

JOSEPH W. MITCHELL, PH.D.

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Joseph Mitchell's career has spanned several fields over the decades of his professional life. As an experimental particle physicist, he developed excellence in scientific methodology at laboratories in the United States (Los Alamos National Laboratory) and Europe (CERN in Geneva, DESY in Germany). He switched to the software industry while still living in Europe, working for Sony in Brussels and San Diego, and finally for Intuit, Inc. Over the 23 years of his software career, he worked as both an engineer and manager, supporting the creation of embedded software for consumer products and financial software products such as QuickBooks and TurboTax.

After settling in California, at the request of his wife he applied his scientific skills to develop a novel wildfire protection system (WEEDS) for their home. This system protected their home in the 2003 Cedar fire, after which Dr. Mitchell published the design of the system in the world's leading fire engineering journal and founded M-bar Technologies and Consulting, LLC to publicize the importance of protecting homes from embers during wildfires. In 2009 he was selected to serve on the California State Fire Marshal Task Force which established a framework for testing ignition-resistant construction proposed for the 2010 update to the California Building Code. With this background, Dr. Mitchell was able to establish himself as an expert in wildfire at the California Public Utilities Commission.

Dr. Mitchell has been an expert witness at the CPUC on issues regarding wildfire and powerlines since 2006 and has authored academic papers on wildfires caused by utility infrastructure. He was the first to recognize and warn of the potential for catastrophic power line firestorms. He proposed and successfully advocated at the CPUC for the first utility fire protection plans aimed at preventing catastrophic fire ignitions. He also proposed the process that led to the statewide utility fire hazard maps created by the CPUC and CAL FIRE, and regulations requiring utilities to provide fire ignition data to the CPUC. As expert witness for and board member of the Mussey Grade Road Alliance (MGRA or Alliance), a grass-roots organization on the wildland urban interface in the San Diego backcountry that seeks to improve fire safety in California, he has helped to oppose utility applications that would compromise public safety, offering both testimony and comment.

Physics and Fire Science Vitae

2020-2021 – Dr. Mitchell supported the Mussey Grade Road Alliance in the review of the 2019, 2020, and 2021 Wildfire Mitigation Plans from the three major California utilities. Dr. Mitchell's unique contributions result from his ability to perform detailed physical, statistical, mathematical, regulatory, and logical analyses of utility submissions, and many of his suggestions have been adopted by the CPUC, the Wildfire Safety Division, and the Investor-Owned Utilities (IOUs). Dr. Mitchell and MGRA continue to advocate for a more active role for the CPUC in the regulation of utility power shutoff ("PSPS"), and were the first to suggest that shutoff thresholds need to balance risks and benefits from both wildfire and power shutoff.

2018-2019 – Supported the Mussey Grade Road Alliance in the aftermath of the Northern California 2017 and 2018 power line firestorms in their opposition to legislation that would compromise fire safety. Authored expert comment in California Public Utility Commission (CPUC) proceedings following from passage of Senate Bill 901, including utility wildfire mitigation plans, proactive power shutoff, utility liability, and the safety culture and potential re-organization of PG&E. Made substantive contributions to the development Wildfire Mitigation Plans and guidelines for utility proactive power shutoff.

2017-2018 – Authored a chapter on radiant heat in the Encyclopedia of Wildfires and Wildland Urban Interface (WUI) Fires.

2009-2017 – Provided key fire safety testimony used in San Diego Gas and Electric Company's (SGE&E) WEBA and WEMA CPUC applications, which were utility proposals to pass on wildfire liability costs to ratepayers. Applications and appeals were denied.

2008-2017 – Participation in ongoing California Public Utility Commission (CPUC) safety proceedings on behalf of MGRA. Jointly sponsored proposed rules with the Consumer Protection and Safety Division (CPSD/SED) and facilitated participation of CAL FIRE. Four rule changes that were proposed on behalf of MGRA (or jointly proposed with the CPSD) were fully or partially accepted by a decision of the California Public Utilities Commission. Continuing to participate on issues of fire data collection and high-resolution fire threat maps for utilities. Made key contributions to the Safety Model Assessment Proceeding (S-MAP). Also analyzed utility fire safety data as a component of SDG&E's 2016 rate case.

