

## Curriculum Vitae of HEIDE M. DOSS

### Education & Certifications

- 1983-1988 **State University of New York at Buffalo**  
BS – Physics, Minor – Mathematics
- 1988-1992 **Drexel University**  
Ph.D. (Physics – Theoretical Quantum Optics and Laser Physics)  
Thesis: Theory of Lasing without Population Inversion  
MS Physics – Line Narrowing (1991)
- 1994-1995 **University of Maryland College Park**  
M.Ed. & Certification (Curriculum and Instruction, Secondary Science - Physics)
- 1997-2024 *Clear Single Subject Teaching Credential for Physics* (pre-k through adult), in California
- 1996-2009 Additional classes  
**University of San Diego** Mainstreaming 2009  
**San Diego State University** Educational Technology 2009  
**Tuskegee University** Science, Engineering, and Technology 1996

### Scientific Research & Development

Theoretical Quantum Optics/Laser Physics: Interaction of light and matter semiclassical and quantum theories of lasers, multi-level systems

Projects: Line narrowing, lasing without population inversion, correlation functions, micromasers, propagation effects

Other Experience/Projects: Environmental sensors, biochemical sensors, immunoassays, software design and improvement

Research with undergraduate students: Magnetic shielding, Pd/D systems & CR-39 detectors, accreting neutron stars

### Education Research & Development

Assisted in the development of high school curricula involving laser physics and nuclear forensics, as well conducting teacher workshops, for the American Physical Society (APS).

Created and conducted educational outreach programs for the general public and K-12 grades on the laser for LaserFest

Assisted in development of materials that could be used in a college level ethics course for the American Physical Society.

<http://www.aps.org/programs/education/ethics/index.cfm>

Assisted the American Physical Society in the development of a website for the SPIN-UP research and other information that can be utilized by undergraduate

physics departments to help them thrive.

<http://www.aps.org/programs/education/undergrad/faculty/spinup/index.cfm>

Assisted in the writing and editing of the teacher materials for the high school *Active Physics* curriculum, being published by *It's About Time*.

Assisted in the development and the writing of teacher's materials for the *Project Based Inquiry Science* curriculum for grades 6, 7, and 8. Published by *It's About Time*.

Assisted in the editing of the middle school materials that review for the Florida Comprehensive Assessment Test on middle school science, called *Science Mini-Lab Review*. Published by *It's About Time*.

Correlated state and/or national standards for various curricula such as the high school curricula *BIOCOMM* and *Active Physics*, and middle school curricula *InterActions*, and *PBIS*.

Assisted in the development of materials for the curriculum *InterActions in Physical Science*, an 8<sup>th</sup> grade physical science curriculum, with an emphasis on teacher guides that include information on student misconceptions, conceptual development, state and national standards, logistical aspects of implementation, and assessments.

Developed various student materials while teaching. Researched and developed activities for the classroom involving student misconceptions, concept mapping, reading across the curriculum, and learning styles.

Other Experience/Projects: Conducting and designing classroom observations and assessments, conducting and designing student assessments, state and national standards, developing and assessing student centered learning stations. Designed an educational website to assist teaching electricity and magnetism. Designed and presented elementary school science presentations.

## Employment Record

- 2013-present **Point Loma Nazarene University**, Adjunct Professor
- 2013-present **Pearson Evaluation Systems**, Content Specialist. Contacts: Cathy Hawks (413) 256-2750, [cathy.hawks@pearson.com](mailto:cathy.hawks@pearson.com) 300 Venture Way, Hadley, MA 01035
- 2011-present **American Physical Society (APS)** Consultant. Writing for Physics Central. Contacts: James Roche, One Physics Ellipse College Park, MD, 20740-3844, Email: [roche@aps.org](mailto:roche@aps.org)
- 2010-present **Grossmont Union High School District** Substitute Teacher.
- 2014-2016 **San Diego State University** Lecturer. Contact: Usha Sinha (Physics Chair) (619) 594-6240, Email: [usinha@mail.sdsu.edu](mailto:usinha@mail.sdsu.edu). 5500 Campanile Dr. San Diego, CA 92182
- 2010-2015 **Cajon Valley Union School District** Substitute Teacher.
- 2013-2015 **Leap Ahead Tutoring** Tutor. Contact: Valerie Atkinson, 568 Stevens Avenue, Solana Beach, CA 92075, (858) 952-4419.

