Daniel Gonnella *June 5, 1989*

dan.gonnella@gmail.com • +1 (585) 615-0018 • http://lepp.cornell.edu/∼dg433
224 Northwood Drive, Rochester, NY 14612

Summary

I am currently a graduate research assistant in Cornell's Superconducting Radio Frequency (SRF) Group. We focus on designing and optimizing niobium SRF cavities to be used in current and future particle accelerators. As part of my research, I have been trying to answer a few fundamental questions: What is the highest quality factor that can be achieved in modern SRF cavities? What methods can we develop that can achieve those high quality factors? What limits the maximum quality factor a cavity can reach and can those limitations be mitigated? How does doping cavities with impurities affect performance?

I have been intimately involved with the High Q_0 program for the proposed LCLS-II machine at SLAC. My work has focused on developing a cavity preparation method that can be used on cavities for LCLS-II and to study the properties of those cavities. Specifically, I have been looking at the maximum accelerating fields that can be reached and the susceptibility of the cavities to ambient magnetic field.

Education

Cornell University — Ithaca, New York
Ph.D., Physics — *Expected, Spring 2016*
M.S., Physics — *April 2014*

Clarkson University — Potsdam, New York
B.S., Physics & B.S., Mathematics (GPA: 3.94/4.0) — *May 2011*

Research Experience

Cornell University — Ithaca, New York
Ph.D. Student — *December 2011 – Present*

- Performed experimental and theoretical studies on superconducting RF cavities for use in particle accelerators. Specifically looking at preparation methods to reach high quality factors.
- Developed a research plan for studying the effects of doping niobium SRF cavities with impurities to improve cryogenic efficiency from theoretical diffusion models through single-cell cavities and fully dressed 9-cell cavities in a cryomodule.
- Studied the effects of external magnetic fields on cavity performance from small-scale experiments to full cryomodule tests. Gained skills in leadership and project management while developing a research plan that involved more than 15 technicians and research associates.
- Led a team of approximately 10 scientists, engineers, technicians, and graduate students in order to conduct five individual tests on fully dressed prototype LCLS-II cavities in a test cryomodule. This involved leading meetings, planning experiments, organizing work, collecting and analyzing data, and delegating tasks.

Undergraduate Research Assistant — *June 2009 – August 2009*

- Worked on the Cornell Electron Storage Ring Test-Accelerator (CesrTA) project developing theoretical models and experimental data.
- Conducted low emittance research to better understand the properties of the Storage Ring.
- Contributed to research that will be used in the design of the International Linear Collider's Storage Rings.
- Honed skills in computer programming and data analysis.
- Refined skills in task-management and independent research.

University of Rochester — Rochester, New York
Undergraduate Research Assistant — *June 2010 – August 2010*

- Worked on the design and implementation of a diffraction grating feedback external cavity diode laser (ECDL) and an interference-filter feedback ECDL.
- Independently developed an algorithmic locking technique to ensure that the lasers operate at a stable frequency using Doppler-free saturation Absorbtion Spectroscopy in Rubidium.
- Learned to conduct research in both independent and group-based settings.

Clarkson University — Potsdam, New York

Physics Team Design Mentor — *August 2008 – May 2009*

- Assisted members of the Freshman Physics Team Design Program in designing and conducting various experiments to model the kinematics of a toy car (fall semester) and an electric train (spring semester).
- Gained leadership experience in a research setting.

Teaching Experience

Cornell University — Ithaca, New York

REU and SRCCS Mentor — *May 2012 – Present*

- Mentored undergraduate students participating in the Cornell Research Experience for Undergraduates (REU) and Summer Research for Community College Students (SRCCS) programs.
- Helped to guide aspiring scientists through research projects related to SRF. Learned skills in mentorship and project management.

Graduate Teaching Assistant, General Physics I — *August 2011 – December 2011*

- Responsible for 14-hours of individualized instructing and grading per week. Students learned the concepts of kinematics, Newtonian mechanics, and thermodynamics in an independent study setting.

