



Exponent[®]
Engineering & Scientific Consulting

Betsy Groves, Ph.D.

Managing Scientist | Data Sciences
Menlo Park
+1-650-688-7147 | egroves@exponent.com

Professional Profile

As a computational physicist with over 15 years of programming experience, Dr. Groves has expertise in algorithm design, software solutions, and regulatory compliance. In the artificial intelligence sector, she has built computational systems for object detection, facial recognition, and feature extraction using image processing and machine learning algorithms.

Specific projects include the use of artificial intelligence for the prediction of animal biometrics and automated diagnosis and quantification of defects in consumer products.

The emerging field of artificial intelligence regulation demands evaluation of which traditional computer science quality assurance practices are relevant and applicable for systems based in machine learning and deep learning methodologies. Dr. Groves has software quality assurance expertise in traditional computer science sectors, including source code review for FDA approval and other governing bodies. In addition, Dr. Groves has experience evaluating the relevance of traditional computer science quality assurance methodologies for modern autonomous vehicle systems.

Dr. Groves has worked on all aspects of the development lifecycle, including design, development, testing, and maintenance. She has extensive experience in algorithm design, and developing and maintaining accurate documentation of complex software. Dr. Groves' experience includes design and development of scalable, object-oriented software for image processing software performing filtering, edge detection, and feature extraction, for use in mobile applications. Dr. Groves also has extensive experience in data mining and statistical analysis of large datasets.

As a physicist, Dr. Groves has investigated techniques in both experimental high energy physics and theoretical quantum optics. She developed software and analytical solutions to study nonlinear partial differential equations that model ultrashort laser pulses in resonant systems. Using finite-difference techniques and soliton solutions, she derived new methods for storage of broadband optical information for next-generation photonic devices. Her experience in experimental high energy physics includes applying statistical and data mining techniques to search for supersymmetric particles and the Higgs boson.

Academic Credentials & Professional Honors

Ph.D., Physics, University of Rochester, 2013

M.A., Physics, University of Rochester, 2005

B.S., Applied Physics, University of California, Davis, 2003

Publications

Groves E, Clader BD, Eberly JH. Jaynes-Cummings theory out of the box. *Journal of Physics B: Atomic, Molecular and Optical Physics* 2013; 46.

Groves E, Eberly JH. Coherent storage and retrieval of broadband optical pulses. *Frontiers in Optics, OSA Technical Digest postdeadline paper PDPB8*, 2011.

Groves E, Clader BD, Eberly JH. Multipulse quantum control: Exact solutions. *Optical Letters* 2009; 34:2539.

Groves E, Clader BD, Eberly JH. Pulse areas in multi-soliton propagation. *arXiv:0811.1975*, 2008.

Invited Talks

Groves E. A soliton collision for laser pulse storage, manipulation, and retrieval. Willamette University, Salem, OR, November 2012.

Groves E. High-bandwidth optical pulse storage and retrieval. San José State University, San José, CA, May 2012.

Groves E. Optical information storage and retrieval via a second-order soliton solution. University of Rochester, Rochester, NY, April 2011.

Contributed Talks

Groves E, Eberly JH. Double soliton solution for optical storage and retrieval. 7th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, GA, April 2011.

Groves E, Eberly JH. Multi-soliton pulse areas and the bright-dark basis. 40th Annual Meeting of the APS Division of Atomic, Molecular, and Optical Physics, Charlotte, VA, May 2009.

Groves E, Eberly JH. Coherent optical pulse propagation in a four-level medium. *Frontiers in Optics*, Rochester, NY, October 2008.

Groves E. Evolving entanglement: The strange behavior of a simple system. University of Rochester, Rochester, NY, June 2007.

Groves E. Solutions to the Sine-Gordon equation by inverse scattering. University of Rochester, Rochester, NY, May 2006.

Posters

Groves E, Eberly JH. Short optical pulse storage and retrieval in absorbing media. Cross Border Conference on Laser Science, Waterloo, Canada, June 2010.

Groves E, Eberly JH. Can we control the group velocities of multiple ultrashort pulses using the dark state? Symposium on Optical Interactions and Quantum Systems, Rochester, NY, October 2009.

Groves E, Eberly JH. Multi-pulse areas and dark states in a partially coherent medium. Cross Border Conference on Laser Science, Ottawa, Canada, May 2009.

Groves E, Eberly JH. Ultrashort pulse propagation in a four-level medium. Cross Border Conference on Laser Science, Ithaca, NY, June 2008.

Groves E, Eberly JH. Multi-particle entanglement dynamics. Conference on Coherence and Quantum Optics, Rochester, NY, June 2007.

Groves E. Entanglement dynamics of a four-particle system. Cross Border Workshop, Toronto, Canada, May 2007.

Peer Reviews

Reviewer for Optics Letters (2010-2012)