2012-2013 – Presented on the power line fire threat at the International Conference on Engineering Failure Analysis conference in the Hague, Netherlands. Published in Engineering Failure Analysis in 2013.

2011 – Presented on the power line fire threat and California's regulatory response at the annual Wildland Fire Litigation Conference.

2009 – Presented paper and presentation at *Fire and Materials 2009* on catastrophic power line fires, which was the first paper to demonstrate the relationship between wind, fire suppression efficiency, and power line failure rates. Served on a California State Fire Marshal Task Force, which established a framework for testing ignition-resistant construction proposed for the 2010 update to the California Building Code. WEEDS water spray system was featured in a news segment by San Diego television station KGTV.

2008-2009 – Successfully opposed an application by San Diego Gas & Electric Company to shut off power under regularly occurring wind conditions, arguing instead for a cost/benefit analysis – a recommendation that was adopted by the CPUC.

2007-2008 – Submission of expert witness testimony on behalf of MGRA in the CPUC hearings for the proposed SDG&E "*Sunrise Powerlink*" transmission line on the subject of power lines and wildland fire, which included cross-examination and contribution to briefs. Demonstrated potential fire risks from transmission lines, and also found a significantly larger number of power line fires in San Diego County.

2007 – Presented work with Oren Patashnik at *Fire & Materials 2007* conference in San Francisco, whose Scripps Ranch data demonstrated potential ember vulnerability of curved-tile roofing (confirmed in 2009 by NIST research). Provided comment on and criticism of San Diego County's 'shelter-in-place' guidelines. Wrote an op-ed piece published in the San Diego Union Tribune and provided commentary for News 8 KFMB piece on shelter-in-place. Submitted expert testimony for CPUC on *Sunrise Powerlink* project.

2006 – Publication of peer-reviewed paper on the WEEDS water-spray wildland fire protection system in the *Fire Safety Journal*. Presentation of results at the *Third International Fire Ecology and Management Congress*, San Diego, CA.

2001-2005 – Developed the WEEDS method for structure defense during wildland fires. Completed in time for the October 26, 2003 Cedar fire, when it was validated under wildfire conditions. Founded M-Bar Technologies and Consulting to promulgate knowledge regarding

WEEDS and the importance of designing for firebrand protection under high-wind conditions. Poster session at *Wildfire 2004* conference, Reno, NV. Articles published in *San Diego Reader* magazine and in *Home&fire* and *Wildfire* trade magazines. Computer modeling validates WEEDS principles.

1999 – Returned to the United States from Europe, settling in San Diego, CA.

1996-2019 – Work in software engineering and management for major multinational corporations.

1989-1998 – Lived and worked in Europe first as a postdoctoral physicist and then in software engineering for a multinational corporation. Resided in Switzerland, Germany, France, and Belgium.

1993-1996 – Postdoctoral work for University of California at Davis in heavy ion physics, performed at CERN. Continuing with work in lasers, optical systems and computer modeling.

1989-1993 – Postdoctoral work for McGill University in high energy physics at CERN (Center for European Nuclear Research, Geneva, Switzerland) and DESY (Deutsches Electron-Synchrotron, Hamburg, Germany). Developed expertise in energy measurement, computer modeling, lasers and optical systems.

1989 – Ph. D. in Physics received from Ohio State University, Columbus, Ohio

1981-1989 – Graduate research in elementary particle (neutrino) physics, Columbus and Los Alamos National Laboratory, NM. Trained in electronics, mechanical engineering, computing, energy measurement and statistics.

1981-1983 – Graduate teaching assistant, OSU physics department.

1981 – Bachelor of Science in Physics received from Ohio State University, Columbus, Ohio

Expert Testimony and Technical Commentary

California Public Utilities Commission (CPUC); Application Proceeding A.06-08-010; Mussey Grade Road Alliance (MGRA); MG-1; MGRA Phase 1 and Phase 2 Direct Testimony; Sunrise Powerlink Transmission Line Project; Application No. 06-08-010; March 12, 2008

DIRECT TESTIMONY OF THE MUSSEY GRADE ROAD ALLIANCE - WEBA IMPACTS ON FIRE RISK AND COSTS; Application No. 09-08-020; September, 11, 2011.

