 9, 2007. d. TRIUMF Board of Management, TRIUMF, Sept. 14, 2007. e. organizer and presenter of TRIUMF User Group (TUG) workshop on UCN source during townhall meeting, Aug. 1-3, 2007. f. Member of TUG working group, and author of UCN section, fall 2006. Lead author of white paper and proposals for the project, 2006-2008.

- Organizer and Chair of "International Workshop: Ultracold Neutron Sources and Experiments" (50 participants) at TRIUMF, Vancouver, BC, Sept. 13-14, 2007.

- Organizer and Session Chair of "Electroweak Standard Model Tests II: Semileptonic" session at CAP Annual Congress, Saskatoon, SK, June 15-20, 2007.

- Three public lectures in the past five years.

- "Strange Quarks in the Proton: The G0 Experiment" and "Electroweak Standard Model Tests at JLab: The Qweak and E2EPV Experiments" J.W. Martin presentations at 2005 CAP DNP townhall meeting, Sept. 9-10, 2006, TRIUMF, Vancouver, BC.

- Referee, Foreign Affairs Canada, Global Partnership Program (GPX), 2005, relating to nuclear nonproliferation and arms control and disarmament.

- Session Chair "Subnucleonic Degrees of Freedom" APS DNP meeting, Oct. 28 - Nov. 1, 2003, Tuscon, AZ.

- Referee, Physical Review C.

- Judge at nine high school, state, provincial, and first nations science fairs in the past five years

- currently supervising or cosupervising three graduate students and one postdoctoral scholar.

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LIST OF PUBLISHED CONTRIBUTIONS

Provide a list of your most significant published contributions (e.g. submitted/published articles, patents, technical reports) from the last five years. Note: the list should not include any text beyond the contributions; any page containing additional information will be removed

In addition to those publications listed in the previous section:

- [7] "Transverse Beam Spin Asymmetries in Forward-Angle Elastic Electron-Proton Scattering," D.A. Armstrong et al. (the G0 Collaboration), Phys. Rev. Lett. 99, 092301/1-5 (2007).
- [8] "A Multiwire Proportional Chamber for Precision Studies of Neutron Beta Decay Angular Correlations," T.M. Ito, et al., Nucl. Instrum. Meth. A 571, 676-686 (2007).
- [9] "Longitudinal-transverse separations of structure functions at low Q^2 for hydrogen and deuterium," V. Tvaskis, et al., Phys. Rev. Lett. 98, 142301/1-4 (2007).
- [10] "Extraction of the Neutron Magnetic Form-Factor from Quasielastic $^3\text{He}(e, e')$ at $Q^2 = 0.1 - 0.6 \text{ (GeV/c)}^2$," B. Anderson et al., Phys. Rev. C 75, 034003/1-15 (2007).
- [11] "Measurements of Electron-Proton Elastic Cross-Sections for $0.4 \text{ (GeV/c)}^2 < Q^2 < 5.5 \text{ (GeV/c)}^2$," M. E. Christy et al, Phys. Rev. C 70, 015206/1-15 (2004).
- [12] "Parity-violating Electron Deuteron Scattering and the Proton's Neutral Weak Axial Vector Form Factor," T. M. Ito et al. (SAMPLE Collaboration), Phys. Rev. Lett. 92, 102003/1-4 (2004).
- [13] "Measurement of Electron Backscattering in the Energy Range of Neutron Decay," J.W. Martin et al, Phys. Rev. C 68, 055503/1-8 (2003).
- [14] "PWIA Extraction of the Neutron Magnetic Form Factor from Quasi-Elastic $^3\text{He}(e, e')$ at $Q^2 = 0.3 \text{ to } 0.6 \text{ (GeV/c)}^2$," W. Xu et al, Phys. Rev. C 67, 012201(R)/1-5 (2003).

