

# Deborah Ruth Mills Errede

July 2003

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**Date of Birth** April 30, 1957

**Citizenship** USA

**Education** Bachelors of Arts in Physics, University of Colorado, Boulder, CO  
September 1975 – December 1979

Ph.D. University of Michigan, Ann Arbor, MI September 1980 – August 1987  
Ph.D. Thesis Advisor, Rudolf P. Thun  
Ph.D. Thesis A Search for Sequential Neutrinos with HRS at PEP  
Ph.D. Thesis Defense in August 1987, formal graduation in December 1987.

**POSITIONS:** 1987-1991 Post-doctoral Research Associate University of Wisconsin, Madison, WI

1991-1994 Visiting Assistant Professor University of Illinois, Champaign, IL

1994-2000: Assistant Research Professor University of Illinois, Champaign-Urbana

2000-Present: Associate Research Professor University of Illinois, Champaign-Urbana

**AWARDS:** Universities Research Association Scholarship 1975-1979.

## WORK-RELATED ACTIVITIES

### University of Illinois, Champaign-Urbana:

**Spring 2002 – Present:** UIUC group responsible for data acquisition system for liquid hydrogen absorber filling/high power/beam tests in 400 MeV proton beam facility under construction at Fermi National Accelerator Laboratory. This includes instrumentation of said absorber. UIUC graduate student Zachary Conway is building the system both hardware-wise (operation of PC, Lakeshore 218 temperature monitor, FISO fiber-optic transducer readout electronics, Internet Rack Monitor) and software-wise (from scratch development of LabView code for data acquisition). Conway leaves for a separate thesis program through our group but with a SCRF group at Argonne National Laboratory summer 2003 (Ken Sheperd and Jerry Nolen).

Summer Plans for 2003: Mike Haney, Jason Crnkovic (NSF REU student) and myself are investigating the viability of the FISO white light interferometry temperature transducers at cryogenic temperatures (liquid hydrogen temperatures are of particular interest, 14 -20 K). This experiment involves a continuous-flow cryostat with liquid helium operation, GaAlAs diodes with Lakeshore readout, FISO transducer readout, and the data acquisition system written by Conway. Instrumentation of our absorber in the Mucool Test Area needs to be operational in

high radiation environments ( $10^{13}$  protons/pulse @ 15Hz), high magnetic fields ( $\sim 5$  Tesla), and at cryogenic temperatures. This is a demanding environment and instrumentation is a serious issue for investigation.

**Note:** our entire summer ended up being devoted to making the Resistive Thermal Devices from Lake Shore Electronics operational. The difficulties encountered centered around temperature-related induced voltages in the test setup.

Studying completely new alternative linear cooling channel composed of quadrupoles (alternative to Feasibility Study 2) in beam dynamics group (M. Berz, C. Johnstone, K. Makino, K. Paul) and written paper titled "Stochastic Processes in Cooling Channels" presented at both ICAP02 in Lansing, Michigan and CPO-6 in Maryland during fall 2002. (I was on the advisory committee for ICAP02, the 7<sup>th</sup> international computational accelerator physics conference.) This is a major project. Kevin Paul is designing the target collection system for this channel and has given two talks (NuFact03 in New York City, Phenom03 in Madison, Wis. in summer 2003) on the physics associated with neutrinos related to neutrino factories and on the target system work. His background is high energy particle theory.

Discussions are underway to join MICE (Muon Ionization Cooling Experiment) presently proposed at Rutherford Appleton Laboratory, a natural continuation of the Mucool experiment's component testing program. MICE is designed to demonstrate cooling from approximately two cells of a SFOFO style (solenoid) cooling channel. Our interests lie in the RF cavities.

**Summer 2003 became member of Division of Particles and Beams Committee on Education and Outreach.**

**January 2000 – Spring 2002:** Member of Muon Collaboration and Mucool experiment, designing an experiment to demonstrate ionization cooling (6-dimensional phase space reduction) of muon beams in order to obtain high intensity beams for a neutrino factory.

**Principal investigator** of UIUC subcontract (0.45M\$) from IBHE/HECA funds from the state of Illinois; awarded Fall 2000. Receiving \$84k from NSF for same purpose, awarded Fall 2001.

UIUC's responsibilities include a data acquisition system for window pressure/burst testing program for liquid hydrogen absorbers and cooling simulation studies on Linux compute farm.

In the process of organizing classes/discussions on accelerator physics by experts to students and physicists interested in obtaining knowledge of the field.

**Started entirely new program of accelerator physics in the physics department at the University of Illinois, Urbana-Champaign (Fall 2001)**. Taught graduate course with Fred Mills "Accelerator Theory and Applications" 498ACC in Summer 1999.

## **PUBLICATIONS:**

### Some Most Recent Publications

- 1) D. Errede, K. Makino (UIUC), M. Berz (MSU), A. Van Ginneken, C. Johnstone, (FNAL), Stochastic Processes in Cooling Channels. CPO-6 Conference, Greenfield Maryland, October 2002, (to be published in proceedings, NIM)
- 2) C. Johnstone, M. Berz, D. Errede, K. Makino, Muon Beam Ionization Cooling in a Linear Quadrupole Channel, CPO-6 Conference, Greenfield Maryland, October 2002, (to be published in proceedings, NIM)

- 3) K. Makino, M. Berz, D. Errede, C. J. Johnstone, Higher Order Map Treatment of Superimposed Cavities, Absorbers, and Magnetic Multipole and Solenoid Fields, , CPO-6 Conference, Greenfield Maryland, October 2002, (to be published in proceedings, NIM)
- 4) D. M. Kaplan, E.L. Black, K. W. Cassel(IIT), S. Geer, M Popovic (FNAL), S. Ishimoto, K Yoshimura (KEK), L. Bandura, M. A. Cummings, A. Dyshkant, D. Kubik, D. Hedin (NIU), C. Darve (NU), Y. Kuno (Osaka), D. Errede, M Haney, S. Majewski (UIUC), M. Reep, D. Summers (Mississippi), Progress in Absorber R&D 2: Windows, PAC 2001 proceedings, June 18-22, 2001, Chicago, Illinois
- 5) D. M. Kaplan, E.L. Black, M. Boghosian, K. W. Cassel, R. P. Johnson(IIT), S. Geer, C. J. Johnstone, M Popovic (FNAL), S. Ishimoto, K Yoshimura (KEK), L. Bandura, M. A. Cummings, A. Dyshkant, D. Kubik, D. Hedin (NIU), C. Darve (NU), Y. Kuno (Osaka), D. Errede, M Haney, S. Majewski (UIUC), M. Reep, D. Summers (Mississippi), “Progress in Absorber R&D for Muon Cooling”, 3<sup>rd</sup> International Workshop on Neutrino Factory Based on Muon Storage Rings(NuFACT01 proceedings), May 24-30, 2001, Tsukuba Japan
- 6) U. Baur(Buffalo), E.L. Berger(ANL), H.T. Diehl(FNAL), D. Errede(UIUC) et al. Report of the Working Group on Photon and Weak Boson Production. Workshop on “QCD and Weak Boson Physics in Run II” November 4,5,6, 1999