

## **David McGinnis Ph.D.**

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### **EXPERIENCE**

4/9/18 to present MAX IV LABORATORY - Lund, Sweden

- RF Group Leader / Accelerator Division

9/1/11 to 3/19/18 EUROPEAN SPALLATION SOURCE - Lund, Sweden

- Senior Accelerator Advisor / Accelerator Division
- Chief Engineer / Accelerator Division
- Radio Frequency Group Leader / Accelerator Division

6/6/88 to 8/7/11 FERMI NATIONAL ACCELERATOR LABORATORY - Batavia, IL

- Scientist with the Proton Source
- Visiting Professor at University of Chicago
- Adjunct Professor at Northern Illinois University
- Instrument Scientist with the 21cm Project
- Project X Initial Concept Project Leader
- Large Hadron Collider at Fermilab Accelerator Software Project Leader
- Associate Accelerator Division Head for Systems, Integration, and Operations
- Run II Upgrades Technical Manager
- Antiproton Source Department Head
- Scientist with the Beams Division Luminosity Upgrade Group
- Proton Source Department Head
- Booster Synchrotron Department Head
- Fermilab Linac Accelerator Upgrade Commissioner
- RF engineer for the Main Accelerator Department
- Ph.D. Thesis advisor to two graduate students.
- Adjunct Professor at Illinois Institute of Technology
- Microwave Electrical Engineer with the Fermilab Antiproton Source.

5/87 - 5/88 UNIVERSITY OF WISCONSIN - Madison, WI

Post-Doctoral Research Associate in the area of superconducting RF devices.

### **TEACHING EXPERIENCE**

**Visiting Professor at the University of Chicago Physics Dept.**

Spring 2011 UC408 [Radio Frequency and Microwave Physics Concepts and Techniques](#)

**Adjunct Professor at Northern Illinois University Electrical Engineering Dept.**

Fall 2008, 2009 ELE674 [Microwave Measurements and Beam Instrumentation Laboratory](#).

**Instructor for the [United States Particle Accelerator School](#)**

Teaching RF and Microwave Instrumentation and Measurement Techniques. Students are awarded full credit equivalent to graduate course at the host university. Taught at: [Duke University 1995](#); Beijing, China 1998; [Vanderbilt University 1999](#); [Stony Brook 2000](#);

[University of California, Los Angeles 2002](#); [University of California, Berkeley 2005](#); [Texas A&M University 2007](#); [University of California, Santa Cruz 2010](#); [University of Texas, Austin 2012](#); [Old Dominion University 2015](#).

#### **Ph.D. Thesis Advisor**

Ph.D. Thesis advisor to two graduate students in the Fermilab Accelerator Physics Program. The students were from the University of Wisconsin - Madison (graduated 1994) and University of Minnesota Physics Department.

#### **Adjunct Professor at Illinois Institute of Technology 1989-1991**

With the Electrical Engineering Department teaching transmission line theory and AC circuit analysis.

## **ACCOMPLISHMENTS**

#### **European Spallation Source Accelerator Division Chief Engineer**

Led the [redesign of the ESS linac](#) in 2012-2014 to reduce the cost of the linac by 75 million Euros. The redesign now forms the new baseline of the ESS accelerator complex.

#### **[AMERICAN PHYSICAL SOCIETY FELLOW](#)**

Elected in 2003 for important contributions in increasing the performance of the Fermilab Accelerator complex

#### **[SCIENTIST III](#)**

Promoted in 2008 for “for sustained leadership and fundamental technical contributions in achieving full realization of the performance potential of the Tevatron Collider; and for leadership in identifying future options for development of the Fermilab accelerator complex”. Scientist III is the highest tenured level at Fermilab and is equivalent to the tenure level of a full professor.

#### **Instrument Scientist with the 21cm Project**

Led the Fermilab effort in the 21 cm Cylindrical Radio Telescope Collaboration charged with developing instrument requirements and design. Member of the CHIME (Canadian Hydrogen Intensity Mapping Experiment) collaboration responsible for instrument simulations.

#### **PROJECT X**

Conceived the initial fundamental concept of the Fermilab Project X which is a superconducting linac based on ILC technology.

