

## CURRICULUM VITAE

January 26, 2016

Donald Cronin Schmadel

Physics Department  
University of Maryland  
College Park, MD 20742

301-405-6141 (office)

301-325-5353 (cell)

email: [schmadel@physics.umd.edu](mailto:schmadel@physics.umd.edu)

web page: [www2.physics.umd.edu/~schmadel/](http://www2.physics.umd.edu/~schmadel/)

## PERSONAL

Date of Birth: May 8, 1952

Birth Place: Pittsburgh, PA

Nationality: US Citizen

Married

## EDUCATION

B.S., Physics (Departmental Honors)

University of Pittsburgh

1974.

Ph.D., Physics

University of Maryland at College Park

2002

## EMPLOYMENT

Associate Research Scientist, Physics Department, University of Maryland, College Park; 2010 to 2014. As Principal Investigator for the Quantum Optical Microscope program, set up laser laboratory to generate entangled photon pairs. Invented graphene terahertz generator and emitter. Also consulted for the Department of Environmental Safety DES on projects involving electrical safety including work with the Center for Advanced Life Cycle Engineering CALCE for Destructive Physical Analysis. This work involved identifying any safety hazards along with methods and alternative hardware for mitigation. Additionally, supervised students involved in projects and experiments in programs under the Materials Research Science and Engineering Center as well as the Laboratory for Physical Sciences.

Assistant Research Scientist, Physics Department, University of Maryland, College Park; 2005 to 2010. Measured the real and imaginary Hall angle in the mid- and far infrared for high temperature superconductors. Investigated the high frequency response of plasmonic particles formed into regular arrays as gratings. Co-invented quantum optical imaging system and obtained funding to investigate and develop the concept.

Associate Researcher, Physics Department, University of Maryland, at College Park; 2002 to present. Set up laboratory procedure involving buffered hydrofluoric acid to etch optical fiber into very complex shapes. Invented and developed novel methods and means for illumination and detection in Near-field Scanning Optical Microscope (NSOM) imaging. Measured the real and imaginary Hall angle in the mid-infrared for underdoped  $\text{YBa}_2\text{Cu}_3\text{O}_7$  films. Established proof of concept for a high resolution imaging system to examine integrated circuit features buried within the silicon wafer.

Research Assistant, Physics Department, University of Maryland, at College Park; 1995 to present. Designed and set up laser laboratory facility to measure the cyclotron resonance in high temperature superconductors. This involved working with Facilities Management to move existing walls and install required infrastructure. Measured the real and imaginary Hall angle in the mid-infrared for  $\text{YBa}_2\text{Cu}_3\text{O}_7$  and  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$  films using a novel photoelastic modulator system with in situ calibration. Developed a novel high-speed rotator for measuring the polarization of an optical beam illuminating cryogenic samples located within an intense magnetic field.

President, Tensor Technologies Corp, 2003 to present: Manufacture scientific equipment. Provide consultant services for optical systems, e.g., holographic memory, optical cryostats, FTIR, etc.

Chief Scientist, Comptic, Inc., Washington, DC; 1994-present. Researched and evaluated existing optical computing technologies. Invented and engineered an optical transform generator to produce Fourier transforms of objects, pictures and scenes particularly useful in recognition and identification. Invented an all optical multichannel switch for optical fiber communications.

Manager of Engineering, PTI, Phoenix, AZ; 1988-1989. Set up engineering department whose mission was to support and improve existing capillary tube and optical fiber manufacturing effort and to develop new products with applications in medicine, biology, and analytical chemistry.

Department Staff Engineer, Hughes Aircraft, Electro-Optic Data Systems Group, 1985-1988. Developed virtual image displays to reduce eyestrain and eliminate ocular refocusing when viewing automobile instrument clusters. Established optical device lab with vacuum deposition, diffusion bonding, and reactive ion beam etching capability. Invented and developed amalgamation bond process for the fabrication of shared aperture devices used for focusing laser beams through atmospheric turbulence.