Graduate Teaching Assistant, Oscillations, Waves, and Quantum Physics — *January 2013 – May 2013*

- Responsible for giving 4 hours of lecture and 1 hour of lab instruction per week. Students learned concepts in simple harmonic motion, sound and light waves, and quantum mechanics.

Clarkson University — Potsdam, New York

Teaching Assistant, Physics for Life Sciences — *August 2009 – May 2011*

- Taught topics including Newtonian Mechanics, Electrodynamics, Magneostatics, Thermodynamics, and Modern Physics to undergraduate students.

Skills

Technical specialties: Fluent in Matlab/Octave for programming, data analysis, and hardware control. Working knowledge of C, C++, Python, and EPICS. Experience with LabView for hardware control. Solid knowledge of AutoCAD software. Fluent with Microsoft Office and LaTeX.

Hands-on Skills: Strong experimental background including experimental design and project management. Extensive experience with clean-room practices and RF microwave equipment.

Oral Presentations

Invited Orals

[1] D. Gonnella, D.L. Hall, and M. Liepe. Mean Free Path Dependence of Losses from Trapped Magnetic Flux. Whistler, BC, Canada, September 2015. JaCoW.

Contributed Orals

[1] D. Gonnella, M. Liepe, and S. Posen. Quench and Trapped Flux Studies at Cornell. In *The 7th SRF Materials Workshop, TJNAF, Newport News, VA, USA*, TJNAF, Newport News, VA, USA, July 2012.

[2] D. Gonnella and M. Liepe. Cavity Testing for High Q. In *The Tesla Technology Collaboration Workshop, DESY, Hamburg, Germany*, DESY, Hamburg, Germany, March 2014.

[3] D. Gonnella and M. Liepe. Effects of External Magnetic Field on Cavity Performance. In *The Tesla Technology Collaboration Workshop, DESY, Hamburg, Germany*, DESY, Hamburg, Germany, March 2014.

[4] D. Gonnella, N. Valles, and M. Liepe. Experience with Cavity Performance: Changes from Vertical to Cryomodule Test. In *The Tesla Technology Collaboration, DESY, Hamburg, Germany*, DESY, Hamburg, Germany, March 2014.

[5] D. Gonnella and M. Liepe. Experience with Cavity Testing at Cornell. In *The Tesla Technology Collaboration, KEK, Tsukuba, Japan*, KEK, Tsukuba, Japan, December 2014.

[6] D. Gonnella and M. Liepe. Impact of Cool-Down Procedure and Residual Field on High Q0 at Cornell. In *The Tesla Technology Collaboration Workshop, KEK, Tsukuba, Japan*, KEK, Tsukuba, Japan, December 2014.

[7] D. Gonnella, M. Ge, F. Furuta, and M. Liepe. Update on Nitrogen Doping at Cornell. In *The Tesla Technology Collaboration Workshop, KEK, Tsukuba, Japan*, KEK, Tsukuba, Japan, December 2014.

[8] D. Gonnella. Vertical and Horizontal High Q Testing - Lessons Learned for LCLS-II. In *The LCLS-II Testing Workshop*, Fermilab, Batavia, IL, USA, October 2015.

[9] D. Gonnella. Possible Field Dependence of Superconducting Properties in N-Doped Cavities. In *The Tesla Technology Collaboration Workshop, SLAC, Menlo Park, CA, USA*, SLAC, Menlo Park, CA, USA, December 2015.

Publications

Peer-Reviewed Publications

[1] N. Valles, M. Liepe, F. Furuta, M. Gi, D. Gonnella, Y. He, K. Ho, G. Hoffstaetter, D. S. Klein, T. O'Connell, S. Posen, P. Quigley, J. Sears, G. Q. Stedman, M. Tigner, and V. Veshcherevich. The main linac cavity for Cornell's energy recovery linac: Cavity design through horizontal cryomodule prototype test. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, 734, Part A(0):23–31, 2014.