DIRECT TESTIMONY OF THE MUSSEY GRADE ROAD ALLIANCE, SDG&E 2016 RATE CASE; May 15, 2015.

DIRECT TESTIMONY OF THE MUSSEY GRADE ROAD ALLIANCE SDG&E WILDFIRE EXPENSE MANAGEMENT ACCOUNT; October 17, 2016

Provided all technical input on wildland fire for the following CPUC Proceedings for the Mussey Grade Road (MGRA):

P.07-11-007 – SDG&E fire safety petition.

R.08-11-005 – Fire safety rulemaking.

A.08-12-021 – SDG&E application for pro-active power shutoff.

(includes J. W. Mitchell report “*When to Turn Off the Power? Cost/Benefit Outline for Proactive De-energization*”, March 27, 2009)

A.09-08-021 – SDG&E application to recover costs of 2007 wildfires.

A.13-11-006 - Rulemaking to Develop a Risk-Based Decision-Making for Energy Utilities.

A.14-11-003 – SDG&E 2016 rate case.

A.15-05-002-5 –Review of SDG&E Safety Model Assessment

R.15-05-006 – Rulemaking to Develop and Adopt Fire-Threat Maps and Fire-Safety Regulations.
A.15-09-010 – SDG&E application to recover costs of 2007 wildfires.
R.18-10-007 – Order Instituting Rulemaking to Implement Electric Utility Wildfire Mitigation Plans Pursuant to Senate Bill 901.
R.18-12-005 – Order Instituting Rulemaking to Examine Electric Utility De-Energization of Power Lines in Dangerous Conditions
I.15-08-019; PG&E safety culture investigation.
R.19-01-006 – Order Instituting Rulemaking to Implement Public Utilities Code Section 451.2 Regarding Criteria and Methodology for Wildfire Cost Recovery Pursuant to Senate Bill 901 (2018).
I.19-11-010-11 – SDG&E RAMP Proceeding (suspended)
I.19-11-013 – Order Instituting Investigation on the Commission’s Own Motion on the Late 2019 Public Safety Power Shutoff Events
2020 Wildfire Mitigation Plans
R.20-07-013 – Risk-based Decision-making Framework
A.20-06-012 – PG&E RAMP Proceeding
A.21-05-013 – SDG&E RAMP Proceeding
A.21-06-021 – PG&E General Rate Case
2021 Wildfire Mitigation Plans

Publications

Fire Publications & Presentations - Academic

Mitchell, J.W., 2018. Radiant Heat, in: Manzello, S.L. (Ed.), Encyclopedia of Wildfires and Wildland-Urban Interface (WUI) Fires. Springer International Publishing, Cham, pp. 1–6.
https://doi.org/10.1007/978-3-319-51727-8_65-1 (in press)

Mitchell, Joseph W.; Power line failures and catastrophic wildfires under extreme weather conditions; Engineering Failure Analysis; Volume 35, 15 December 2013, Pages 726–735 (ICEFA V, The Hague, The Netherlands, July 3, 2012)
<http://www.sciencedirect.com/science/article/pii/S1350630713002343>

Mitchell, Joseph W.; “Power Lines and Catastrophic Wildland Fire in Southern California”; Presentation to the Fire & Materials 2009 Conference, San Francisco CA, Jan 26, 2009.
http://www.mbartek.com/images/FM09_JWM_PLFires_1.0fc.pdf

Mitchell, Joseph W. and Oren Patashnik; Firebrand Protection as the Key Design Element for Structure Survival during Catastrophic Wildland Fires; Fire and Materials 2007, San Francisco, CA; Jan 29-31, 2007.
http://www.mbartek.com/images/FM07_FirebrandsWildfires_1.1F.pdf

Mitchell, Joseph W.; REDUCING URBAN INTERFACE ECOLOGICAL IMPACTS AND FIRE LOSSES THROUGH STRUCTURAL FIREBRAND PROTECTION; Third International Fire Ecology and Management Conference; San Diego, CA; Nov. 13-17, 2006.