Physicist, Optelecom Inc., Gaithersburg, MD; 1978-1984. Established and managed optical sensing research facility consisting of three laboratories. Invented and developed passive and active, optical interferometric systems using holography, CVD, ion beam etching, external cavity diode lasers, ring dye lasers, single mode fiber, etc. Built the first sodium discharge pumped dye laser and communicated results in a deposition for litigation over the inventorship of the laser.

## PRESENTATIONS

Aspen Winter Conference on High Temperature Superconductivity January 9-15, 2005  
IR Hall Effect Evidence for Fermi Pockets in the Pseudogap State of the Cuprates  
Invited Talk: 45 minutes

High Temperature Superconductivity Seminar, Superconductivity Center, University of Maryland,  
February 2005  
IR Hall Effect Evidence for Fermi Pockets in the Pseudogap State of  $\text{YBa}_2\text{Cu}_3\text{O}_7$  Films  
1 hour talk

High Temperature Superconductivity Seminar, Superconductivity Center, University of Maryland,  
February 2005 IR Hall Effect Evidence for Fermi Pockets in the Pseudogap State of  $\text{Pr}_{1-x}\text{-Ce}_x\text{CuO}_4$   
1 hour talk

APS Centennial Meeting, March 1999, Atlanta, GA  
Quasiparticle Cyclotron Resonance in Superconducting  $\text{YBa}_2\text{Cu}_3\text{O}_7$  Films  
10 minute talk

Superconductivity Seminar, Superconductivity Center, University of Maryland: May 1999  
Cyclotron Resonance of Quasiparticles in Superconducting  $\text{YBa}_2\text{Cu}_3\text{O}_7$  Films  
10 minute talk

Superconductivity Seminar, Superconductivity Center, University of Maryland: October 1999  
Vortex Lattice and Cyclotron Resonance response in Superconducting  $\text{YBa}_2\text{Cu}_3\text{O}_7$  Films  
10 minute talk

APS Meeting, March 1998  
Faraday Rotation by Cyclotron Resonance in a GaAs Heterojunction  
D.C. Schmadel, J. Cerne, H.D. Drew, K.D. Maranowski, A.C. Gossard  
10 minute talk

APS Meeting, March 1998  
Infrared Circular Dichroism and Faraday Rotation Measurements of Metal and High-Temperature  
Superconductor Thin Films using a Novel Polarization Modulation Technique  
J. Cerne, D.C. Schmadel, J.R. Simpson, H.D. Drew, P.J. Kung, R. Hughes  
10 minute talk

APS Meeting, March 1996  
Low-field Giant Magnetoresistance at Microwave Frequencies  
D. C. Schmadel, S. D. Tyagi, S. E. Lofland, M. Dominguez, S. M. Bhagat, C. Kwon, M. C.  
Robson, R. Ramesh, T. Venkatesan  
10 minute talk

## PUBLICATIONS

"Proposal for a Graphene Plasmonic THz Emitter" Don Schmadel, Gregory S. Jenkins, H. Dennis Drew; arXiv:1311.1605 (2014)

"Probing limits on spatial resolution using nonlinear optical effects and nonclassical light" Y. Leng, D. H. Park, D. Schmadel, V. E. Yun, W. N. Herman, J. Goldhar; Appl Opt. 2014 Jan 1;53(1):51-63. doi: 10.1364/AO.53.000051 (2014)

"Giant plateau in the terahertz Faraday angle in gated  $\text{Bi}_2\text{Se}_3$ " Jenkins, Gregory S.; Sushkov, Andrei B.; Schmadel, Don C.; Kim, M.-H.; Brahlek, Matthew; Bansal, Namrata; Oh, Seongshik; Drew, H. Dennis Drew; Phys. Rev. B 86, 235133 (2012) DOI: <http://dx.doi.org/10.1103/PhysRevB.86.235133>

"Dirac cone shift of a passivated topological  $\text{Bi}_2\text{Se}_3$  interface state" Gregory S. Jenkins, Andrei B. Sushkov, Don C. Schmadel, Max Bichler, Gregor Koblmueeller, Matthew Brahlek, Namrata Bansal, Seongshik Oh, H. Dennis Drew; PhysRevB.87.155126, (2012) DOI: 10.1103/PhysRevB.87.155126

