

ERIN MARGARET SCHUMAN

PERSONAL

Birth date: May 15, 1963
Current status: Director, Professor
Lab address: Max Planck Institute for Brain Research
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EDUCATION

| | | | |
|-------|---------------------------|------------------------|---------------|
| Ph.D. | Neuroscience | Princeton University | January, 1990 |
| B.A. | Psychology | Univ. of Southern Cal. | May, 1985 |
| | Neural Systems & Behavior | Marine Biological Lab | Summer, 1988 |

AWARDS AND HONORS

2013 Alexander Cruickshank Lecture, Gordon Research Conference
2013 Hodgkin-Huxley-Katz Prize for 2013
2013 Norbert Elsner Lecture, German Neuroscience Society
2008 Gerard Lecture, University of California, Irvine
2005 Howard Hughes Medical Institute Investigator
2002 Howard Hughes Medical Institute Associate Investigator
1997 Howard Hughes Medical Institute Assistant Investigator
1996 Ferguson Biology Undergraduate Teaching Prize
1996-1998 Beckman Young Investigator Award
1995 Ferguson Biology Graduate Teaching Prize
1995 American Association of University Women Emerging Scholar
1995-1999 Pew Biomedical Scholar
1994-1998 John Merck Scholar
1994-1996 Alfred P. Sloan Research Fellow
1994-1996 McKnight Scholars Award (declined)
1991 Katherine McCormick Foundation fellow
1990 NIH postdoctoral fellow
1986 NIH predoctoral fellow
1985 Phi Beta Kappa, graduation with honors
1985 Sigma Xi Outstanding Undergraduate Research Award

EMPLOYMENT

2013-present Managing Director, Max Planck Institute for Brain Research
2009-2013 Director, Max Planck Institute for Brain Research, Frankfurt, Germany
2004-2010 Professor, Caltech, Biology
2007-2009 Option Representative, Division of Biology, Caltech
2008 INSERM-Visiting Faculty, Ecole Normale Supérieure, Paris
2005 Visitor in Biology, Russ Fernald's lab, Stanford University
2004-2009 Investigator, HHMI

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|-----------|---|
| 2002-2004 | Associate Investigator, Howard Hughes Medical Institute |
| 2000-2006 | Executive Officer in Biology, Caltech |
| 1999-2004 | Associate Professor, Caltech, Biology |
| 1997-2002 | Assistant Investigator, Howard Hughes Medical Institute |
| 1993-1999 | Assistant Professor, Caltech, Biology |
| 1990-1993 | Postdoctoral Fellow, Stanford University, PI: Daniel V. Madison |
| 1990 | Postdoctoral fellow, Princeton University, PI: Gregory Clark |
| 1985-1990 | Graduate student, Princeton University, PI: Joseph Farley and Gregory Clark |

Advisory/Editorial Boards

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| 2015- | NERF Neuroelectronics Research Flanders Scientific Advisory Board |
| 2014- | Axelrod Neuroscience Prize Selection Committee |
| 2014- | Gruber Neuroscience Prize Committee |
| 2014- | Scientific Advisory Board, MRC Centre for Developmental Neurobiology (UK) |
| 2014- | 10 th RIKEN Brain Science Advisory Council (BSAC), Saitama, Japan |
| 2014- | Associate Editor of Neuroscience Research (Japan) |
| 2013- | Foundation for Dystonia Research Scientific Advisory Committee |
| 2013- | VIB Center for the Biology of Disease Scientific Advisory Board |
| 2012- | Society for Neuroscience Axelrod Prize Committee |
| 2011- | Panel Member, ERC Starting Grant |
| 2011- | Kavli Institute for Systems Neuroscience Scientific Advisory Board |
| 2011- | Editorial Board Learning & Memory |
| 2010- | Society for Neuroscience International Affairs Committee |
| 2010- | Wellcome Trust Core Interview Panel |
| 2010-2014 | Scientific Advisory Board, Neuroscience Institute, Helsinki |
| 2009- | Associate Editor, Current Opinion in Neurobiology |
| 2008 | Advisory Committee, Harvard University, Molecular-Cellular Biology |
| 2004-2007 | NIH Study section member, NIH, MDCN I and SYN |

Meeting Organization

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| 2014- | FENS Brain Conferences Committee (BCC) |
| 2013- | Meeting Organizer RNA Localization Conference 2015 |
| 2013- | Meeting Organizer JFRC High-throughput Sequencing for Neuroscience 201 |
| 2012 | FENS Forum (2014) Program Committee |
| 2011 | Co-Chair, Gordon Conference on Dendrites |
| 2009 | Co-Organizer, Cell-adhesion symposium, Cell Biology meeting |
| 2009 | Meeting Organizer, JFRC Protein Translation at the Synapse |
| 2007 | Meeting Organizer, JFRC Protein Translation at the Synapse |
| 2003 | Co-Chair, Cold Spring Harbor Meeting on Learning and Memory |
| 2001 | Chair, Gordon Conference on Neural Plasticity |
| 2001 | Co-Organizer, Keystone Meeting on the Hippocampus and Synapses |
| 1998 | Co-Chair, Gordon Conference on Neural Plasticity |