- 2013 **Optical Society of America** Consultant. Assisting with updating, and making more accessible their Optics For Kids website. This includes teacher, parent, and student webpages. Contact: Gale Mamatova [GMamatova@osa.org](mailto:GMamatova@osa.org), Deputy Senior Director, Member & Education Services, Optical Society of America, 2010 Massachusetts Avenue NW, Washington, DC 20036, 202.416.1415 (phone)
- 2010-2013 **DeVry University** Visiting Faculty Carol Cujec, Assistant Professor, Program Chair, College of Liberal Arts & Sciences, DeVry University, 2655 Camino Del Rio North, Suite 350, San Diego, CA 92108, Office: 619-293-5453 VoIP: 619-203-5453 VoIP, Home: 858-547-4331 Email: [ccujec@devry.edu](mailto:ccujec@devry.edu)
- 2009-2011 **American Physical Society (APS)** Consultant develop specialized high school lessons, conduct teacher workshops, assist with ethics curricula and spin-up website. Contact: Monica Plisch, Ph.D., Assistant Director of Education, American Physical Society, One Physics Ellipse, College Park, MD 20740, Email: [plisch@aps.org](mailto:plisch@aps.org), Phone: 301-209-3273, Fax: 301-209-0867
- 2006-2009 **Herff Jones Education Division, It's About Time Publishing** Consultant first year, Associate Editor/Writer following. Contact: Barbara Zahm, Ph.D., Executive Vice President, Director of Product Development and Grants, It's About Time Publishing, Herff Jones Education Division, 84 Business Park Drive, Armonk, NY 10504, Tel: 914-273-2233 ext. 520, cell: 914-882-7963, Fax: 914-273-2227, [bzahm@herffjones.com](mailto:bzahm@herffjones.com)
- 2007 **Grossmont Community College** Physics Instructor: Contact: Ross Cohen, Chair, Department of Physics, Astronomy, and Physical Science, 8800 Grossmont College Drive, El Cajon, CA 92020, (619) 644-7825, Email: [ross.cohen@gcccd.edu](mailto:ross.cohen@gcccd.edu)
- 1999-2006 **San Diego State University Center of Research in Mathematics and Science Education** 6475 Alvarado Road, Suite 128, San Diego, CA 92120
- 1997-1999 **TACAN Corporation** Staff Research Scientist in the Research and Development Department. 2330 Faraday Ave, Carlsbad, CA 92008
- 1995-1997 **Gwynn Park High School** Teacher. Prince George's County Public Schools, Maryland, 13800 Brandywine Road, Brandywine, MD 20613. Tel: 301-372-0140
- 1992-1994 **Mississippi State University**, Assistant Professor, Department of Physics and Astronomy, P.O. Drawer 5167, Mississippi State, MS 39762-5167
- 1992 **Max-Planck Institut für Quantenoptik**, Visiting Research Associate, Garching, Germany
- 1991-1992 **Optics Communication**, Assistant to the Editor, Philadelphia, PA
- 1988-1991 **Drexel University**, Teaching Assistant. Physics Department. Philadelphia, PA

## Teaching Experience

- University Traditional and blended classes, undergrad physics for majors and non-majors, (Mechanics/EM/Modern/Quantum/Seminar), Cosmos, Physical Science, Physical Science for Teachers, Earth Science, Earth & Space Science for Teachers, Pascal, Pre-Algebra, Algebra, Statistics)

High School	Conceptual Physics, Talented & Gifted Physics, Comprehensive Physics, AP Physics B & C. Guest science speaker.
Middle School	8 <sup>th</sup> grade Physical Science. Guest science speaker 6 <sup>th</sup> through 8 <sup>th</sup> grades.
Elementary	Guest speaker K through 5. Volunteer assisting students with Reading, Math, Science, English, and Social Studies
Other	Teacher workshops on laser lessons, diffraction, and nuclear forensics. General public science outreach

## Computer Experience

Completed an educational technology class May 2009, designed websites e.g., an educational website using Webquest, currently learning python, have worked in the past with BASIC, PASCAL, FORTRAN, Visual BASIC, Some C and C++, IDL, PV-Wave, Mathematica, UNIX, DOS, Macintosh, Sun workstations, VAX, MicroVAX

Numerical methods: Data analysis, Fourier transforms, ordinary differential equations, partial differential equations

## Current Professional Societies

Optical Society of America (Member)  
American Physical Society (Member)  
American Association for the Advancement of Science (Member)  
American Association of University Women (Member)

## Publications (separated by Scientific Research, Scientific Outreach, Education)

### Scientific Research Publications

M.W Sailer and H.M. Doss, *Magnetic Shielding for Interplanetary Travel*, JBIS 72 May 2019; <https://jbis.org.uk/paper/2019.72.83>, <https://arxiv.org/abs/1902.10122>

M.W. Sailer and H.M. Doss, *Radiation Shielding Using Magnetic Fields*, JURP 27, 1 Summer 2018 <https://www.spsnational.org/jurp/2018/radiation-shielding-using-magnetic-fields>

J.T. Ives, H.M. Doss, B.J. Sullivan, J.C. Stires, J.H. Bechtel, *Fiber Optic Immunosensors to Monitor Small-Molecule Analytes in Groundwater*, Chemical, Biochemical, and Environmental Fiber Sensors X, 2-3 Nov 1998, Boston, MA. Proceedings of the SPIE, Vol 3540, p 36-44, (1999)

C.H. Keitel, H.M. Doss, M. Fleischhauer, L.M. Narducci, M.O. Scully, and S.-Y. Zhu, *The dressed state picture in quantum coherence and interference*, Z. Naturforsch. **52a**, 114 (1997).

C.H. Keitel, O.A. Kocharovskaya, S.-Y. Zhu, M.O. Scully, L.M. Narducci, H.M. Doss, *Two mechanisms for inversionless amplification in four-level atoms with Raman pumping*, Phys. Rev. A **48**, 3196 (1993).

H.M. Doss, L.M. Narducci, M.O. Scully, Gao Jinyue, *Theoretical analysis of a four-level laser without inversion driven by a pumped Raman field*, Opt. Comm., 95, 58 (1993).

A.S. Manka, H.M. Doss, L.M. Narducci, P. Ru, G.-L. Oppo, *The spontaneous emission and absorption properties of a driven three-level system. II - The lambda and cascade models*, Phys. Rev. A43, 3748 (1991).

L.M. Narducci, M.O. Scully, C.H. Keitel, S.-Y. Zhu and H.M. Doss, *Physical origin of gain in a four-level model of a Raman driven laser without inversion*, Opt. Comm., 86, 324 (1991).

L.M. Narducci, H.M. Doss, P. Ru, M.O. Scully, S.Y. Zhu and C. Keitel, *A simple model of a laser without inversion*, Opt. Comm., 81, 379 (1991).