[2] D. Gonnella, R. Eichhorn, F. Furuta, M. Ge, D. Hall, V. Ho, G. Hoffstaetter, M. Liepe, T. O' Connell, S. Posen, P. Quigley, J. Sears, V. Veshcherevich, A. Grassellino, A. Romanenko, and D. A. Sergatskov. Nitrogen-doped 9-cell cavity performance in a test cryomodule for LCLS-II. *J. Appl. Phys.*, 117:023908, 2015.

Conference Proceedings

[1] Dan Gonnella, Sam Posen, and Matthias Liepe. Quench Studies of a Superconducting RF Cavity. In *Proceedings of IPAC 2012, New Orleans, LA, USA*, number WEPPC071, pages 2375–2377, New Orleans, LA, USA, May 2012. JaCoW.

[2] Dan Gonnella, Nicholas Valles, and Matthias Liepe. Automated Cavity Test Suite for Cornell's ERL Program. In *Proceedings of IPAC 2012, New Orleans, LA, USA*, number WEPPC070, pages 2372–2374, New Orleans, LA, USA, May 2012. JaCoW.

[3] M. Liepe, F. Furuta, M. Ge, D. Gonnella, Y. He, G. Hoffstaetter, T. O'Connell, S. Posen, P. Quigley, J. Sears, E. Smith, M. Tigner, N. Valles, and V. Veshcherevich. Progress on Superconducting RF Work for the Cornell ERL. In *Proceedings of IPAC 2012, New Orleans, LA, USA*, number WEPPC073, pages 2381–2383, New Orleans, LA, USA, May 2012. JaCoW.

[4] S. Posen, D. Gonnella, G. Hoffstaetter, M. Liepe, and J. Oh. Residual Resistance Studies at Cornell. In *Proceedings of IPAC 2012, New Orleans, LA, USA*, number WEPPC079, pages 2393–2395, New Orleans, LA, USA, May 2012. JaCoW.

[5] N. Valles, F. Furuta, M. Ge, D. Gonnella, Y. He, V. Ho, G. Hoffstaetter, M. Liepe, T. O'Connell, S. Posen, P. Quigley, J. Sears, M. Tigner, and V. Veshcherevich. Testing of the Main-Linac Prototype Cavity in a Horizontal Test Cryomodule for the Cornell ERL. In *Proceedings of IPAC 2012, New Orleans, LA, USA*, number WEPPC075, pages 2387–2389, New Orleans, LA, USA, May 2012. JaCoW.

[6] D. Gonnella and M. Liepe. High Q0 Studies at Cornell. In *Proceedings of SRF 2013, Paris, France*, number TUP027, pages 478–482, Paris, France, September 2013. JaCoW.

[7] D. Gonnella, R. French, and M. Liepe. Investigation of Spatial Variation of the Surface Resistance of a Superconducting RF Cavity. In *Proceedings of SRF 2013, Paris, France*, number TUP028, pages 483–486, Paris, France, September 2013. JaCoW.

[8] D. Gonnella, M. Liepe, and A. Grassellino. Performance of a FNAL Nitrogen Treated Superconducting Niobium Cavity at Cornell. In *Proceedings of SRF 2013, Paris, France*, number TUP026, pages 475–477, Paris, France, September 2013. JaCoW.

[9] G.R. Eichhorn, B. Bullock, B. Clasby, B. Elmore, F. Furuta, M. Ge, D. Gonnella, D. Hall, A. Ganshin, Y. He, V. Ho, G.H. Hoffstaetter, J. Kaufman, M. Liepe, T. O'Connell, S. Posen, P. Quigley, J. Sears, E. Smith, V. Shemelin, and V. Veshcherevich. High Q Cavities for the Cornell ERL Main Linac. In *Proceedings of SRF 2013, Paris, France*, number THIOB02, pages 844–849, Paris, France, September 2013. JaCoW.