Teaching

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| 2011-present | IMPRS Lecturer |
| 2006-2009 | Co-Instructor, Bi129, Cellular Dynamics |
| 2004-2009 | Co-Instructor, Bi162, Cellular Neurophysiology |

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| 2003-2009 | Guest Lecturer, Bi150 and Bi156, Neurobiology |
| 1998-2003 | Co-Instructor, Bi260, How to give a seminar |
| 1996-1998 | Co-Director, Brain Development and Function Course, CSHL |
| 1995 | Faculty, Neural Systems and Behavior, Marine Biological Laboratory |
| 1994-2002 | Co-Instructor, Bi150, Neurobiology |
| 1994-2005 | Co-Instructor, Bi80, Current Research |

MPI Committees/Services

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| 2012- | MPI for Molecular Genetics Search Committee |
| 2012- | Working Group to support female scientists in the MPG |
| 2011-2014 | MPG Perspective's Committee |
| 2011- | CAESAR Search Committee |
| 2011- | IMPRS for Neural Circuits, Spokesperson |
| 2011 | Max Planck 20X2020 |
| 2011 | Biology of Sleep Search Committee |
| 2010-2011 | Max Planck Florida Institute |
| 2010 | MPG 2010+ Co-Author |

Caltech Committee Work

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| 2007-2009 | Admissions Task Force |
| 2006-2009 | Chair, Genetics of Neural Circuits and Behavior |
| 2006-2009 | Institute Convocations committee |
| 2006-2009 | Faculty Committee on Recruiting and Retaining Women and Minority Faculty |
| 2005-2009 | Cellular and molecular biology search committee |
| 2006-2009 | Behavior & Genetics Search committee chair |
| 2003-2009 | Target of Opportunity committee |
| 2000-2009 | Division of Biology Postdoctoral Fellowship committee |
| 2002-2009 | Cellular & Molecular Neuroscience Qualifying Exam chair |
| 2002-2006 | Behavior & Genetics Search Committee |
| 2003 | Faculty Board nominating Committee |
| 2002 | Ad hoc Child Care Committee |
| 2001-2004 | Faculty Board |
| 2003-2004 | Bioengineering Search Committee |

PUBLICATIONS

Hanus, C., Langer, J., Tushev, G. and Schuman, E.M. (201X). Unconventional secretory processing diversifies neuronal ion channel properties. Submitted to **Science**.

You, X., Vlatkovic, I., Babic, A., Will, T.J., Epstein, I., Tushev, G., Akbalik, G., Wang, M., Glock, C., Quedenau, C., Wang, X., Hou, J., Liu, H., Sun, W., Sambandan, S., Chen, T., Schuman, E.M.* and Chen, W. (201X) Neural circular RNAs are derived from synaptic genes and regulated by development and plasticity. * co-senior and corresponding authors. Under review at **Nature Neuroscience**.

tom Dieck, S., Kochen, L., Hanus, C., Bartnik, I., Nassim-Asir, B., Merk, K., Mosler, T.,

Garg, S., Bunse, S., Tirrell, D.A. and Schuman, E.M. (201X). Direct visualization of identified and newly synthesized proteins in situ. Revised manuscript under review at **Nature Methods**.

Buhr, F., Kohl-Landgraf, J., tom Dieck, S., Hanus, C., Chatterjee, D., Hegelein, A., Schuman, E.M., Wachtveitl J., and Schwalbe, H. (201X). Design of photocaged puromycin for nascent polypeptide release and spatiotemporal monitoring of translation. Revised manuscript under review at **Angewandte Chemie**.

Garg, S., Fischer, S. Stelzer, E.H.K., and Schuman, E.M. (2014). Lateral assembly of N-cadherin drives tissue integrity by stabilising adherens junctions. **Journal of Royal Society Interface**, in press.

Hanus, C., Kochen, L., tom Dieck, S., Racine, V., Sibarita, J.B., Schuman, E.M., and Ehlers, M.D. (2014). Synaptic Control of Secretory Trafficking in Dendrites. **Cell Reports**, pii: S2211-1247(14)00420-3. doi: 10.1016/j.celrep.2014.05.028. (Epub ahead of print).

Perkovic, M., Kunz, M., Endesfelder, U., Bunse, S., Wigge, C., Yu, Z., Hodirnau, V.V., Scheffer, M.P., Seybert, A., Malkusch, S., Schuman, E.M., Heilemann, M., and Frangakis, A.S. (2014). Correlative light- and electron microscopy with chemical tags. **Journal of Structural Biology**, 186(2):205-13. doi: 10.1016/j.jsb.2014.03.018.