## Outreach Publications

*Imaging a Black Hole*, APS Physics Central, *Physics in Action*, 2020  
<https://www.physicscentral.com/explore/action/black-hole.cfm>

*Is there Need for a New Particle Physics Model?*, APS Physics Central, *Physics in Action*, 16 December 2019  
<http://www.physicscentral.com/explore/action/particle-model.cfm>

*TESS: A Satellite Scout for Nearby Exoplanets*, APS Physics Central, *Physics in Action*, 12 December 2018  
<http://physicscentral.com/explore/action/tess-exoplanet-scout.cfm>

*Analyzing Water with Lasers and Levitation*, APS Physics Central: *Physics+*, 17 August 2018  
<http://physicscentral.com/explore/plus/water-levitation.cfm>

*Meet the Tiny Machines that Harness Humidity for Power*, APS Physics Central: *Physics in Action*, 15 May 2018  
<http://physicscentral.com/explore/action/hyrobots.cfm>

*Shields Up: What's Holding Up Human Travel to Mars?*, APS Physics Central: *Physics in Action*, 8 Feb 2018  
<http://physicscentral.com/explore/action/shields-up.cfm>

*Micius and the Journey of Spaceborne Entangled Photons*, APS Physics Central: *Physics in Action*, 1 Nov 2017  
<http://physicscentral.com/explore/action/micius.cfm>

*A Black Hole Born Sans a Supernova?*, APS Physics Central: *Physics in Action*, 17 August 2017  
<http://physicscentral.com/explore/action/bhsanssupernova.cfm>

*Neuralink*, APS Physics Central: *Physics in Action*, 24 May 2017  
<http://physicscentral.com/explore/action/neuralink.cfm>

*Imaging Forests for Environmental Assessment*, APS Physics Central: *Physics in Action*, 27 March 2017  
<http://www.physicscentral.com/explore/action/imaging-forests.cfm>

*Neutron Stars: Cosmic Laboratories for Quantum Physics*, APS Physics Central: *Physics in Action*, 2 Feb 2017  
<http://physicscentral.com/explore/action/cosmic-quantum-labs.cfm>

*Molecular Machinery Snags 2016 Nobel in Chemistry*, APS Physics Central: *Physics in Action*, 22 Nov 2016  
<http://www.physicscentral.com/explore/action/nobelchem2016.cfm>

*Dressed to Impress: Attraction Between Electrons*, APS Physics Central: *Physics in Action*, 13 October 2016  
<http://www.physicscentral.com/explore/action/dressed-to-impress.cfm>

*Hitomi, An Ambitious Endeavor Cut Short*, APS Physics Central: *Physics in Action*, 19 August 2016

<http://www.physicscentral.com/explore/action/hitomi-x-ray.cfm>

*Advances in Micro-Drones*, APS Physics Central: *Physics in Action*, 21 June 2016

<http://www.physicscentral.com/explore/action/microdrone-perching.cfm>

*Quantum Computing, Human Processing*, APS Physics Central: *Physics in Action*, 20 May 2016

<http://www.physicscentral.com/explore/action/quantum-moves.cfm>

*Using Gold Nanoparticles to Kill Cancer*, APS Physics Central: *Physics in Action*, 1 April 2016

<http://www.physicscentral.com/explore/action/pnb-nanotherapy.cfm>

*FAST Earthquake Analysis*, APS Physics Central: *Physics in Action*, 24 February 2016

<http://www.physicscentral.com/explore/action/fast-earthquakes.cfm>

*Nobel Neutrinos*, APS Physics Central: *Physics in Action*, 31 December 2015

<http://physicscentral.com/explore/action/nobel-neutrinos.cfm>

*Wireless Neural Implants*, APS Physics Central: *Physics in Action*, 22 September 2015

<http://www.physicscentral.com/explore/action/wirelessneuroimplant.cfm>

*Plasma Fairies: Femtosecond Laser Holograms*, APS Physics Central: *Physics in Action*, 18 August 2015

<http://www.physicscentral.com/explore/action/femtosecond-hologram.cfm>

*Color-Tunable Elastic Fibers*, APS Physics Central: *Physics in Action*, 23 July 2015

<http://www.physicscentral.com/explore/action/color-tunable-fibers.cfm>

*Ultrafast Aluminum Battery*, APS Physics Central: *Physics in Action*, 9 June 2015

<http://physicscentral.com/explore/action/battery.cfm>

*Wave-Particle Duality in One Image*, APS Physics Central: *Physics in Action*, 21 April 2015

<http://www.physicscentral.com/explore/action/wave-particle.cfm>

*Deciphering Vesuvius Scrolls with “X-ray” Vision*, APS Physics Central: *Physics in Action*, 2 March 2015

<http://www.physicscentral.com/explore/action/vesuvius-scrolls.cfm>

*Passively Cool: A Departure from A/C*, APS Physics Central: *Physics in Action*, 26 January 2015

<http://physicscentral.com/explore/action/passive-cooling.cfm>

*Measuring Drought with GPS*, APS Physics Central: *Physics in Action*, 8 December 2014

<http://physicscentral.com/explore/action/gps-drought.cfm>

*Curiosity vs. other Mars Missions*, APS Physics Central: *Physics in Action*, 16 October 2014

<http://physicscentral.com/explore/action/mars-missions.cfm>

*Electrifying Tesla Coil, Music, and Fashion*, APS Physics Central: *Physics in Action*, 8 September 2014

<http://www.physicscentral.com/explore/action/tesla-coil-music.cfm>

*Holograms: From Credit Cards to Chocolates*, APS Physics Central: *Physics in Action*, 5 Aug 2014

<http://www.physicscentral.com/explore/action/holograms.cfm>

*Memory, Thermodynamics, and Time*, APS Physics Central: *Physics in Action*, 30 June 2014