Mitchell, Joseph W.; Wind-enabled ember dousing; Fire Safety Journal; v. 41 (2006); pp 444-458.
<https://www.sciencedirect.com/science/article/abs/pii/S0379711206000567>

WEEDS poster session; Wildfire 2004 conference, Reno, NV; Mar. 2004.

Presentations to Public Officials

Senate Energy, Utilities and Communications Subcommittee on Gas, Electric and Transportation Safety Hearing of 05-03-2016
<https://ca.digitaldemocracy.org/hearing/1083?startTime=698&vid=1OQ4lwsNiZY> Starting 23:37

Fire Publications & Presentations – Trade and General Public

Mitchell, Joseph W.; [Goaded into Action: California's Regulatory Response to the Power Line Fire Threat](#)
Presented at the [5th Annual Wildland Fire Litigation Conference, April 16, 2011](#)

Conklin, Diane and Joseph W. Mitchell; The PUC should deny this plan outright; The San Diego Union Tribune; May 10, 2009.
<http://www3.signonsandiego.com/stories/2009/may/10/puc-should-deny-plan-outright/?uniontrib>

Mitchell, Joseph W; Wind-Enabled Ember Dousing - A comparison of wildland fire protection strategies; Prepared for the Ramona Fire Recovery Center, 8/12/2008.
http://www.mbartek.com/images/Mbar_WEEDS_Comparison_web.pdf

Mitchell, Joseph W.; Playing with fire: The county's 'Shelter in Place' gamble; The San Diego Union-Tribune; May 2, 2007, p. B7.
http://www.signonsandiego.com/uniontrib/20070502/news_lz1e2mitchell.html

Mitchell, Joseph W.; Brand Dilution (Cover article); Wildfire Magazine; Mar. 2005
http://wildfiremag.com/wui/brand_dilution/

Mitchell, Joseph W.; WEEDS: Wind Enabled Ember Dousing System; Home&fire Magazine; Spring,2005; p. 32

Mitchell, Joseph; Engineering a Miracle; San Diego Weekly Reader Magazine; April 29, 2004

Physics: List of neutrino, high-energy, and heavy ion physics publications is attached below.

Software Industry Experience

Intuit, San Diego – Staff Engineer

2005 - 2019

Led and contributed to transitions through multiple generations of build and deployment pipelines, emphasizing automation and seamless end-user experience.
Built enterprise-wide Jenkins build system based on AWS, Chef, and CloudFormation and transitioned major projects such as TurboTax onto the corporate infrastructure.

Built tools and engaged with business unit teams to migrate builds from both internal and AWS-based build infrastructure to Kubernetes-based AWS build infrastructure.

Worked across organizational boundaries to develop, acquire and proselytize DevOps best practices.

Designed and built three generations of build systems using best current technology for Intuit's Central Technology Organization.

Designed, drove and implemented user engagement models that enabled a small team with one rotating support engineer to support 60% of builds for the entire enterprise.

Led migration of Central Technology Organization through two generations of source control systems (first to Perforce, then to Git).

Sony, Brussels and San Diego — Software Developer, SCM Engineer, SCM Manager

1996 - 2005

Managed a four person SCM team developing embedded software for Sony cable and satellite television products.

Developed virtualized build system following standard patterns and transitioned development team onto best of breed source control.

Contact info:

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Joseph W. Mitchell, Ph.D. Particle Physics Publication List

NA49 (CERN) Publications

Transverse Energy Production in Pb 208+ Pb Collisions at 158 GeV per Nucleon
(with Alber, T, et. al.) 1995. Physical review letters 75, 3814.

First results from NA49 on Pb+ Pb collisions at 158 GeV/nucleon
(with Margetis, et. al.) 1995. Nuclear Physics A 590, 355–365.

Hadron yields and hadron spectra from the NA49 experiment.
(with Jones, et. al.) 1996. Nuclear Physics A 610, 188–199.