Non-refereed conference presentations not listed in the previous section:

- [15] "Systematic Error Considerations for a 12 GeV Moeller Experiment," J.W. Martin and J. Birchall invited talk at "Electroweak Workshop: The Scientific Impact and Feasibility of an Ultra-precise 12 GeV Moeller Experiment to Test the Standard Model," December 11-13, 2006, Jefferson Lab, Newport News, VA, USA.
- [16] "Accurate Beta Spectroscopy for UCN Beta-Decay," J.W. Martin contributed talk at Canadian Association of Physicists Annual Congress, June 11-14, 2006, St. Catharines, ON.
- [17] "Measurement of Electron Backscattering for Neutron-Decay," J.W. Martin contributed talk at the 2nd Joint Meeting of the Nuclear Physics Divisions of the APS and The Physical Society of Japan, Sept. 18-22, 2005, Maui, HI.
- [18] "The Strange Form-Factors of the Proton and the G0 Experiment," J.W. Martin for the G0 Collaboration, contributed talk at CAP Congress, June 4-8, 2005, Vancouver, BC.
- [19] "The Strange Form-Factors of the Proton and the G0 Experiment," J.W. Martin at Baryons 2004, Oct. 25-29, 2004, Ecole Polytechnique, Palaiseau, France. Proceedings published in Nucl. Phys. A 755, 245-248 (2005).
- [20] "The Beta-Asymmetry in Neutron Decay," J. W. Martin for the UCNA Collaboration, contributed poster at "From Zero to Z0: A Workshop on Precision Electroweak Physics," May 12-14, 2004, Fermi National Accelerator Laboratory, Batavia, IL.
- [21] "Measurement of Electron Backscattering in the Energy Range of Neutron Beta-Decay," J.W. Martin for the G0 Collaboration, contributed talk at the American Physical Society, Division of Nuclear Physics Meeting DNP03, October 28 - November 1, 2003, Tuscon, AZ.

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RESEARCH OR TECHNOLOGY DEVELOPMENT FUNDING

List sources of support held over the last five years, as an applicant or co-applicant for grants and contracts from all sources, including industry and academic/research institutions.

Use the following groupings: support under review (R) or awarded (W).

- Title of Proposal - Name of Principal Applicant / Project Leader	- Funding Source and Program name - Time Commitment (hours/month)	W,R	Average amount per Year	Support Period	
				From	to
Quartz Scanner Detector for Qweak J.W. Martin	NSERC RTI 80	W	43300	2006	
Qweak Experiment: Measurement of the Proton's Weak Charge (JLab E02-020) S.A. Page	NSERC Subatomic Physics Project 50	W	250000	2007	2009
Measurement of the Flavor Singlet Form Factors of the Proton, TJNAF- E04-115, E04-101 W.T.H. van Oers	NSERC Subatomic Physics Project 20	W	110000	2007	2009
Qweak Compton Electron Detector: Mechanical System and Spares J.W. Martin	NSERC Subatomic Physics Research Tools and Instruments 50	W	81000	2008	2008
Fundamental Physics at the Spallation Neutron Source M.T.W. Gericke	NSERC Group Discovery Grant 50	W	34000	2007	2008
Qweak Compton Polarimeter Electron Detector J.W. Martin	NSERC Subatomic Physics Research Tools and Instruments 50	W	85000	2007	2007
Weak Interactions in Few Body Systems J.W. Martin	NSERC Discovery Grant 100	W	72500	2005	2007
University Startup Funds J.W. Martin	University of Winnipeg Research Startup 0	W	8333	2004	2007
Travel to WNPPC 2006, Banff, AB J.W. Martin	University of Winnipeg Travel Grant 0	W	1000	2006	2006
Fabrication of Light Guides for Qweak scanner J.W. Martin	University of Winnipeg Discretionary Grant 0	W	750	2006	2006
Testing the Standard Model of Quarks and Leptons: a 12 GeV Moeller Experiment W.T.H. van Oers	NSERC Special Research Opportunity - Pre-Research Proposal 0	W	14500	2006	2006

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				From	to
Subatomic Physics Detector Laboratory J.W. Martin	CFI, Manitoba Research and Innovation Fund, and others Leaders Opportunity Fund 0	W	222578	2006	2006
Travel to Baryons 2004, Palaiseau, France J.W. Martin	University of Winnipeg Travel Grant 0	W	2000	2004	2004
Electronics Testing for G0 J.W. Martin	University of Winnipeg Major Research Grant 0	W	4000	2004	2004