<http://www.physicscentral.com/explore/action/memory-and-time.cfm>

*The Dawn of the Tetraquark*, APS Physics Central: *Physics in Action*, 22 May 2014

<http://www.physicscentral.com/explore/action/tetraquark.cfm>

*First Detection of Elusive Gravitational Waves Explained*, APS Physics Central: *Physics in Action*, 17 April 2014  
<http://www.physicscentral.com/explore/action/gravitational-waves.cfm>

*In Depth: Fusion Strides at NIF*, APS Physics Central: *Physics in Action*, 27 March 2014  
<http://www.physicscentral.com/explore/action/fusion-at-nif.cfm>

*Whirling Skirts Reveal Steady Patterns*, APS Physics Central: *Physics in Action*, 25 February 2014  
<http://www.physicscentral.com/explore/action/whirling-dervish.cfm>

*Glowing Carpets: Rolling Out in 2014*, APS Physics Central: *Physics in Action*, 3 February 2014  
<http://www.physicscentral.com/explore/action/glowing-carpets.cfm>

*Pluto's Neighbor Could Float on Water*, APS Physics Central: *Physics in Action*, 19 December 2013  
<http://physicscentral.com/explore/action/kuiper-belt-light.cfm>

*Ancient Chalice Inspires New Physics*, APS Physics Central: *Physics in Action*, 26 November 2013  
<http://www.physicscentral.com/explore/action/lycergus-cup.cfm>

*Atomic Friction*, APS Physics Central: *Physics in Action*, 24 October 2013  
<http://www.physicscentral.com/explore/action/atomic-friction.cfm>

*Element 115 and the Island of Stability*, APS Physics Central: *Physics in Action*, 24 September 2013  
<http://physicscentral.com/explore/action/element-115.cfm>

*A Spin on Doppler*, APS Physics Central: *Physics in Action*, 27 August 2013  
<http://www.physicscentral.com/explore/action/doppler-spin.cfm>

*Tiny Particle Accelerators*, APS Physics Central: *Physics in Action*, July 30, 2013  
<http://www.physicscentral.com/explore/action/tabletop-accelerator.cfm>

*Neurons and Nuclear Testing*, APS Physics Central: *Physics in Action*, July 2013  
<http://physicscentral.com/explore/action/nuclear-neurons.cfm>

*Identification by Breath*, APS Physics Central: *Physics in Action*, June 2013  
<http://www.physicscentral.com/explore/action/breathprint.cfm>

*Cloaking Earthquakes*, APS Physics Central: *Physics in Action*, May 2013  
<http://www.physicscentral.com/explore/action/cloaking-earthquakes.cfm>

*The Cyborg Scientist – Extending Senses*, APS Physics Central: *Physics in Action*, April 2013  
<http://physicscentral.com/explore/action/project-cyborg.cfm>

*“Living” Crystal Colonies*, APS Physics Central: *Physics in Action*, March 2013  
<http://www.physicscentral.com/explore/action/living-crystals.cfm>

*Below Absolute Zero, Negative Temperatures Explained*, APS Physics Central: *Physics in Action*, February 2013  
<http://www.physicscentral.com/explore/action/negative-temperature.cfm>

*Self healing material*, APS Physics Central: *Physics in Action*, January 2013  
<http://www.physicscentral.com/explore/action/bullet-proof.cfm>

*Could this be the next robotic skin?*, APS Physics Central: *Physics in Action*, December 2012  
<http://www.physicscentral.com/explore/action/robotic-skin.cfm>

*Silencing with the Speech Jammer*, APS Physics Central: *Physics in Action*, November 2012



<http://www.physicscentral.com/explore/action/speech-jam.cfm>

*Forget X-ray vision, there's router vision*, APS Physics Central: *Physics in Action*, November 2012

<http://www.physicscentral.com/explore/action/router-vision.cfm>

*Wireless electric bus route!*, APS Physics Central: *Physics in Action*, October 2012

<http://www.physicscentral.com/explore/action/electric-bus.cfm>

*Laser speckle patterns and malaria*, APS Physics Central: *Physics in Action*, August 2012

<http://www.physicscentral.com/explore/action/detectingmalaria.cfm>

*Quantum Dots and Cells*, APS Physics Central: *Physics in Action*, July 2012

<http://www.physicscentral.com/explore/action/quantumdots.cfm>

*The cup-in-hand walk*, APS Physics Central: *Physics in Action*, June 2012

<http://www.physicscentral.com/explore/action/cupinhand.cfm>

*Super Efficient LEDs*, APS Physics Central: *Physics in Action*, April 2012:

<http://www.physicscentral.com/explore/action/led.cfm>

*Ultralight Lattices*, APS Physics Central: *Physics in Action*, March 2012:

<http://www.physicscentral.com/explore/action/microlattice.cfm>

*Entangled Diamonds*, APS Physics Central: *Physics in Action*, February 2012:

<http://www.physicscentral.com/explore/action/entangled-diamonds.cfm>

*Nano Cupcakes*, APS Physics Central: *Physics in Action*, December 2011:

<http://www.physicscentral.com/explore/action/nano-cupcakes.cfm>

*3D Printers and Fabbers*, APS Physics Central: *Physics in Action*, October 2011:

<http://www.physicscentral.com/explore/action/3d-printers.cfm>

*Electronic Tattoos*, APS Physics Central: *Physics in Action*, September 2011:

<http://www.physicscentral.com/explore/action/tattoos.cfm>

*Mind over matter – light over mind*, APS Physics Central: *Physics in Action*, August 2011:

<http://www.physicscentral.com/explore/action/firingwithlight.cfm>

*Nanoantennas – detecting the very small*, APS Physics Central: *Physics in Action*, June 2011:

<http://www.physicscentral.com/explore/action/nanoantennas.cfm>

*Cloaking – Making Something Appear Invisible*, APS Physics Central: *Physics in Action*, May 2011:

<http://www.physicscentral.com/explore/action/cloaking.cfm>

*Ionizing Radiation and Humans*, APS Physics Central: *Physics in Action*, March 2011;

<http://www.physicscentral.com/explore/action/radiationandhumans.cfm>

*Nuclear Forensics and Unbaking the Cake*, APS Physics Central: *Physics in Action*, March 2011;

<http://www.physicscentral.com/explore/action/unbakingcake.cfm>

*fMRI*, APS Physics Central: *Physics in Action*, January 2011;

<http://www.physicscentral.com/explore/action/fmri.cfm>

*Graphene*, APS Physics Central: *Physics in Action*, December 2010;

<http://www.physicscentral.com/explore/action/graphene.cfm>



## Educational Publications

**Nuclear Forensic Lessons: Student and Teacher Edition**, American Physical Society, (Maryland) (2011)  
<http://www.hope.edu/academic/physics/faculty/mader/NuclearForensics/Curriculum/Curriculum.htm>

**Laser Lessons: Student and Teacher's Edition**, Heide Doss, Ed Lee, Monica Plisch, American Physical Society, (Maryland), October 2010 (<http://www.laserfest.org/resources/lessons.cfm>)

**Active Physics Curriculum Teacher's Editions: Teacher's Edition Active Physics**, A. Eisenkraft et al. It's About Time, (New York) (2010)

### **Project-Based Inquiry Science Curriculum for middle school Teacher Planning Guides:**

*Teacher's Planning Guide Project-Based Inquiry Science, Diving Into Science*, (2009)

*Teacher's Planning Guide Project-Based Inquiry Science, Moving Big Things*, (2009)

*Teacher's Planning Guide Project-Based Inquiry Science, Digging In*, (2009)

*Teacher's Planning Guide Project-Based Inquiry Science, Animals in Action*, (2009)

*Teacher's Planning Guide Project-Based Inquiry Science, Living Together*, (2009)

*Teacher's Planning Guide Project-Based Inquiry Science, Planetary Forecaster*, (2009)

*Teacher's Planning Guide Project-Based Inquiry Science, Good Friends and Germs*, (2008)

J.L. Kolodner, J.S. Krajcik, D.C. Edelson, B.J. Reiser, et al. (2007-2008) It's About Time, (New York).

**Physical Science Curriculum for 8<sup>th</sup> grade (main work on teacher support items): InterActions in Physical Science**, S. Bendall, F. Goldberg, P. Heller, R. Poel, et al. (2005) It's About Time, (New York).

H.M. Doss-Hammel, *Overview of the Impact of Activity-Based Teaching Strategies on Learning Science*, available online at: <http://www.sci-ed-ga.org/k-12-science-education-standards> (2004).

## Conferences and Workshops (separated by Scientific Research and Education/Outreach)

### Conferences and Workshops – Scientific Research

*Effects of Time-dependent Heat Sources on Neutron Star Crust Cooling*, A. Smith, H.M. Doss, Poster, APS April Meeting Washington DC, CO Meeting 2020 (Undergraduate Research Poster session. A. Smith presenting, uploaded to virtual conference). <https://aps-april.onlineeventpro.freeman.com/posters>

*Investigation of Track Formation in CR-39 for Various Hydrated Environments*, M.E. Karahadian, A. Smith, E. Vahle, H.M. Doss, Poster, APS March Meeting, Denver, CO 2020 (Undergraduate Research Poster session. M.E. Karahadian presenting, uploaded to virtual conference)  
<https://virtualmarchmeeting.com/presentations/investigation-of-track-formation-in-cr-39-for-various-hydrated-environments>

*Evidence of Particles During Electrochemical Pd-D Co-deposition*, M.E. Karahadian, H.M. Doss, Poster, APS March Meeting Boston, MA 2019 (Undergraduate Research Poster session. M.E. Karahadian presenting)

*Evidence of Particles During Electrochemical Pd-D Co-deposition*, M.E. Karahadian, H.M. Doss, Presentation, Honor's Conference, Point Loma Nazarene University (M.E. Karahadian presenting) April 2019

*Galactic cosmic radiation shielding utilizing both active and passive methods*, M. Sailor, H.M. Doss, Poster, APS March Los Angeles, CA Meeting 2018 (Undergraduate Research Poster session. M Sailor presenting)

*Galactic cosmic radiation shielding utilizing both active and passive methods*, M. Sailor, H.M. Doss, Presentation, Honor's Conference, Point Loma Nazarene University (M. Sailor presenting) April 2018

*Fiber optic immunosensors to monitor small molecule analytes in groundwater*, J.T. Ives, H.M. Doss, B.J. Sullivan, J.C. Stires, J.H. Bechtel, SPIE International Symposium on Industrial and Environmental Monitors and Biosensors, Boston, MA, November 1998.

*Fiber optic biosensors for hazardous material analysis*, H.M. Doss, J.T. Ives, B.J. Sullivan, L.M. DiRuscio, and J.H. Bechtel Optical Society of America, Annual Meeting, Baltimore, MD, October 1998.

*Mechanism of inversionless amplification in four-level atoms with Raman pumping*, H.M. Doss, O.A. Kocharovskaya, C.H. Keitel, S.-Y. Zhu, L.M. Narducci, M.O. Scully, Optical Society of America, Annual Meeting, Albuquerque, New Mexico, September 1992.