#### **ASSOCIATE ACCELERATOR DIVISION HEAD**

In charge of systems, integration, and operations of the Fermilab accelerator complex. Supervisor of seven systems department heads that oversees the activities of approximately 150 people. In charge of day-to-day operations of the Accelerator complex. Oversaw a factor of three increase in total integrated, weekly integrated and peak luminosity from June 2003 – June 2005. Member of the machine advisory committees for LHC, ILC, RHIC, and LANSCE

#### **RUN II UPGRADES Technical Manager**

Technical architect of the Run II upgrades. The project will last about four years and will involve 60 full time staff members. The total project cost is estimated at about \$30 million.

#### **FERMILAB ANTIPROTON SOURCE DEPARTMENT HEAD**

The Antiproton Source Department was the largest source of antiprotons in the world. The source consisted of two synchrotrons each with a circumference of 500 meters. The source also contained 10 microwave stochastic cooling systems with a total bandwidth spanning 1-8 GHz. Responsible for supervising a staff of 20 people which included eight Ph.D's . Oversaw the commissioning of the Antiproton Source for Run II. Invented the concept of the shot lattice and the 4-8 GHz transverse core cooling upgrade for a two-fold increase in beam brightness. Developed numerous instrumentation systems including antiproton closure systems for the Debuncher, Accumulator, and Tevatron.

#### **FERMILAB PROTON SOURCE DEPARTMENT HEAD**

The Proton Source Department is responsible for one third of all the accelerators at Fermilab. These accelerators include a 130 meter long, 400 MeV LINAC with a pulsed RF power output of 110 megawatts, and an 8 GeV rapid cycling synchrotron that is 475 meters in circumference. The department head is responsible for supervising a staff of 34 people, which includes six Ph.D's and six M.S.E.E's. The annual budget of the Proton Source Department is over two million dollars in materials and services.

#### **RF AND MICROWAVE ENGINEERING AT FERMILAB**

- Project leader for the Run II Accumulator 4-8 GHz Transverse Stochastic Cooling Upgrade.
- Conceived, designed, and oversaw the construction and commissioning of the Debuncher 4-8 GHz Stochastic Cooling Upgrade. Invented the concept of slotted waveguide slow-wave arrays to couple to the antiproton beam.
- Designed, constructed, and commissioned all the beam stabilization systems for the 1996-1997 Fermilab Fixed Target Run. - Employee Recognition Award on August 8, 1997 for work related to the 1996 Fixed Target Dampers.
- Introduced the concept using narrowband dampers for the Fermilab Booster. Designed and commissioned the Fermilab Booster narrow band damper system.
- Project leader of the Antiproton Source Stochastic Cooling Stack-Tail Upgrade. Invented the concept of planar loops.
- Project leader for the Debuncher Stochastic Cooling Transverse Aperture Upgrade

## **EDUCATION**

- 5/30/87 DOCTOR OF PHILOSOPHY IN ELECTRICAL ENGINEERING
- University of Wisconsin – Madison  
Research in the area of superconducting RF devices. Research for the thesis involved the fabrication of integrated superconducting Josephson Junction VFT circuits for use in a millimeter-wave distributed amplifier circuit.
- 12/31/84 MASTERS OF SCIENCE IN ELECTRICAL ENGINEERING
- University of Wisconsin – Madison  
Report topic: The Superconducting Vortex Flow Transistor.
- 5/31/83 MASTERS OF SCIENCE IN PHYSICS
- University of Illinois – Urbana
- 5/31/82 BACHELORS OF SCIENCE IN GENERAL ENGINEERING - Secondary field: Physics.
- University of Illinois – Urbana

## HONORS

- [Frank Rogers Bacon Fellowship](#) (Wisconsin)
- Hartman Fellowship Award (Cornell)
- Graduation with Highest Honors (Illinois)
- University Honors - Bronze Tablet (Illinois)
- Edmund J. James Scholar (Illinois)

## Publications

[“New Design Approaches for High Intensity Superconducting Linacs – The New ESS Linac”](#)  
Design” David McGinnis, 5th International Particle Accelerator Conference IPAC’14 Invited Talk

[“A Very Intense Neutrino Super Beam Experiment for Leptonic CP Violation Discovery based on the European Spallation Source Linac: A Snowmass 2013 White Paper”](#), E. Baussan et al,  
arXiv.org > hep-ex > arXiv:1309.7022

[“RF strip-line anodes for Psec large-area MCP-based photodetectors,”](#) Hervé Grabas et al,  
Nuclear Instruments and Methods in Physics Research Section A Accelerators Spectrometers  
Detectors and Associated Equipment 09/2013; 711:124–131.