Bagert, J.D., Xie, Y.J., Sweredoski, M.J., Qi, Y., Hess, S., Schuman, E.M., and Tirrell, D.A. (2014). Quantitative, time-resolved proteomic analysis by combining bioorthogonal noncanonical amino acid tagging and pulsed stable isotope labeling by amino acids in cell culture. **Mol. Cell. Proteomics**, 13(5):1352-8. doi:10.1074/mcp.M113.031914

Tom Dieck, S., Hanus, C., and Schuman, E.M. (2014). SnapShot: Local Protein Translation in Dendrites. **Neuron**, 81(4):958-958.e1; doi:10.1016/j.neuron.2014.02.009

Akbalik, G., and Schuman, E.M. (2014). mRNA, Live and Unmasked. **Science**, 24 (6169): 375-376; doi: 10.1126/science.1249623.

Will, T.J., Tushev, G., Kochen, L., Nassim-Assir, B., Cajigas, I.J., tom Dieck, S., and Schuman, E.M. (2013). Deep-Sequencing and High-Resolution Imaging Reveal Compartment-Specific Localization of Bdnf mRNA in Hippocampal Neurons. **Science Signaling**, 6 (306), rs16; doi: 10.1126/scisignal.2004520.

Bunse, S., Garg, S., Junek, S., Vogel, D., Ansari, N., Stelzer, E.H.K., and Schuman, E.M. (2013). Role of N-cadherin cis and trans interfaces in the dynamics of adherens junctions in living cells. **PLoS ONE**, 8(12): e81517; doi:10.1371/journal.pone.0081517.

Holt, C.E. and Schuman, E.M. (2013). The central dogma decentralized: new perspectives on RNA function and local translation in neurons. **Neuron**, Volume 80, Issue 3, 648-657; doi:10.1016/j.neuron.2013.10.036.

Hinz, F.I., Tushev, G., Aizenberg, M., and Schuman, E.M. (2013). Protein synthesis-dependent associative long-term memory in larval zebrafish. **Journal of Neuroscience**,

33(39):15382-15387.

Hanus, C.T. and Schuman, E.M. (2013). Proteostasis in dendrites. **Nature Reviews Neuroscience**, AOP, published online 31 July 2013; doi:10.1038/nrn3546.

Hinz, F.I., Dieterich, D.C., and Schuman, E.M. (2013). Teaching old NCATS new tricks: Using non-canonical amino acid tagging to study neuronal plasticity. **Current Opinion in Chemical Biology**, 17(5), 738–746.

Epstein, I., Tushev, G., Will, T.J., Vlatkovic, I., Cajigas, I.J., Schuman, E.M. (2013). Alternative polyadenylation and differential expression of Shank mRNAs in the synaptic neuropil. **Phil. Trans. R. Soc. B**, 369(1633); published online 2 December 2013; doi: 10.1098/rstb.2013.0137.

Ngo, J.T., Schuman, E.M., and Tirrell, D.A. (2013). A mutant methionyl-tRNA synthetase from bacteria enables site-selective N-terminal labeling of proteins expressed in mammalian cells. **Proc. Natl. Acad. Sci.**, 110(13), 4992-4997.

Taylor, A., Wu, J., Tai, H.C., and Schuman, E.M. (2013). Axonal translation of β -catenin regulates synaptic vesicle dynamics. **Journal of Neuroscience**, 33(13), 5584-5589.

tom Dieck, S., Müller, A., Nehring, A., Hinz, F.I., Bartnik, I., Schuman, E.M., Dieterich, D.C. (2012). Metabolic labeling with noncanonical amino acids and visualization by chemoselective fluorescent tagging. **Current Protocols in Cell Biology**, Chapter 7: Unit 7.11.

Ngo, J.T., Babin, B.M., Champion, J.A., Schuman, E.M. and Tirrell, D.A. (2012). State-selective metabolic labeling of cellular proteins. **ACS Chemical Biology**, 7(8), 1326-1330.

Hodas, J.J.L., Nehring, A., Höche, N., Sweredoski, M.J., Pielot, R., Hess, S., Tirrell, D.A., Dieterich, D.C., Schuman, E.M. (2012). Dopaminergic modulation of the hippocampal neuropil proteome identified by bio-orthogonal non-canonical amino-acid tagging (BONCAT). **Proteomics**, 12(15-16): 2464-76.

Cajigas, I.J., Tushev, G., Will, T.J., tom Dieck, S., Fuerst, N., and Schuman, E.M. (2012). The local transcriptome in the synaptic neuropil revealed by deep sequencing and high-resolution imaging. **Neuron**, 74, 453-466.

Ito, H. and Schuman, E.M. (2012). Functional division of hippocampal area CA1 via modulatory gating of entorhinal cortical inputs. **Hippocampus**, 22: 2, 372-387.

Hinz, F.I., Dieterich, D.C., Tirrell, D.A., and Schuman, E.M. (2012). Non-canonical amino acid labeling in vivo to visualize and affinity purify newly synthesized proteins in larval zebrafish. **ACS Chemical Neuroscience**, 3 (1), 40-49.