*Lasing without inversion: the Raman-driven four level model*, M.O. Scully, L.M. Narducci, S.-Y. Zhu, C.H. Keitel, H.M. Doss, Crested Butte Workshop on Atomic Coherence and Interference in Quantum Optics, Crested Butte, Colorado, September 1992.

*Lasing without inversion: a survey of experimental and theoretical results*, L.M. Narducci, H.M. Doss, M.O. Scully, Gao Jinyue, Summer Research Conference, Max Planck Institute for Quantum Optics, Garching, Germany, July 1992.

*Quantum noise suppression*, L.M. Narducci, M.O. Scully, C.H. Keitel, H.M. Doss, A.S. Manka, 22nd Winter Colloquium on Quantum Electronics, Snowbird, Utah, January 1992.

*Generation of subnatural linewidths and other coherent phenomena in driven multilevel systems*, L.M. Narducci, M.O. Scully, H.M. Doss, A.S. Manka, Lasers '91, San Diego, CA, December 1991.

*Physical origin of the gain in a model of a laser without inversion*, H.M. Doss, L.M. Narducci, M.O. Scully, C.H. Keitel, S.-Y. Zhu, Optical Society of America, Annual Meeting, San Jose, CA, November 1991.

*The dressed state picture in quantum coherence and interference*, C.H. Keitel, H.M. Doss, M. Fleischhauer, L.M. Narducci, M.O. Scully, Shi-Yao Zhu, Workshop in honor of E.C.G. Sudarshan's contributions to theoretical physics, Austin, TX, September 1991.

*Emission and absorption spectra in cascade and lambda models of driven atoms*, H.M. Doss, A. Manka, P. Ru, L. M. Narducci, G. L. Oppo, and M. O. Scully, Optical Society of America, Annual Meeting, Boston, MA, October 1990.

*Narrowing of the resonance fluorescence spectrum of an atom driven by two coherent fields*, G.-L. Oppo, L.M. Narducci, P. Ru, A.S. Manka, H.M. Doss, J.R. Tredicce, European Physical Society, Annual Meeting, Amsterdam, The Netherlands, November 1990.

### **Conferences and Workshops - Education/Outreach**

*Making and Sustaining Inclusive Change in the Classroom*, Faculty Development & Scholarship Day, PLNU, 27 August 2019, Dustin Thomas, Ryan Botts, Heide Doss, and Jen Lineback.

*The Physics of LASERs Workshop*– Next-Gen Science Education Conference, Miramar College, San Diego, CA, 4 November 2017

*CSET Multiple Subject – Science Prep Workshops* – SDSU San Diego, CA, Saturdays Feb 6-27, 2016

*Physics Outreach Grant Experiences*, American Physical Society March 2014 Meeting, Denver, CO, March 2014

*The Physics of Lasers: Inquiry Lessons for High School Physics Students*, San Diego Computer Using Educators, Cal State San Marcos, 3 November 2012

*Laser Lessons Workshop*, Heide Doss, OSA Educator's Day, San Jose, CA, 19 October 2011.  
[http://www.osa.org/Video\\_Library/Search.aspx?param=eday](http://www.osa.org/Video_Library/Search.aspx?param=eday)

*Laser Lessons Workshop*, Heide Doss, DAMOP Teacher's Day, Atlanta, GA, 17 June 2011.

*Diffraction Workshop*, Heide Doss, DAMOP Teacher's Day, Atlanta, GA, 17 June 2011.

*The Physics of LASERs: Inquiry Lessons for High School Physics Students*, H. Doss, E. Lee, M. Plisch, APS April Meeting, Long Beach, CA, April, 2011

*Nuclear Forensics for High School Science*, C. Mader, H. Doss, M. Plisch, APS April Meeting, Long Beach, CA April, 2011

*Laser Lessons Workshop*, Heide Doss, APS Teacher's Day, Dallas, TX, 23 March 2011.

*Diffraction Workshop*, Heide Doss, APS Teacher's Day, Dallas, TX, 23 March 2011.

*Laser Lessons Workshop*, Heide Doss, OSA Educator's Day, Rochester, NY, 27 October, 2010.

*Laser Lessons Workshop*, Heide Doss, APS/AAPT High School Physics Teacher's Day, Houston, TX, 29 May, 2010.

*Laser Lessons Workshop*, Heide Doss, Monica Plisch, Michigan Section of the American Association of Physics Teachers, Holland, MI, 24 April 2010.

*Nuclear Forensics Workshop*, Monica Plisch, Heide Doss, APS/AAPT High School Physics Teachers' Day, Portland, OR, 16 March 2010.

*Laser Lessons Workshop*, Heide Doss, Monica Plisch APS/AAPT High School Physics Teachers' Day, Portland, OR, 16 March 2010.

*Nuclear Forensics Unit for High School Students*, D.M. Crowe, D. Writer, J. Flynn, M. Plisch, H. Doss, C. Mader, APS/AAPT April Meeting in February, Washington D.C., 16 February 2010.

*Nuclear Forensics Workshop*, Dan Crowe, Monica Plisch, Heide Doss, Cathy Mader, and Betsy Beise, APS/AAPT High School Physics Teachers' Day, Washington D.C., 14 February 2010.

*Laser Lessons Workshop and Nuclear Forensics Workshop* APS/AAPT High School Physics Teachers' Day, Washington D.C., 12 February 2010. (Canceled due to weather)

*Reading Across the Curriculum*, V.A. Brown, H.M. Doss, T. Nicholas, Goals 2000 Action Research Conference, Baltimore, MD, June 1997.

*Concept Mapping*, H.M. Doss Action Research Conference, University of Maryland, July 1995.