[10] M. Ge, F. Furuta, D. Gonnella, G. Hoffstaetter, M. Liepe, and H. Padamsee. Investigation of the Surface Resistivity of SRF Cavities Via the Heat and SRIMP Program as Well as the Multi-Cell T-Map System. In *Proceedings of SRF 2013, Paris, France*, number TUP105, pages 724–727, Paris, France, September 2013. JaCoW.

[11] D. Gonnella, F. Furuta, and M. Liepe. Heat Treatment of SRF Cavities in a Low-Pressure Atmosphere. In *Proceedings of SRF 2013, Paris, France*, number TUP029, pages 487–489, Paris, France, September 2013. JaCoW.

[12] D.L. Hall, D.A. Gonnella, and M. Liepe. Quality Factor Measurements of the Ultramet 3 GHz Cavity Constructed Using Chemical Vapour Deposition. In *Proceedings of SRF 2013, Paris, France*, number TUP072, pages 607–610, Paris, France, September 2013. JaCoW.

[13] N. Valles, R. Eichhorn, F. Furuta, M. Ge, D. Gonnella, D. Hall, Y. He, V. Ho, G. Hoffstaetter, M. Liepe, T. O'Connell, S. Posen, P. Quigley, J. Sears, and V. Veshcherevich. Record Quality Factor Performance of the Prototype Cornell ERL Main Linac Cavity in the Horizontal Test Cyromodule. In *Proceedings of SRF 2013, Paris, France*, number MOP071, pages 300–304, Paris, France, September 2013. JaCoW.

[14] N. Valles, R. Eichhorn, F. Furuta, M. Ge, D. Gonnella, D. Hall, Y. He, V. Ho, G. Hoffstaetter, M. Liepe, T. O'Connell, S. Posen, P. Quigley, J. Sears, and V. Veshcherevich. Cryomodule Performance of the Main Linac Prototype Cavity for Cornell's Energy Recovery Linac. In *Proceedings of NAPAC 2013, Pasadena, CA, USA*, number THPMA07, pages 1367–1369, Pasadena, CA, USA, December 2013. JaCoW.

[15] A. Crawford, R. Eichhorn, F. Furuta, G.M. Ge, R.L. Geng, D. Gonnella, A. Grassellino, A. Hocker, G. Hoffstaetter, M. Liepe, O. Melnychuk, A.D. Palczewski, C. Reece, A. Romanenko, M. Ross, A. Rowe, and D.A. Sergatskov. The Joint High Q0 R&D Program for LCLS-II. In *Proceedings of IPAC 2014, Dresden, Germany*, number WEPRI062, pages 2627–2630, Dresden, Germany, June 2014. JaCoW.

[16] Dan Gonnella and Matthias Liepe. Flux Trapping in Nitrogen-Doped and 120C Baked Cavities. In *Proceedings of IPAC 2014, Dresden, Germany*, number WEPRI063, pages 2631–2633, Dresden, Germany, June 2014. JaCoW.

[17] S. Posen, D. Gonnella, and M. Liepe. Recent Progress in Nb3Sn SRF Cavity Development at Cornell. In *Proceedings of IPAC 2014, Dresden, Germany*, number WEPRI066, pages 2641–2644, Dresden, Germany, June 2014. JaCoW.

[18] Dan Gonnella and Matthias Liepe. New Insights into Heat Treatment of SRF Cavities in a Low-Pressure Nitrogen Atmosphere. In *Proceedings of IPAC 2014, Dresden, Germany*, number WEPRI064, pages 2634–2637, Dresden, Germany, June 2014. JaCoW.

[19] D.L. Hall, A. Bartnkik, M.G. Billing, D.A. Gonnella, G.H. Hoffstaetter, M. Liepe, and C. Mayes. Beam-Based HOM Measurements in Cornell's ERL Main Linac Cavity. In *Proceedings of IPAC 2014, Dresden, Germany*, number MOPRO113, pages 359–362, Dresden, Germany, June 2014. JaCoW.