[“A ground-based 21cm Baryon acoustic oscillation survey,”](#) Hee-Jong Seo Scott Dodelson John  
Marriner, Dave McGinnis, Albert Stebbins, Chris Stoughton, Alberto Vallinotto, The  
Astrophysical Journal, Volume 721, Number 1, August 2010

[“21 cm Intensity Mapping,”](#) J. Peterson et al, arXiv.org > astro-ph > arXiv:0902.3091

[“A Measurement of the Rate of type-Ia Supernovae at Redshift  \$z \approx 0.1\$  from the First Season of the SDSS-II Supernova Survey,”](#) SDSS Collaboration (Benjamin Dilday et al.), The Astrophysical  
Journal, Volume 682, Number 1, Jan 2008

[“First-Year Spectroscopy for the SDSS-II Supernova Survey,”](#) SDSS-II Collaboration (Chen Zheng  
et al.), The Astronomical Journal, Volume 135, Number 5, Feb 2008

[“The Sloan Digital Sky Survey-II Photometry and Supernova IA Light Curves from the 2005  
Data,”](#) SDSS-II Collaboration (Jon A. Holtzman et al.), The Astronomical Journal, Volume 136,  
Number 6, Dec 2008

[“The Sloan Digital Sky Survey-II Supernova Survey: Technical Summary,”](#) J. Frieman et al, The  
Astronomical Journal 12/2007; 135(1):338.

[“Beam decelerations with variable momentum compaction in the Fermilab anti-proton  
accumulator,”](#) D.P. McGinnis, G. Stancari, S.J. Werkema, Nuclear Instruments and Methods in  
Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment,  
Volume 506, Issue 3, 1 July 2003, Pages 205-216

["A Nondestructive fast beam profile monitor,"](#) W.S. Graves, V. Bharadwaj, D. McGinnis, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment Volume 364, Issue 1, 21 September 1995, Pages 13-18

["An Introduction to stochastic cooling,"](#) J. Marriner, D. McGinnis , The Physics of Particle Accelerators Vol. I, Volume 249, pp. 693-761, March 10, 1992

["Theory and Design of Microwave Planar Electrodes for Stochastic Cooling of Particle Beams,"](#) McGinnis, D.P, Microwave and Optical Technology Letters, Vol. 4, No. 11, October 1991.  
"Vortex Flow Devices," D. P. McGinnis, J. B. Beyer, and J. E. Nordman, Microwaves and RF, Vol. 27, No. 9, 71, September 1988.

["A broad-band microwave superconducting thin-film transformer,"](#) McGinnis, D.P., Beyer, J.B., Microwave Theory and Techniques, IEEE Transactions on , vol.36, no.11, pp.1521-1525, Nov 1988

["A cryogenic system for RF measurements on superconducting vortex flow transistors,"](#) McGinnis, D.P., Beyer, J.B., Nordman, J.E., Instrumentation and Measurement, IEEE Transactions on , vol.37, no.2, pp.274-276, Jun 1988

["Vector S-parameter measurements of the superconducting vortex flow transistor,"](#) McGinnis, D.P., Beyer, J.B., Nordman, J.E., Electron Devices, IEEE Transactions on , vol.35, no.2, pp.240-244, Feb 1988

["Gain measurements of the superconducting vortex flow transistor at high frequencies,"](#) McGinnis, D. P., Beyer, J. B., Nordman, J. E., Journal of Applied Physics , vol.63, no.8, pp.2828-2830, Apr 1988

["Distributed amplifier using Josephson vortex flow transistors,"](#) McGinnis, D. P., Beyer, J. B., Nordman, J. E., Journal of Applied Physics , vol.59, no.11, pp.3917-3919, Jun 1986