Kim, S.A., Tai, Chin-Yin, Mok, Lee-Peng, Mosser, E.A., Schuman, E.M. (2011). Calcium-dependent dynamics of cadherin interactions at cell-cell junctions. **Proc. Natl. Acad. Sci.**, 108 (24), 9857-9862.

Aizenberg, M. and Schuman, E.M. (2011). Cerebellar-dependent learning in larval zebrafish. **Journal of Neuroscience**, 31(24), 8708-8712.

Szychowski, J., Mahdavi, A., Hodas, J.J.L., Bagert, J.D., Ngo, J.T., Landgraf, P., Dieterich, D.C., Schuman, E.M., Tirrell, D.A. (2010). Cleavable Biotin Probes for Labeling of Biomolecules via Azide-Alkyne Cycloaddition. **Journal of the American Chemical Society**, 132 (51), 18351–18360.

Schuman, E., Zhuang X. (2010). New Technologies. Editorial overview. **Current Opinion in Neurobiology**, 20:608-609.

Cajigas, I.J., Will, T., and Schuman, E.M. (2010). Protein homeostasis and synaptic plasticity. **The EMBO Journal**, 29, 2746-2752.

Dieterich, D.C., Hodas, J.J.L., Gouzer, G., Shadrin, I.Y., Ngo, J.T., Triller, A., Tirrell, D.A., and Schuman, E.M. (2010). *In situ* visualization and dynamics of newly synthesized proteins in rat hippocampal neurons. **Nature Neurosci.**, 13, 897-905.

Tai, Hwan-Ching, Besche H., Goldberg A.L. and Schuman E.M. (2010). Characterization of the brain 26S proteasome and its interacting proteins. **Frontiers in Molecular Neuroscience**, 3:12.

Taylor, A.M., Dieterich, D.C., Cho, J., Ito, H., Kim, S.A., and Schuman, E.M. (2010). Microfluidic local perfusion chambers for the visualization and manipulation of synapses. **Neuron**, 66, 57-68.

Rutishauser, U., Ross, I.B., Mamelak, A.N. and Schuman, E.M. (2010). Human memory strength is predicted theta-frequency phase-locking of single neurons. **Nature**, 464: 903-907.

Tai, Hwan-Ching and Schuman, E.M. (2010). Angelman Syndrome: Finding the lost arc. **Cell**, 140, 608-610.

Ito, H. and Schuman, E.M. (2009). Distance-dependent homeostatic synaptic scaling mediated by A-type potassium channels. **Frontiers in Cellular Neuroscience**, 3:15.

Ngo JT, Champion JA, Mahdavi A, Tanrikulu IC, Beatty KE, Connor RE, Yoo TH, Dieterich DC, Schuman EM, Tirrell DA. (2009). Cell-selective metabolic labeling of proteins. **Nature Chemical Biology**, 5, 715-717.

Sutton, M.A. and Schuman, E.M. (2009). Partitioning the synaptic landscape: distinct microdomains for spontaneous and spike-triggered neurotransmission. **Science Signaling**, 7, 19.

Tai, H.C. and Schuman, E.M. (2008). Ubiquitin, the proteasome and protein degradation in neuronal function and dysfunction. **Nature Rev. Neurosci.**, 11, 826-38.

Tai, C.Y., Kim, S.A., and Schuman, E.M. (2008). Cadherins and Synaptic Plasticity. **Curr. Opin. Cell Biol.** 5, 567-575.

- Mysore SP, Tai CY, Schuman EM. (2008) N-cadherin, spine dynamics, and synaptic function. **Frontiers in Neuroscience**, Dec 2(2):168-175.
- Ito HT, Schuman EM. (2008) Frequency-dependent signal transmission and modulation by neuromodulators. **Frontiers in Neuroscience**, Dec; 2(2):138-144.
- Rutishauser, U., Schuman, E.M. and Mamelak, A.N. (2008). Activity of human hippocampal and amygdala neurons during retrieval of episodic memories. **Proc. Natl. Acad. Sci.**, 105, 1:329-334.
- Antion, M.D., Merhav, M., Hoeffler, C.A., Reis, G., Kozma, S.C., Thomas, G., Schuman, E.M., Rosenblum, K., and Klann, E. (2008). Removal of S6K1 and S6K2 leads to divergent alterations in learning, memory, and synaptic plasticity. **Learn. Mem.** 15, 29-38.
- Ito, H. and Schuman, E.M. (2007). Frequency-dependent gating of synaptic transmission and plasticity by dopamine. **Frontiers in Neural Circuits**, 1, 1-13.
- Mysore, S. P., Tai, C-Y, and Schuman, E. M. (2007). Effects of N-cadherin disruption on spine morphological Dynamics. **Frontiers in Cellular Neurosci.**, 1, 1-14.
- Sutton, M. A., Taylor, A.M., Ito, H.T., Pham, A. and Schuman, E.M. (2007). Postsynaptic decoding of neural activity: eEF2 as a biochemical sensor coupling miniature synaptic transmission to local protein synthesis. **Neuron**, 55, 648-661.
- Tai, C.Y., Mysore, S.P., Chiu, C. and Schuman, E.M. (2007). Activity-regulated N-cadherin endocytosis. **Neuron**, 54, 771-785.
- Dieterich, D.C., Lee, J.J., Link, A.J., Graumann, J., Tirrell, D.A., and Schuman, E.M. (2007). Labeling, detection and identification of newly synthesized proteomes with bioorthogonal non-canonical amino-acid tagging. **Nature Protocols**, 2, 532-540.
- Beatty, K., Liu, J. Dieterich, D.C., Schuman, E.M. and Tirrell, D.T. (2006). Fluorescence Visualization of Newly Synthesized Proteins in Mammalian Cells. **Angewandte Chemie**, 45, 7364-7367.
- Sutton, M.A. and Schuman, E.M. (2006). Dendritic protein synthesis, synaptic plasticity, and memory. **Cell**, 127, 49-58.
- Bingol, B. and Schuman, E.M. (2006). Activity-dependent dynamics and sequestration of proteasomes in dendritic spines. **Nature**, 441, 1144-1148.
- Dieterich, D.N., Link, A.J., Graumann, J., Tirrell, D.T. and Schuman, E.M. (2006). Selective identification of newly synthesized proteins in mammalian cells using bioorthogonal non-canonical amino acid tagging (BONCAT). **Proc. Natl. Acad. Sci.**, 103, 9482-9487.
- Sutton, M.A., Ito, H., Cressy, P., Kempf, C., Woo, J. and Schuman, E.M. (2006). Miniature neurotransmission stabilizes synaptic function via tonic suppression of local dendritic protein synthesis. **Cell**, 125, 785-799.