### **Other Science, Education, and Outreach Efforts (presentations, seminars, workshops)**

~~*Tech Trek STEM Summer Camp at UCSD—Phyises Core teacher June 21-27, 2020* - Covid cancellation~~

~~*Barnard Elementary Science Night, Barnard Asian Pacific Language Academy, San Diego, CA 10 April 2020*  
Covid cancellation~~

~~*STEM in Your Backyard, Montgomery Middle School, San Diego, CA 12 March 2020* – Covid cancellation~~

*Curriculum Vitae of Heide M. Doss 2019*

~~*STEM in Your Backyard, Burbank Elementary School, San Diego, CA 11 March 2020*~~ – Covid cancellation

*STEM in Your Backyard, Miller Elementary School, Escondido, CA 9 March 2020*

*San Diego Science Expo, with Point Loma Nazarene University, San Diego, CA 7 March 2020*

*Point Loma Nazarene University Fall Festival, San Diego, CA October 2019*

*Middle School Girls' STEM camp visit to PLNU, August 2019*

*Barnard Elementary Science Night, Barnard Asian Pacific Language Academy, San Diego, CA 14 March 2019*

*STEM in your Backyard, Hillsdale Middle School, El Cajon, CA 7 March 2019*

*San Diego Science Expo, with Point Loma Nazarene University, San Diego, CA 2 March 2019*

*Point Loma Nazarene University Fall Festival, San Diego, CA October 2018*

*Barnard Elementary Science Night, Barnard Asian Pacific Language Academy, San Diego, CA 14 March 2018*

*San Diego Science Expo, with Point Loma Nazarene University, San Diego, CA 3 March 2018*

*Point Loma Nazarene University Fall Festival, San Diego, CA October 2017*

*San Diego Science Expo, with Point Loma Nazarene University, San Diego, CA 5 March 2017*

*Waves, organized and conducted an outreach effort with Point Loma Nazarene University Society of Physics Students to teach waves to four first grade classes, Point Loma, CA February 2017*

*Career Day at Pauma, Pauma School and Pauma Band of Mission Indians JOM Program, Pauma Valley, CA 8 June 2016*

*San Diego Science Expo, with Point Loma Nazarene University, San Diego, CA 5 March 2016*

*Laser workshop, H.M. Doss, BE WiSE (Better Education for Women in Science and Engineering) workshop, San Diego, CA, 27 June, 2015*

*HerWorld Program, DeVry University: Transitioning from High School to College and STEM Careers, H.M. Doss, DeVry University HerWorld Program in conjunction with the 6th Annual Latina Women's Empowerment Conference for girls 14-18, Mount Miguel High School, Spring Valley, CA 31 March 2012*

*The Physics of LASERs: Inquiry Lessons for High School Physics Students workshop, H.M. Doss, BE WiSE (Better Education for Women in Science and Engineering) workshop, San Diego, CA, October 2011*

*The Physics of LASERs: Inquiry Lessons for High School Physics Students workshop, H.M. Doss, BE WiSE (Better Education for Women in Science and Engineering) workshop, San Diego, CA, June 2011*

*Ionizing Radiation – Fuerte Elementary School, May 2011*

*Carbon, Graphene, and the 2010 Nobel Prize in Physics – Fuerte Elementary School, December 2010*

*The LASER is 50! – Hillsdale Middle School, 9 June 2010*

*The LASER is 50! – Hillsdale Middle School, 3 June 2010*

*The LASER is 50! – Hillsdale Middle School, 27 May 2010*

*The LASER is 50! Celebrate it's 50<sup>th</sup> with cake, refreshments, and its story from birth to the wonderful impacts it has on our society today!* – Rancho San Diego Library, 17 May 2010

*The LASER is 50!* – Fuerte Elementary School, 4, 5, & 6 May 2010

*The LASER is 50!* – Emerald Middle School, 26 March 2010

*The LASER is 50!* – Steele Canyon High School, 25 March 2010

*Why Is the Sky Blue? Why is Science SO Fun? What Does Cerulean Mean?* Fuerte Elementary School, April 2009

*Simple Machines*, Fuerte Elementary School, September 2008

*Lasers without Inversion*: Internal Seminar, TACAN Corporation, December 1997.

*Learning Styles*, Gwynn Park High School, August, 1996.

*Life after Graduate School*, Graduate Student Seminar, Mississippi State University, October 1993.

*Theory of Lasing without Inversion*, Invited Seminar, Universidad de Navarra, Pamplona, Spain, June 1993.

*Theory of Lasing without Inversion*, Invited Seminar, Parc Valrose University, Nice, France, May 1993.

*Theory of Lasing without Inversion*, Invited Colloquium, Jackson State University, November 1992.

*Lasing without Population Inversion*, Graduate Student Seminar, Mississippi State University, October 1992.

*Highlights of the 1992 Optical Society of America conference*, Graduate Student Seminar, Mississippi State University, October 1992.

*Lasing without Inversion: Physical Origin of the Gain*, Invited Seminar, Mississippi State University, May 1992.

*Lasing without a Population Inversion: The Physical Origin of the Gain*, Invited Seminar, Rochester University, April 1992.

## **Community Activities, Awards, Recognitions**

~~APS Career Mentoring Fellows program 2020~~ – went through training, conference cancelled due to covid

*Forum on Outreach and Engagement Newsletter*, Editor, A publication of The Forum on Outreach and Engaging the Public - A forum of the American Physical Society. 2013-2015, 2016-2018, 2018-2020. See newsletters at: <http://www.aps.org/units/foep/>

*Co-chair* TECH TREK (AAUW – La Mesa, El Cajon branch) organizational, 2020-2021 (STEM summer camp for 7<sup>th</sup> grade girls)

*Volunteer* TECH TREK (AAUW) organizational, 2019-2020 (STEM summer camp for 7<sup>th</sup> grade girls)

*Class of 2019 PTO parent Steele Canyon High School 2018-2019* (Chair grad night, baccalaureate, senior awards, senior breakfast).