## Conference Proceedings

["The European Spallation Source,"](#) M. Lindroos, M. Eshraqi, D.P. McGinnis, FRYAA2 Proceedings of PAC2013, Pasadena, CA USA

["European Spallation Source Afterburner Concept,"](#) D.P. McGinnis, M. Lindroos, R. Miyamoto, THPWO073 Proceedings of IPAC2013, Shanghai, China

"Applications of High Power Induction Output Tubes in High Intensity Superconducting Proton Linacs," Frank Gerigk, M.R.F. Jensen, R. Garoby, M. Lindroos, D. McGinnis, E. Montesinos, A. Sunesson, 14th IEEE International Vacuum Electronics Conference, IVEC, Paris; 05/2013

["Design Options of the ESS Linac,"](#) M. Eshraqi, H. Danared, D.P. McGinnis, Proceedings of IPAC2013, Shanghai, China THPWO072

[“The ESS Linac Design,”](#) M. Lindroos, H. Danared, C. Darve, D.P. McGinnis, S. Molloy, TH2A01 Proceedings of LINAC2012, Tel-Aviv, Israel

[“Investigation of Feedback Control for Klystron Ripple,”](#) R. Zeng, D.P. McGinnis, S. Molloy, A.J. Johansson, Proceedings of IPAC2012, New Orleans, Louisiana, USA THPPC083

[“Control Performance Improvement by Using Feedforward in LLRF,”](#) R. Zeng, D.P. McGinnis, S. Molloy, A.J. Johansson, THPPC082 Proceedings of IPAC2012, New Orleans, Louisiana, USA

[“Upgrade Strategies for High Power Proton Linacs,”](#) M. Lindroos, H. Danared, M. Eshraqi, D.P. McGinnis, S. Molloy, S. Peggs, K. Rathsmann, R.D. Duperrier, J. Galambos, WEPS064 Proceedings of IPAC2011, San Sebastián, Spain

[“Debuncher cooling performance,”](#) P.F. Derwent, David McGinnis, Ralph Pasquinelli, David Vander Meulen, Steven Werkema, BEAM COOLING AND RELATED TOPICS: International Workshop on Beam Cooling and Related Topics - COOL05, March 2006

[“Performance and upgrades of the Fermilab Accumulator stacktail stochastic cooling,”](#) P.F. Derwent, Ed Cullerton, David McGinnis, Ralph Pasquinelli, Ding Sun, David Tinsley, BEAM COOLING AND RELATED TOPICS: International Workshop on Beam Cooling and Related Topics - COOL05, March 2006

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[“Slotted waveguide slow-wave stochastic cooling arrays,”](#) McGinnis, D., Particle Accelerator Conference, 1999. Proceedings of the 1999 , vol.3, no., pp.1713-1715 vol.3, 1999

[“The 4-8 GHz stochastic cooling upgrade for the Fermilab Debuncher,”](#) McGinnis, D., Particle Accelerator Conference, 1999. Proceedings of the 1999 , vol.1, no., pp.59-61 vol.1, 1999

[“Measurement and simulation results of Ti coated microwave absorber,”](#) Sun, D., McGinnis, D., Particle Accelerator Conference, 1999. Proceedings of the 1999 , vol.2, no., pp.854-856 vol.2, 1999

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["Bunched beam stochastic cooling in the Fermilab Tevatron Collider ,"](#) Jackson, G., Buchanan, E., Budlong, J., Harms, E., Hurh, P., McGinnis, D., Pasquinelli, R., Peterson, D., Poll, D., Seifrid, P., Particle Accelerator Conference, 1993., Proceedings of the 1993 , vol., no., pp.3533-3535 vol.5, 17-20 May 1993

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["Performance of the upgraded Stacktail Momentum Cooling system in the Fermilab antiproton source,"](#) Pasquinelli, R.J., McGinnis, D., Particle Accelerator Conference, 1993., Proceedings of the 1993 , vol., no., pp.2361-2363 vol.3, 17-20 May 1993

