

Deborah Errede

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Education

University of Colorado, Boulder	B.A.	December 1979
University of Michigan, Ann Arbor	Ph.D.	August 1987

Professional Appointments:

University of Wisconsin, Madison, WI	Post-doctoral Research Associate	1987-1991
University of Illinois	Visiting Assistant Professor	1991-1994
University of Illinois	Assistant Research Professor	1994-2000
University of Illinois	Associate Research Professor	2000-Present

Professional Awards:

Universities Research Association Scholarship 1975-1979

Professional Activities:

2000 – present: I was given responsibility for bringing up a Tier 3 at UIUC for ATLAS starting 2006. Mark Neubauer has since started taking this on and also wishes to increase the compute power and disk-space availability in connection with our own new machines and the OpenScienceGrid plus facilities available here at NCSA at UIUC. I am investigating pulse shape analysis for ATLAS TileCal (where concerns with minimum bias events are evident) with others in the UIUC TileCal group, and Ki Lie, a graduate student, investigating the top mass spectrum.

Earlier my efforts were directed towards CDF, where I contributed to the fast tracking electronics upgrade. The UIUC electronics is complete though the upgrade continues.

Co-taught graduate course 598ACC again with Fred Mills in summer of 2007.

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

I started my own accelerator group which was dedicated to studies of advanced accelerator techniques, such as those needed for large emittance large aperture machines. The UIUC group responsible for data acquisition system for liquid hydrogen energy absorber tests in Muon Test Area built at FNAL. This includes instrumentation of said absorber. UIUC graduate student Zachary Conway and engineers built the system hardware-wise (plus engineers) (operation of PC, Lakeshore 218 temperature monitor, FISO fiber-optic transducer readout electronics, Internet Rack Monitor) and, Zack, software-wise (from scratch development of LabView code for data acquisition). I was responsible for studying resistive thermal device instrumentation. The negative coefficient RTDs measure temperatures accurately in the liquid helium range in particular but also in a wide range of temperatures pertinent for filling the energy absorbers. The Muon Test Area, a test beam facility at Fermilab, is a result of the research associated with this

effort in conjunction with the Illinois Consortium for Accelerator Research. My group provided a costly power supply and correct shielding calculations for the beam facility, for instance.

Zack Conway did thesis on 345MHz triple spoke cavity with a magnetostrictive tuner looking at problems with the Q of the cavity, measuring the power losses in the power coupler with regards to avoiding thermal damage to the coupler during high continuous-wave and high pulsed power tests. The IBHE HECA grant finished and Zack had an Argonne fellowship working with Ken Shepard and Jerry Nolen through my group.

Studying completely new alternative linear cooling channel composed of quadrupoles (alternative to Feasibility Study 2) and other studies in beam dynamics group (M. Berz, D. Errede, C. Johnstone, K. Makino, K. Paul) and written paper titled "Stochastic Processes in Cooling Channels" presented at both ICAPO2 in Lansing, Michigan and CPO-6 in Maryland during fall 2002.

1999 : Convener for Fermilab Run 2 Workshop, Weak Boson and Photon subgroup.

Summer 1999: Taught graduate seminar class on accelerator physics with Fred Mills at U of I. 498ACC Accelerators: Theory and Applications. This is the first time such a class has been taught at the University of Illinois in the last 20 years, to my knowledge.

1998: Elected member of Fermilab's User's Executive Committee which included a trip to Washington DC to discuss the future of High Energy Physics with officials from DoE and members of Congress.

Member of **CDF (Collider Detector at Fermilab)** analysis group investigating multiple boson (Electroweak) physics. especially W-Photon and Z-Photon physics. In particular, measuring the background level of QCD jets mimicking photons in our data sets.

Importance of these research efforts:

CDF and D0 have produced the first results on trilinear gauge WWZ and $WW\gamma$ couplings from WW and WZ production, and $WW\gamma$, $ZZ\gamma$, and $Z\gamma\gamma$ couplings from $W\gamma$ and $Z\gamma$ production. All measurements are in agreement with the Standard Model, including those for WWZ coupling. This is the first direct evidence for nonzero WWZ coupling and for the resulting destructive interference between s-channel and t- and u- channel diagrams, providing the required gauge cancellation that is mandated by renormalizability of the Standard Model of electroweak interactions. A WWZ coupling of zero is excluded at the 99% CL, independent of the choice of form factor. (I point out that the Wg and Zg analysis measure the other couplings.)

1996-1998: Convener of CDF Electroweak analysis group, responsible for encouraging/overseeing electroweak analyses through to publication for the experiment.