"Terahertz Hall measurements on optimally doped single-crystal  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+x}$ " G. S. Jenkins, D. C. Schmadel, A. B. Sushkov, G. D. Gu, H. Kontani, and H. D. Drew; Phys. Rev. B 82, 094518 (2010)

"Terahertz Kerr and reflectivity measurements on the topological insulator  $\text{Bi}_2\text{Se}_3$ " G. S. Jenkins, A. B. Sushkov, D. C. Schmadel, N. P. Butch, J. Paglione, and H. D. Drew; Phys. Rev. B 82, 125120 (2010)

"Far-infrared cyclotron resonance and Faraday effect in  $\text{Bi}_2\text{Se}_3$ "; A. B. Sushkov, G. S. Jenkins, D. C. Schmadel, N. P. Butch, J. Paglione, and H. D. Drew; Phys. Rev. B 82, 125110 (2010)

"Simultaneous measurement of circular dichroism and Faraday rotation at terahertz frequencies utilizing electric field sensitive detection via polarization modulation"; G. S. Jenkins, D. C. Schmadel, and H. D. Drew; Rev. Sci. Instrum. 81, 083903 (2010)

"Origin of the anomalous Hall effect in the overdoped n-type superconductor  $\text{Pr}_{2x}\text{Ce}_x\text{CuO}_4$ : Current-vertex corrections due to antiferromagnetic fluctuations"; G. S. Jenkins, D. C. Schmadel, P. L. Bach, R. L. Greene, X. Béchamp-Laganière, G. Roberge, P. Fournier, Hiroshi Kontani, and H. D. Drew; Phys. Rev. B 81, 024508 (2010)

"Terahertz magnetotransport measurements in underdoped  $\text{Pr}_{2x}\text{Ce}_x\text{CuO}_4$  and comparison with angle-resolved photoemission"; G. S. Jenkins, D. C. Schmadel, P. L. Bach, R. L. Greene, X. Béchamp-Laganière, G. Roberge, P. Fournier, and H. D. Drew; (Editor' Suggestion) Phys. Rev. B 79, 224525 (2009)

"Optical plasmonic resonances in split-ring resonator structures: an improved LC model" Corrigan, T. D., Kolb, P. W., Sushkov A.B., Drew H.D., Schmadel D.C., Phaneuf R.J.; OPTICS EXPRESS 16, 19850-19864 (2008)

"Infrared Hall effect in the electron-doped high- $T_c$  cuprate  $\text{Pr}_{2x}\text{Ce}_x\text{CuO}_4$ " A. Zimmers, L. Shi, D. C. Schmadel, W. M. Fisher, R. L. Greene, H. D. Drew, M. Houseknecht, G. Acbas, M.-H. Kim, M.-H. Yang, J. Cerne, J. Lin, and A. Millis; Phys. Rev. B 76, 064515 (2007)

"Infrared Hall conductivity of  $\text{Na}_{0.7}\text{CoO}_2$ " E. J. Choi, S. H. Jung, J. H. Noh, A. Zimmers, D. Schmadel, H. D. Drew, Y. K. Bang, J. Y. Son, and J. H. Cho; Phys. Rev. B 76, 033105 (2007)

"Infrared Hall conductivity in optimally doped  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$  : Drude behavior examined by experiment and fluctuation-exchange-model calculations" D. C. Schmadel, G. S. Jenkins, J. J. Tu, G. D. Gu, Hiroshi Kontani, and H. D. Drew; (Rapid Com) Phys. Rev. B 75, 140506 (2007)

"Development of high-throughput, polarization-maintaining, near-field probes" Adiga, V.P.; Kolb, P.W.; Evans, G.T.; Cubillos-Moraga, M.A.; Schmadel, D.C.; Dyott, R.; Drew, H.D.; Applied Optics 45, 2597-600 (2006)

"Magneto-optical evidence for a gapped Fermi surface in underdoped  $\text{YBa}_2\text{Cu}_3\text{O}_{6+x}$ " Rigal, L.B.; Schmadel, D.C.; Drew, H.D.; Maiorov, B.; Physical Review Letters, vol.93, no.13, 24 Sept. 2004. p. 137002/1-4.