Schuman, E.M., Dynes, J.L., and Steward, O. (2006). Synaptic regulation of translation of dendritic mRNAs. **J. Neurosci.**, 26, 7143-7146.

Rutishauser, U., Schuman, E.M. and Mamelak, A.N. (2006). Online detection and sorting of extracellularly recorded action potentials in human medial temporal lobe recordings, in vivo. **J. Neurosci. Meth.**, 154, 204-224.

Rutishauser, U., Mamelak, A.N., and Schuman, E.M. (2006). Single-trial learning of novel stimuli by individual neurons of the human hippocampus-amygdala complex. **Neuron**, 49, 805-813.

Tai, H.C. and Schuman, E.M. (2006). MicroRNAs reach out into dendrites. **Current Biology**, 16, R121-123.

Bingol, B. and Schuman, E.M. (2005). Synaptic protein degradation by the ubiquitin proteasome system. **Curr. Op. Neurobiol.**, 15, 536-541.

Goard, M., Aakalu, G., Fedoryak, O.D., Quinonez, C., St. Julien, J., Poteet, S.J., Schuman, E.M. and Dore, T.M. (2005). Light-mediated inhibition of protein synthesis. **Chemistry and Biology**, 12, 685-93.

Sutton, M.A. and Schuman, E.M. (2005). Local translational control in dendrites and its role in long-term synaptic plasticity. **J Neurobiol.**, 64, 116-31.

Smith, W.B., Starck, S.R., Roberts, R.W. and Schuman, E.M. (2005). Dopaminergic stimulation of local protein synthesis enhances surface expression of GluR1 and synaptic transmission in hippocampal neurons. **Neuron**, 45, 765-779.

Bhattacharya, J., Edwards, J., Mamelak, A.N., and Schuman, E.M. (2005). Long-range temporal correlations in the spontaneous spiking of neurons in the hippocampal-amygdala complex of humans. **Neuroscience**, 131, 547-55.

Schuman, E.M. and Chan, D. (2004). Fueling Synapses. **Cell**, 119, 738-740.

Remondes, M. and Schuman, E.M. (2004). Role for a cortical input to hippocampal area CA1 in the consolidation of a long-term memory. **Nature**, 431: 699-703.

Sutton, M.A., Aakalu, G.N., Wall, N. and Schuman, E.M. (2004). Regulation of dendritic protein synthesis by miniature synaptic events. **Science**, 304, 1979-1983.

Bingol, B. and Schuman, E.M. (2004). A proteasome-sensitive connection between PSD-95 and GluR1 endocytosis. **J. Neuropharmacology**, 47: 755-763.

Patrick, G.N., Bingol, B., Weld, H.A., and Schuman, E.M. (2003). Ubiquitin-mediated proteasome activity is required for agonist-induced endocytosis of GluRs. **Current Biology**, published online 10/20/03, 13, 2073-2081.

Steward, O. and Schuman, E.M. (2003). Compartmentalized synthesis and degradation of proteins in neurons. **Neuron**, 40: 347-359.

Remondes, M. and Schuman, E.M. (2003). Molecular mechanisms contributing to long-lasting synaptic plasticity at the temporoammonic-CA1 synapse. **Learning and Memory**, 10: 247-252.

Murase, S. and Schuman, E.M. (2003). Cadherins and synaptic plasticity: activity-dependent cyclin-dependent kinase 5 regulation of synaptic beta-catenin-cadherin interactions. **Philos. Trans. Royal Society**, 358: 749-756.