1993-1996: Prototyped and tested front-end electronics board for CDF central muon system. The ASD-2 board (Amplifier-Shaper-Discriminator) read in the signal from both ends of a muon chamber wire, measured the amount of charge in each pulse and later by charge division

calculated the position of the initial pulse along the wire. The pulses were sent on to the TDC for drift time measurements and pulse width determination.

1991-1993 Involved in calibration of CDF muon ADC/TDC boards, including fitting fourth-order polynomials to timing curves for what was discovered by us to be heavily nonlinear electronics.

University of Wisconsin, Madison (at FNAL):

1987-1991: Post-doctoral Research Associate studying hadro-production of charm on E769 at Fermilab.

Helped bring up and maintain 14 beamline Transition Radiation Detectors (TRDs) used to separate pions from protons in the 250 GeV hadron beam. (The kaons were tagged with a beamline Cerenkov counter). The TRD project was run by Dr. Marleigh Sheaff of the University of Wisconsin at Madison.

Brought up, debugged and developed E769 reconstruction and analysis code on Amdahl, which involved learning a new operating system. Did tests that determined it would take more than 5 years to reconstruct the entire data set on this particular machine. This was necessary in order to encourage Fermilab to buy alternative adequate computing resources for E769. The birth of my daughter interrupted the Data Summary Tape project which was taken over and completed by Yale.

Part of team which measured E791 (Successor hadronically-produced charm experiment) magnetic field configuration (zip-tracking).

Principal Investigator

PI of UIUC subcontract (0.45M\$/year, 2000-2004) 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.

Education and Public Outreach:

Started new program of accelerator physics in the physics department at the UIUC (Fall 2001). Co-taught graduate course with Fred Mills "Accelerator Theory and Applications" 498ACC in Summer 1999 and again in 2007.

Summer students Stephanie Majewski, Jason Crnkovic, Lauren Ducas worked on the accelerator program investigating thin absorber windows, negative-coefficient resistive thermal devices, and studying RF cavities plus new scrubbing techniques, respectively. Majewski is presently on ATLAS and Crnkovic is doing UIUC graduate work with D. Herzog.

Member of Women's Studies General Council at UofI

Talks on the physics of airplanes for both **Saturday Honors Physics Program** at UofI (for the general public) and a colloquium at Illinois State University (Bloomington-Normal) titled **How Do Airplanes Work? : "Taking the Fear Out of Flying a Piper Archer II.**
November 1998 and April 1999

Talks:

Photon and Weak Boson Physics: Part 2
Plenary Session, QCD and Weak Boson Physics Run II Workshop
Fermilab, Batavia, IL
March 1999

Hadroproduction of Charm on E769 at Fermilab, August 1990, 25th International Conference on High Energy Physics, Singapore.

Hadroproduction of Charm on E769, April 1990, University of Chicago, Chicago, Illinois.

E769, A Hadroproduction of Charm Experiment and Beam-Tagging with TRDs, April 1989, University of Illinois, Urbana, Illinois.

Hadroproduction of Charm on E769, April 1988, University of Minnesota, Minneapolis, Minnesota.

Beam-Tagging with a TRD in a 250 GeV Hadron Beam, March 1988, International Conference on Advanced Technology and Particle Physics, Como, Italy.

and so on.

Publications:

D. Acosta, et al. Measurement of the lifetime difference between B_s mass eigenstates. Phys. Rev. Lett. **94**, 101803-1-7 (2005)

D. Acosta, et al. Measurement of partial widths and search for direct CP violation in D^0 meson decays to K^-/K^+ and p^-/p^+ . Phys. Rev. Lett. **94**, 122001-1-7 (2005)

A. Abulencia, et al. Search for $B_s^0 \rightarrow m^+ m^-$ and $B_d^0 \rightarrow m^+ m^-$ decays in $p p^-$ collisions with CDF II. Phys. Rev. Lett. **95**, 221805 (2005). Erratum-ibid. **95**, 249905 (2005).

D. Errede, K. Makino (UIUC), M. Berz (MSU), A. Van Ginneken, C. Johnstone, (FNAL), Stochastic Processes in Cooling Channels, Nucl. Instr. Meth. A **519**, 466 (2004).

D.M. Kaplan, et al. Progress in absorber R & D for muon cooling. Presented at *3rd International Workshop on Neutrino Factory based on Muon Storage Rings (NuFACT'01)*, Tsukuba, Japan, 24-30 May 2001. Nucl. Instrum. Meth. A **503**, 392-395 (2003).

[S. Ozaki, \(ed.\) et al.](#) Feasibility study two of a muon based neutrino source. BNL-52623, Jun 2001. 544pp.

and so on.

Ph.D. Thesis Advisor: Rudolf P. Thun

Thesis Title: "A Search for Sequential Neutrinos with HRS at PEP"