*Volunteer* TECH TREK (AAUW) organizational, 2019 (STEM summer camp for 7<sup>th</sup> grade girls)

*Curriculum Vitae of Heide M. Doss 2019*

*Volunteer TECH TREK (AAUW) AT UCSD, June 2018 (STEM summer camp for 7<sup>th</sup> grade girls)*

*Member at Large, The Forum on Outreach and Engaging the Public - A forum of the American Physical Society. 2016-2018, See FOEP website at: <http://www.aps.org/units/foep/>*

*Member of Steele Canyon High School Site Council 2018*

*Secretary Steele Canyon PTO 2016-2017, 2017-2018*

*Valhalla High School's Gold Star Volunteer Award, 2016*

*President Valhalla PTO & Co-Chair Grad Night 2015-2016*

*Member of Valhalla School Site Council – 2012-2013, 2013-2014, 2014-2015, 2015-2016*

*Safety Committee Valhalla High School – 2015-2016*

*Nominated as volunteer of the year for Cajon Valley Unified School District by Hillsdale Middle School, 2015*

*Secretary Hillsdale PTA 2013-2014, 2014-2015*

*Secretary Valhalla PTO 2013-2014, 2014-2015*

*Editor of ValhallaLine News for PTO 2014-January 2015*

*Co-Chair membership Hillsdale PTA 2013-2014*

*Member of Hillsdale Middle School Site Council – 2009-2010, 2010-2011, 2011-2012, 2012-2013*

*Woman Physicist of the Month, May 2013, <https://www.aps.org/programs/women/scholarships/month/2013.cfm>*

*NSTA Conference 2013. Vendor booth with the American Physical Society sponsoring Science on Cards. April 11-14, 2013*

*5<sup>th</sup> Vice President (Volunteer Coordinator) of Hillsdale Middle School PTA – 2010-2011, 2011-2012, 2012-2013*

*Assisted with BE WiSE Overnight Workshop at the San Diego Zoo Institute for Conservation Research, BE WiSE (Better Education for Women in Science and Engineering) May 4-5, 2012.*

*Assisting weekly in fifth grade classrooms at Fuerte Elementary, and as needed at Hillsdale Middle. 2011-2012*

*Assisting weekly in the Everyone's A Reader (EAR) program at Fuerte Elementary. 2010-2011, 2011-2012*

*Assisted weekly in fourth grade classrooms at Fuerte Elementary, and as needed at Hillsdale Middle. 2010-2011*

*Assisted weekly in third grade classroom with math, science, reading, and writing. 2009-1010*

*Assisted as needed in 6<sup>th</sup> grade middle school math and science. 2009-2010.*

*Assisted weekly in second grade classroom with math, science, reading, and writing. Assisted in fifth grade classroom with math, science, social studies, reading, and ESL students. 2008-2009*

*San Diego County Elementary Science Field Day Coach, Fuerte Elementary, Cajon Valley School District March-June 2008.*

*Assisted weekly in first grade classroom mainly helping slow readers. 2007-2008*

*Science Bowl Judge, Prince George's County, MD, 1996.*

*Worked with the SouthEastern Consortium for Minorities in Engineering (SECME), 1996.*

*Science Fair Judge, Mississippi Region 5 Science and Engineering Fair, June 1993.*

## **Students**

### **undergraduate research**

- 2019-2020 Austin Smith, Neutron star crust cooling after time dependent mass accretion
- 2019-2020 Micah Karahadian, Effects of Li in Particle Emission Distribution in Pd/D Co-deposition and Characteristics of CR39 for various environments
- 2018-2019 Micah Karahadian, Particle Emission in Pd/D Co-deposition
- 2018 Erika Weisendorf, Magnesium air batteries
- 2017-2018 Matthew Sailer, Radiation Shielding using Magnetic Fields

## **Academic Committees**

### **University Level**

- 2015-2021 Academic Advisor Society of Physics Students/Physics Club, Point Loma Nazarene University
- 1993-1994 Computer Issues, Course Curriculum/Text Book Committee, Faculty Search, Graduate Admissions Laboratory Computers, Lab Supervision: experiment/equipment, Seminar Chair, Student Physical Society Advisor. Mississippi State University
- 1992-1993 Computer Issues, Department Head Search, Graduate Admissions, Laboratory. Mississippi State University

### **High School Level**

- 1995-1997 Science Club sponsor, Engineering Club sponsor, SAT committee

## **Funding**

*American Physical Society Public Outreach and Informing the Public Grants - Physics for All: Mini Lessons – Renamed: Science On Cards. Awarded February 2012.*

*LaserFest – The LASER is 50 (almost)! Celebrate it's 50<sup>th</sup> with cake, refreshments, and its story from birth to the wonderful impacts it has on our society today! – Awarded November 2009*

*IDEA GRANT - How Do You Weigh a Star? - Awarded 1997-1998*

*ACTION RESEARCH GRANT - Reading Across the Curriculum - Awarded 1996-1997*

*Pulse Propagation in a Thick Medium of Multi-Level Atoms, H.M. Doss; MSU research initiation grant, Jan 1 - Dec 31 1993. Awarded*

*Propagation Effects in Optically Thick Media of Three-Level Atoms, H.M. Doss; NSF research initiation grant, March 1 1993 - Feb 1 1994. Awarded*