Jiang, C. and Schuman, E.M. (2002). Regulation and function of local protein synthesis in neuronal dendrites. **TIBS**, 27: 506-513.

Murase, S., Mosser, E., Schuman, E.M. (2002). Depolarization drives β -catenin into neuronal spines promoting changes in synaptic structure and function. **Neuron**, 35, 91-105.

Remondes, A.M. and Schuman, E.M. (2002). Direct cortical input modulates plasticity and spiking in CA1 pyramidal neurons. **Nature**, 416: 736-740.

Tang, S.J., and Schuman, E.M. (2002). Protein synthesis in the dendrite. **Philos. T. Roy. Soc. B.**, 357, 521-529.

Tang, S., Reis, G., Kang, H. Gingras, A.C., Sonenberg, N. and Schuman, E.M. (2002). A rapamycin-sensitive signaling pathway contributes to long-term synaptic plasticity in the hippocampus. **PNAS**, 99, 467-72.

Tang, S., Meulmans, D., Vasquez, L., Colaco, N., Schuman, E.M. (2001). A role for a rat homolog of stau6 in the transport of RNA to neuronal dendrites. **Neuron**, 32, vol. 3, 463-475.

Smith, W.B., Aakalu, G.N. and Schuman, E.M. (2001). Local protein synthesis in neurons. **Current Biology**, 11: R901-903.

Aakalu, G., Smith, W.B., Nguyen, N., Jiang, C. and Schuman, E.M. (2001). Dynamic visualization of local protein synthesis in hippocampal neurons. **Neuron**, 30: 489-502.

Steward, O. and Schuman, E.M. Protein synthesis at synaptic sites on dendrites. (2001). **Ann. Rev. Neurosci.**, 24, 299-325.

D'Apuzzo, M., Mandolesi, G. and Schuman, E.M. (2001). Abundant GFP expression and LTP in hippocampal acute slices by in vivo injection of sindbis virus. **J. Neurophysiol.**, 86: 1037-1042.

Kang H, Schuman E.M. (2000). Intracellular Ca²⁺ signaling is required for neurotrophin-induced potentiation in the adult rat hippocampus. **Neurosci Lett.** 283(3):141-4.

Dvorak-Carbone, H. and Schuman, E.M. (1999). Patterned activity in stratum lacunosum moleculare inhibits CA1 pyramidal neuron firing. **J. Neurophysiol.** 82: 3213-3222

Murase, S. and Schuman, E.M. (1999). The role of cell adhesion molecules in synaptic plasticity and memory. **Curr. Op. Cell Biol.**, 11: 549-553.

Schuman, E.M. (1999). mRNA Trafficking and Protein Synthesis at the Synapse. **Neuron**, 23: 645-648.

Ma, L., Reis, G., Parada, L.F., and Schuman, E.M. (1999). Neuronal NT-3 is not required for synaptic transmission or long-term potentiation in area CA1 of the adult rat hippocampus. **Learning & Memory**, 6: 267-275.

Schuman, E.M. (1999). Neurotrophin regulation of synaptic transmission. **Curr. Op. Neurobiol.**, 9: 105-109.

Dvorak-Carbone, H. and Schuman, E.M. (1999). Long-term depression of temporoammonic-CA1 hippocampal synaptic transmission. **J. Neurophysiol.**, 81: 1036-1044.

Ouyang, Y., Rosenstein, A., Kreiman, G., Schuman, E. M., and Kennedy, M. B. (1999). Tetanic stimulation leads to increased accumulation of Ca²⁺/calmodulin-dependent protein kinase II via dendritic protein synthesis in hippocampal neurons. **J. Neurosci.**, 19: 7823-7833.

Schuman, E., Smith, B., Tang, S., Aakalu, G., Meulmans, D., Vazquez, L., Tsung, M., and Reis, G. (1999). Protein synthesis in hippocampal neurons: Implications for synapse specificity. **Faseb J.**, 13, A703-A703.

Li, Y.X., Zhang, Y., Lester, H.A., Schuman, E.M., Davidson, N. (1998). Enhancement of neurotransmitter release induced by brain-derived neurotrophic factor in cultured hippocampal neurons. **J. Neurosci.**, 18: 10231-10240.

Li, Y.X., Xu, Y., Ju, D., Lester, H.A., Davidson, N., and Schuman, E.M. (1998). Expression of a dominant negative Trk B receptor, T1, reveals a requirement for presynaptic signaling in BDNF-induced synaptic potentiation in cultured hippocampal neurons. **PNAS**, 95: 10884-10889

Tang, L.X., Hung, C.P. and Schuman, E.M. (1998). A role for the cadherin family of cell adhesion molecules in hippocampal long-term potentiation. **Neuron**, 20: 1165-1175.

Korte, M., Kang, H., Bonhoeffer, T. and Schuman, E.M. (1998). A role for BDNF in the late-phase of hippocampal long-term potentiation. **J. Neuropharmacol.**, 37, 553-560.