["A clean way to measure nonlinear momentum compaction factor  \$a\_1\$ ,"](#) Skan, J.P., Kourbanis, I., McGinnis, D., Ng, K.Y., Peggs, S., Particle Accelerator Conference, 1993., Proceedings of the 1993 , vol., no., pp. 35- 37 vol.1, 17-20 May 1993

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["Coupled bunch mode instabilities measurement and control,"](#) D.P. McGinnis, 1991 Accelerator Instrumentation Workshop, 28-31 Oct 1991, Newport News, Virginia

"Longitudinal damper for the SSC," D. Boussard, J. Bridges, J. Fox, D. McGinnis, Proceedings, Supercolliders and superdetectors, \*Erice 1991/1992, 173-180

["Coupled bunch dipole mode measurements of accelerating beam in the Fermilab Booster,"](#) McGinnis, D., Marriner, J., Bharadwaj, V., Particle Accelerator Conference, 1991. Accelerator Science and Technology., Conference Record of the 1991 IEEE , vol., no., pp.1255-1257 vol.2, 6-9 May 1991

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["Design of 4-8 GHz stochastic cooling equalizers for the Fermilab Accumulator,"](#) McGinnis, D., Marriner, J., Particle Accelerator Conference, 1991. Accelerator Science and Technology., Conference Record of the 1991 IEEE , vol., no., pp.1392-1394 vol.3, 6-9 May 1991

["Design of 4-8 GHz bunched beam stochastic cooling arrays for the Fermilab Tevatron,"](#) McGinnis, D., Budlong, J., Jackson, G., Marriner, J., Poll, D., Particle Accelerator Conference, 1991. Accelerator Science and Technology., Conference Record of the 1991 IEEE , vol., no., pp.1389-1391 vol.3, 6-9 May 1991

["A test of bunched beam stochastic cooling in the Fermilab Tevatron collider,"](#) Jackson, G., Buchanan, E., Budlong, J., Harms, E., Lee, G., Marriner, J., McGinnis, D., Pasquinelli, R., Peterson, D., Poll, D., Rohde, D., Seifrid, P., Voy, D., Particle Accelerator Conference, 1991. Accelerator Science and Technology., Conference Record of the 1991 IEEE , vol., no., pp.1758-1760 vol.3, 6-9 May 1991

"Bunched beam Schottky signal measurements for the Tevatron stochastic cooling system.," G. Jackson, J. Marriner, D. McGinnis, R. Pasquinelli, D. Peterson, Workshop On Advanced Beam Instrumentation (ABI) 22-24 Apr 1991, Tsukuba, Japan

["Operation of the Fermilab Accumulator for Medium Energy Proton-Antiproton Physics,"](#) V. Bharadwaj, C. Bhat, D. Broemmelsiek, M. Church, M. Gormley, A. Hahn, E. Harms, S. Y. Hsueh, G. Jackson, J. MacLachlan, J. Marriner, D. McGinnis, J. Peoples, P. Rapidis, X. Q. Wang, S.



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"[Single superconducting thin film devices for applications in high T<sub>c</sub> materials circuits](#)," Hohenwarter, G.K.G., Martens, J.S., McGinnis, D.P., Beyer, J.B., Nordman, J.E., Ginley, D.S., Magnetics, IEEE Transactions on , vol.25, no.2, pp.954-956, Mar 1989

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## Technical Notes

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[“Transit Time Equivalent Circuit for a Superconducting RF Cavity,”](#) D. McGinnis, ESS Docs Document 294, 8 Aug 2013

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[“Run III: Continued Running of the Tevatron Collider Beyond 2011,”](#) C. Hill, et al, Fermilab Beams Document 3617, May 2010

[“Collider Super-Table for a Modern Hadron Collider,”](#) D. McGinnis, Fermilab Beams Document 3201, May 2010

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[“Signal to Noise for an FFT Antenna array,”](#) D. McGinnis, Fermilab Projects Document 653, October 2009

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[“Fermilab Morocco Site Visit Summary,”](#) D. McGinnis, Ralph Pasquinelli, Fermilab Projects Document 432, February 2009

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[“Bandwidth Effects of Superconducting RF Cavity Controlled with a Vector Phase Modulator,”](#) D. McGinnis, Fermilab Beams Document 2959, December 2007

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