Preliminary results on Pb+ Pb collisions from the Grid-TOF data analysed in Budapest.
(with Vesztergombi, G., et. al.) 1996. Acta Physica Hungarica New Series Heavy Ion Physics 4, 55–62.

Stopping and collective effects at SPS energies
(with Wienold, T., et. al.) 1996. Nuclear Physics A 610, 76–87.

ZEUS (DESY) Publications

ZEUS Physics

Measurement of the proton structure function F_2 in e-p scattering at HERA
The ZEUS Collaboration (with M. Derrick et. al.), Physics Letters **B316** (1993) p. 412

Observation of events with a large rapidity gap in deep inelastic scattering at HERA
The ZEUS Collaboration (with M. Derrick et. al.), Physics Letters **B315** (1993) p. 481

Search for excited electrons using the ZEUS detector
The ZEUS Collaboration (with M. Derrick et. al.), Physics Letters **B316** (1993) p. 207

Hadronic energy distributions in deep inelastic electron-proton scattering
The ZEUS Collaboration (with M. Derrick et. al.), Z. Phys. **C59** (1993) p. 231

Observation of two-jet production in deep inelastic scattering at HERA
The ZEUS Collaboration (with M. Derrick et. al.), Physics Letters **B306** (1993) p. 158

Search for leptoquarks with the ZEUS detector

The ZEUS Collaboration (with M. Derrick et. al.), Physics Letters **B306** (1993) p. 173

Initial study of deep inelastic scattering with ZEUS at HERA

The ZEUS Collaboration (with M. Derrick et. al.), Physics Letters **B303** (1993) p. 183

Observation of hard scattering in photoproduction at HERA

The ZEUS Collaboration (with M. Derrick et. al.), Physics Letters **B297** (1992) p. 404

A measurement of $\sigma_{tot}(\gamma p)$ at $\sqrt{s} = 210$ GeV

The ZEUS Collaboration (with M. Derrick et. al.), Physics Letters **B293** (1992) p. 465

ZEUS Instrumentation

Calibration of the forward and rear ZEUS calorimeter using cosmic ray muons

(with U. Behrens et. al.), Nucl. Inst. and Meth. **A339** (1994) p. 498

A laser pulse stretcher made from optical fibres

D. Hanna and J. Mitchell, Nucl. Inst. and Meth. **A309** (1993) p. 14

Construction and Beam Test of the ZEUS Forward and Rear Calorimeter

(with The ZEUS Calorimeter Group: A. Andresen, et. al.) Nucl. Inst. and Meth. **A309** (1991) p. 101

Response of a uranium-scintillator calorimeter to electrons, pions and protons in the momentum range 0.5-10 GeV/c

with The ZEUS Calorimeter Group, A. Andresen, et. al.) Nucl. Instr. and Meth. **A290** (1990) p. 95

E645 (Los Alamos) - Neutrino Oscillation at LAMPF

Limits on Neutrino Oscillations from $\bar{\nu}_e$ Appearance

(with S. J. Freedman et. al.), Physical Review **D 47** (1993) p. 811;

A Fine Grain Modular Detector for Low Energy Particles

(with L. S. Durkin et al.) Nucl. Instr. and Meth. **A227** (1989) p. 386

Limits on $\bar{\nu}_\mu \rightarrow \bar{\nu}_e$ Oscillations

(with L. S. Durkin et al.) Phys. Rev. Lett. **61** (1988) p. 1811

Results of a Search for Neutrino Oscillations at a Meson Factory Beam Stop

J. W. Mitchell, *Ph. D. Thesis*, The Ohio State University and Los Alamos Publication LA-11539-T (1989)

Conference Presentations

The Pulsed Light Calibration System of the ZEUS Calorimeter

J. W. Mitchell, et al., Proceedings of the 3rd International Conference On Advanced Techniques and Particle Physics, Como, Italy, 1992; Nuclear Physics **B32** (1993) p. 106

On the Possibility of Searching for Strangelets and the H^0 Dibaryon with the NA49 Experiment at CERN

J.W. Mitchell, in The Proceedings of the International Symposium on Strangeness and Quark M