Ehrenguber, M. U., Lanzrein, M., Xu, Y., Jasek, M. C., Kantor, D. B., Schuman, E. M., Lester, H. A. and Davidson, N. (1998). Recombinant adenovirus-mediated expression in the nervous system of genes coding for ion channels and other molecules involved in synaptic function. **Meth. in Enzymol.** 293, 483-503.

Kang, H., Shelton, D., Welcher, A. and Schuman, E.M. (1997). Neurotrophins and time: different roles for TrkB signaling in hippocampal long-term potentiation. **Neuron**, 19, 653-664.

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- Kantor, D., Lanzrein, M. Stary, J., Sandoval, G.R., Smith, B., Sullivan, B.M., Davidson, N., and Schuman, E.M. (1996). A role for endothelial NO synthase in LTP revealed by adenovirus-mediated inhibition and rescue. **Science**, 274, 1744-1748.
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- Kang, H. and Schuman, E.M. (1995). Neurotrophin-induced modulation of synaptic activity in the adult hippocampus. **J. Physiol. (Paris)**, 89, 11-23.
- Kang, H. and Schuman, E.M. (1995). Long-lasting neurotrophin-induced enhancement of synaptic transmission in the adult hippocampus. **Science**, 267, 1658-1662.

Publications from postdoctoral and graduate work

- Schuman, E.M. and Madison, D.V. (1994). Locally distributed synaptic potentiation in the hippocampus. **Science**, 263: 532-536.
- Schuman, E.M., Meffert, M., Schulman, H., and Madison, D.V. (1994). An ADP-ribosyltransferase as a potential target for nitric oxide action in hippocampal long-term potentiation. **Proc. Natl.Acad.Sci. (USA)**, 91, 11958-11962.
- Meffert, M.K., Haley, J.E., Schuman, E.M., Madison, D.V. and Schulman, H. (1994). Inhibition of hippocampal heme oxygenase, nitric oxide synthase and long-term potentiation by metalloporphyrins. **Neuron**, 13, 1225-1233.
- Schuman, E.M. and Clark, G.A. (1994). Synaptic facilitation at connections of Hermessenda type B photoreceptors. **Journal of Neuroscience**, 14(3):1613-1622.
- Schuman, E.M. and Madison D.V. (1994). Nitric Oxide and Synaptic Function. **Annual Review of Neuroscience**, 17: 153-183.

Haley, J.E. and Schuman, E.M. (1994). The involvement of nitric oxide in synaptic plasticity and learning. **Seminars in the Neurosciences**, 6: 11-20.

Schuman, E.M. (1994). Molecular consequences of diffusible signalling: locally distributed synaptic enhancement in hippocampal neurons. **Seminars in Cell Biology**, Vol. 5, p. 251-261.

Schuman, E.M. and Madison, D.V. (1993). Nitric-Oxide as an Intercellular Signal in Long-Term Potentiation. **Seminars in the Neurosciences**, 5: 207-215.

Schuman, E.M. and Madison, D.V. (1991). A requirement for the intercellular messenger nitric oxide in long-term potentiation. **Science**, 254: 1503:1506.

Madison, D.V. and Schuman, E.M. (1991). LTP: post or pre? A look at the evidence for the locus of long-term potentiation. **The New Biologist**, 3 (6): 549-557.

Farley, J. and Schuman, E.M. (1991). Protein-Kinase-C inhibitors prevent induction and continued expression of cellular memory in *Hermisenda* Type B photoreceptors. **Proc.Natl.Acad.Sci.** (USA), 88:2016-2020.

Book Chapters

Landgraf, P., Antileo, E.R., Schuman, E.M., and Dieterich, D.C. (2015). BONCAT: Metabolic Labeling, Click Chemistry, and Affinity Purification of Newly Synthesized Proteomes, in Arnaud Gautier and Marlon Hinner (eds.), *Site-Specific Protein Labeling: Methods and Protocols*, Methods in Molecular Biology, vol. 1266, DOI 10.1007/978-1-4939-2272-7_14, Springer Science + Business Media New York, in press.

Rutishauser, U., Schuman, E.M., and Mamelak, A.N. (2014). Single Neuron Correlates of Declarative Memory Formation and Retrieval in the Human Medial Temporal Lobe, in *Single Neuron Studies of the Human Brain*, ed. Itzhak Fried, MIT Press.

W.B. Smith, Baris Bingol, Gentry N. Patrick, and Erin M. Schuman. (2004). The Control of Synaptic Function by Local Protein Synthesis and Degradation, in *Cell Growth: control of cell size*, eds. Michael Hall, Martin Raff, and George Thomas, Cold Spring Harbor Laboratory Press.

Mooney, R., Bear, M.F., Carew, T.J., Hammer, M., Heinemann, U.F., Katz, L.C., Korte, M., Poo, M.-M., Schacher, S.M. and Schuman, E.M. (1998). Are the cellular mechanisms of synaptic development related to synaptic plasticity and to learning in the adult? in *Mechanistic relationships between development and learning*, (T.J. Carew, R. Menzel, and C.J.Shatz, eds.) Wiley Press.