[20] D.L. Hall, M. Liepe, D.A. Gonnella, and I.S. Madjarov. SRF Material Performance Studies Using a Sample Host Cavity. In *Proceedings of IPAC 2014, Dresden, Germany*, number WEPRI065, pages 2638–2640, Dresden, Germany, June 2014. JaCoW.

[21] Dan Gonnella, Mingqi Ge, Fumio Furuta, and Matthias Liepe. Nitrogen Treated Cavity Testing at Cornell. In *Proceedings of LINAC 2014, Geneva, Switzerland*, number THPP016, Geneva, Switzerland, September 2014. JaCoW.

[22] Dan Gonnella and Matthias Liepe. Cool Down and Flux Trapping Studies on SRF Cavities. In *Proceedings of LINAC 2014, Geneva, Switzerland*, number MOPP017, Geneva, Switzerland, September 2014. JaCoW.

[23] D. Gonnella, R. Eichhorn, F. Furuta, M. Ge, D. Hall, Y. He, G. Hoffstaetter, M. Liepe, T. O'Connell, S. Posen, P. Quigley, J. Sears, V. Veshcherevich, A. Grassellino, and A. Romanenko. Nitrogen-Doped 9-Cell Cavity Performance in the Cornell Horizontal Test Cryomodule. In *Proceedings of LINAC 2014, Geneva, Switzerland*, number MOPP018, Geneva, Switzerland, September 2014. JaCoW.

[24] D. Gonnella, F. Furuta, M. Ge, J. Kaufman, M. Liepe, and J.T. Maniscalco. Update on Nitrogen-Doping: Quench Studies and Sample Analysis. In *Proceedings of IPAC 2015, Richmond, VA, USA*, number WEPTY073, Richmond, VA, USA, May 2015. JaCoW.

[25] J.T. Mansicalco, D. Gonnella, M. Liepe, and S. Posen. Hc2 Measurements of Nb3Sn and Nitrogen-Doped Niobium Using Physical Property Measurement System. In *Proceedings of IPAC 2015, RIchmond, VA, USA, May 2015*, number WEPTY075, Richmond, VA, USA, May 2015. JaCoW.

[26] D. Gonnella, R. Eichhorn, F. Furuta, M. Ge, D.L. Hall, Y. He, V. Ho, G. Hoffstaetter, M. Liepe, J.T. Maniscalco, T. O'Connell, S. Posen, P. Quigley, J. Sears, V. Veshcherevich, A. Grassellino, C. Grimm, and O. Melnychuk. Update on Nitrogen-Doped 9-Cell Cavity Performance in the Cornell Horizontal Test Cryomodule. In *Proceedings of IPAC 2015, Richmond, VA, USA*, number WEPTY072, Richmond, VA, USA, May 2015. JaCoW.

[27] F. Furuta, B. Clasby, R.G. Eichhorn, B. Elmore, G.M. Ge, D. Gonnella, D.L. Hall, G.H. Hoffstaetter, R.P.K. Kaplan, J.J. Kaufman, M. Liepe, J.T. Maniscalco, T. O'Connell, S. Posen, P. Quigley, D.M. Sabol, J. Sears, E. Smith, and V. Veshcherevich. Performance of the Cornel ERL Main Linac Prototype Cryomodule. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number FRAA04, Whistler, B.C., Canada, 2015. JaCoW.

[28] F. Furuta, R.G. Eichhorn, G.M. Ge, D. Gonnella, D.L. Hartill, G.H. Hoffstaetter, J.J. Kaufman, M. Liepe, and E. Smith. Multi-Cell T-Mapping and Conclusions. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number TUPB081, Whistler, B.C., Canada, 2015. JaCoW.

[29] D. Gonnella, B. Clasby, R.G. Eichhorn, B. Elmore, F. Furuta, G.M. Ge, D.L. Hall, Y. He, G.H. Hoffstaetter, J.J. Kaufman, P.N. Koufalis, M. Liepe, J.T. Mansicalco, T. O'Connell, P. Quigley, D.M. Sabol, E.N. Smith, V. Veshcherevich, A. Grassellino, C.J. Grimm, O.S. Melnyschuk, A. Romanenko, and D.A. Sergatoskov. Cryomodule Testing of Nitrogen-Doped Cavities. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number MOPB041, Whistler, B.C., Canada, 2015. JaCoW.