"Measurement of the infrared magneto-optic properties of thin-film metals and high temperature superconductors" Cerne, J.; Schmadel, D.C.; Rigal, L.B.; Drew, H.D.; Review of Scientific Instruments, vol.74, no.11, Nov. 2003. p. 4755-67. Journal Paper.

"Far-infrared Hall effect in normal state of  $\text{YBa}_2\text{Cu}_3\text{O}_7$ " Grayson, M.; Rigal, L.; Schmadel, D.C.; Drew, H.D.; International Journal of Modern Physics B, vol.16, no.20-22, 30 Aug. 2002. p. 3148

"Spectral measurement of the Hall angle response in normal state cuprate superconductors" Grayson, M.; Rigal, L.B.; Schmadel, D.C.; Drew, H.D.; Physical Review Letters, vol.89, no.3, 15 July 2002. p. 037003/1-4

"Far-infrared Hall effect in normal state of  $\text{YBa}_2\text{Cu}_3\text{O}_7$ " Grayson, M.; Rigal, L.; Schmadel, D.C.; Drew, H.D.; Proceedings of Physical Phenomena at High Magnetic Fields - IV. Singapore: World Scientific, 2002. p. 250

"The AC Hall effect in  $\text{YBa}_2\text{Cu}_3\text{O}_7$ : temperature and frequency dependence of Hall scattering" Cerne, J.; Grayson, M.; Schmadel, D.C.; Simpson, J.; Physica B, vol.284-288, July 2000. p. 941-2

"Infrared Hall effect in high- $T_c$  superconductors: evidence for non-Fermi-liquid Hall scattering" Cerne, J.; Grayson, M.; Schmadel, D.; Jenkins, G.S.; Physical Review Letters, vol.84, no.15, 10 April 2000. p. 3418-21

"Mid-infrared Hall effect in thin-film metals: Probing the Fermi surface anisotropy in Au and Cu" Cerne, J.; Schmadel, D.C.; Grayson, M.; Jenkins, C.S.; Physical Review B (Condensed Matter), vol.61, no.12, 15 March 2000. p. 8133-40

"The infrared Hall effect in  $\text{YBa}_2\text{Cu}_3\text{O}_7$ : temperature and frequency dependence of Hall scattering" Grayson, M.; Cerne, J.; Drew, H.D.; Schmadel, D.C.; Journal of Low Temperature Physics, vol.117, no.5-6, Dec. 1999. p. 1055-8. Conference Paper.

"Ferromagnetic antiresonance in  $\text{La}_{0.7}\text{Ba}_{0.3}\text{MnO}_3$  traced out by temperature variation" Bhagat, S.M.; Lofland, S.E.; Kim, P.H.; Schmadel, D.C.; Journal of Applied Physics, vol.81, no.8, 15 April 1997. p. 5157-8

"Optically multiplexed interferometric fiber optic sensor system"; Belsley, K.L.; Carroll, J.B.; Hess, L.A.; Huber, D.R., Schmadel, D.; Proceedings of the SPIE - The International Society for Optical Engineering, vol.566, 1985. p. 257-65

## PATENTS

14843468 (pending) Plasmonic activated graphene terahertz generating devices and systems

7,933,482 Optical fiber probe tips and methods for fabricating same

20070297032 (provisional) Holographic storage system with single switch access

20060193232 (provisional) Miniature guided wavelength multiplexed holographic storage system

6,741,768 Optical switch

6,430,328 Optical switch

6,421,163 Two dimensional transform generator

4,725,137 Process and apparatus for measuring an evanescent field in an optical fiber

4,697,888 Frequency shifted cavity for electromagnetic radiation

4,636,031 Process of tuning a grated optical fiber and the tuned optical fiber

4,593,969 Ruggedized grated optical fiber

4,568,408 Fiber optic energy sensor and optical demodulation system and methods of making same

4,566,889 Process of fabricating a portion of an optical fiber capable of reflecting predetermined wavelength bands of light

4,468,091 Fiber optic energy sensor and demodulation system and method of making same

4,360,272 Fiber optic energy sensor and optical demodulation system and methods of making same

4,268,116 Method and apparatus for radiant energy modulation in optical fibers