[30] D. Gonnella, T. Gruber, P.N. Koufalis, M. Liepe, and J.T. Maniscalco. Fundamental Studies on Doped SRF Cavities. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number MOPB042, Whistler, B.C., Canada, 2015. JaCoW.

[31] D. Gonnella, D.L. Hall, and M. Liepe. Mean Free Path Dependence of Losses from Trapped Magnetic Flux. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number MOBA03, Whistler, B.C., Canada, September 2015 2015. JaCoW.

[32] A. Grassellino, M. Checchin, A.C. Crawford, C.J. Grimm, A. Hocker, M. Martinello, O.S. Melnychuk, J.P. Ozelis, A.M. Rowe, D.A. Sergatskov, G. Wu, D. Gonnella, M. Liepe, and J.M. Vogt. Preservation of Very High Quality Factors of 1.3 GHz Nine Cells from Bare Vertical Test to Dressed Horizontal Test. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number MOPB028, Whistler, B.C., Canada, 2015. JaCoW.

[33] P.N. Koufalis, D. Gonnella, M. Liepe, and J.T. Maniscalco. Understanding the Field Dependence of the Surface Resistance of SRF Cavities. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number MOPB004, Whistler, B.C., Canada, 2015. JaCoW.

[34] M. Liepe, P. Bishop, H. Conklin, R.G. Eichhorn, F. Furuta, G.M. Ge, D. Gonnella, T. Gruber, D.L. Hall, G.H. Hoffstaetter, J.J. Kaufman, G. Kulina, J.T. Maniscalco, T. O'Connell, P. Quigley, D.M. Sabol, J. Sears, V. Veshcherevich, M. Checchin, A.C. Crawford, A. Grassellino, C.J. Grimm, A. Hocker, M. Martinello, O.S. Melnychuk, J.P. Ozelis, A. Romanenko, A.M. Rowe, D.A. Sergatskov, W.M. Soyars, R.P. Stanek, G. Wu, A.D. Palczweski, and C.E. Reece. LCLS-II SRF Cavity Processing Protocol Development and Baseline Cavity Performance Demonstration. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number MOPB033, Whistler, B.C., Canada, 2015. JaCoW.

[35] M. Liepe, B. Clasby, R.G. Eichhorn, B. Elmore, F. Furuta, G.M. Ge, D. Gonnella, T. Gruber, D.L. Hall, G.H. Hoffstaetter, J.J. Kaufman, P.N. Koufalis, J.T. Maniscalco, T. O'Connell, P. Quigley, D.M. Sabol, J. Sears, E. Smith, and V. Veshcherevich. Nioibum Impurity -Doping Studies at Cornell and CM Cooldown Dynamic Effect on Q0. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number MOBA08, Whistler, B.C., Canada, 2015. JaCoW.

[36] J.T. Maniscalco, D. Gonnella, D.L. Hall, M. Liepe, and E.N. Smith. Hc2 Measurements of Superconductors. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number MOPB006, Whistler, B.C., Canada, 2015. JaCoW.

[37] A.D. Palczewski, G.K. Davis, F. Furuta, G.M. Ge, D. Gonnella, and M. Liepe. Performance of Dressed Cavities for the Jefferson Laboratory LCLS-II Prototype Cryomodule. In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number MOPB040, Whistler, B.C., Canada, 2015. JaCoW.

[38] W. Schappert, J.P. Holzbauer, Y.M. Pischalinikov, D. Gonnella, and M. Liepe. Resonance Control for Narrow Bandwidth Superconducting RF Applications In *Proceedings of the 17th Workshop on RF Superconductivity, Whistler, B.C., Canada*, number TUPB095, Whistler, B.C., Canada, 2015. JaCoW.