Schuman E.M. (1996). Synaptic transmission in the hippocampus, in *Methods in Neuroscience: Nitric Oxide*: (M. Maines, ed.) Academic Press.

Schuman, E.M. (1995). Nitric oxide signalling, long-term potentiation and long-term depression, in *Nitric Oxide in the Nervous System*, (S. Vincent, ed.), Academic Press, 125-150.

Schuman, E.M. and Madison, D.V. (1994). Communication of synaptic potentiation between synapses of the hippocampus in *Advances in Second Messenger and Phosphoprotein research: Molecular and cellular mechanisms of neurotransmitter release*, (Stjarne, Greengard, Grillner, Hokfelt, and Ottoson, Eds), Raven Press, Vol. 29, 507-521.

Schuman, E.M., and Madison, D.V. (1994). Nitric oxide as a synaptic signaling molecule in hippocampal long-term potentiation in (S. Moncada, G. Nistico, and E.A. Higgs Eds). *Nitric Oxide: Brain and Immune System*, pp. 149-162.

Madison, D.V. and Schuman, E.M. (1994). Involvement of nitric oxide in long-term potentiation in (M. Baudry and J.L. Davis eds.) *Long-term potentiation*, MIT Press, p. 200-221.

Clark, G.A. and Schuman, E.M. (1992). Snails tales: initial comparisons of synaptic plasticity underlying learning in *Hermissenda* and *Aplysia*, in *The Neuropsychology of Memory* (eds. Squire and Butters) Vol. 2: 388-402.

Invited Seminars at Universities and Research Centers

Freiburg University, Germany, Fall 2014

School of Biosciences, Cardiff University, Wales, Fall 2014

Collège de France, Paris, Spring 2014

Baylor College of Medicine, Houston, Texas, USA, Winter 2013/2014

The University of Texas at Austin, USA, Winter 2013/2014

Bordeaux Neurocampus, Bordeaux, France, Winter 2013/2014

DGIST Distinguished Lecture, Daegu, Korea, Fall 2013

Rockefeller University, NY, Spring 2013

Université Paris Descartes, Paris, Winter 2012/2013

ICM, Paris, Winter 2012/2013

Max Planck Institute for Medical Research, Heidelberg, Winter 2012/2013

TEDx: The Brain, Caltech, CA, Winter 2012/13

Neuroscience Seminar, Max Planck Institute Florida, Winter 2012

CNS Colloquium, NYU, New York, Winter 2012

Research Institute of Molecular Pathology, Vienna, Summer 2012

IBMB Barcelona, Spring 2012

Instituto de Neurociencias, Alicante, Spain, Spring 2012

Centro de Biología Molecular, Madrid, Spring 2012

Institute of Neuroscience, Newcastle-upon-Tyne, Spring 2012

Centre for Integrative Physiology, Edinburgh, Spring 2012

MRC LMB, Cambridge, UK, Spring 2012

EMBL, Heidelberg, Spring 2012

Brain Research Institute, University of Zurich, Spring 2012

Center for Human Genetics and VIB, K.U. Leuven & Vesalius Research Center, Winter 2011/12

Single-Unit Human Recordings, New York University, NY, Fall 2011

Max Delbrück Center for Molecular Medicine, Berlin, Fall 2011

Pharmazentrum Frankfurt, University Hospital Goethe-University Frankfurt, Spring 2011

University of Oxford, Department of Physiology, Anatomy and Genetics, Winter 2010/2011
Stanford University, Molecular and Cellular Physiology, Winter 2010/2011
Institute for Cell Biology and Neuroscience, Goethe-University, Winter 2010/2011
Harvard, Center for Brain Science, Fall 2010
Max Planck Unit for Structural Molecular Biology, Hamburg, Fall 2010
Bernstein Center for Computational Neuroscience, Berlin, Summer 2010
Neuroscience Center Niederrad, Frankfurt, Spring 2010
SFB/TR 3, University Hospital, Bonn, Spring 2010
MRC Laboratory for Molecular Cell Biology, University College London, Winter 2009/2010
Biozentrum, Basel, Switzerland, Winter 2009/2010
Allen Institute, Winter 2009
Case Western University, 2008
UCI, Gerard Lecture, 2008
University of Michigan, Agranoff Lecture, 2008
Ecole Normale Superieure, Paris, 2008
University of Pennsylvania Children's Hospital, Spring, 2007
Johns Hopkins University, Neuroscience, Spring, 2007
USC, Zilkha Neurogenetics Institute, Winter, 2007
University of Minnesota, Department of Neuroscience, Winter, 2007
Scripps Research Institute, Winter 2007
Ecole Normale Superieur, Paris, Winter, 2006
University of New Mexico, Grass Traveling Lecturer, Winter, 2006
Rockefeller University, Winter, 2006
Emory University, Spring, 2006
Carnegie Mellon University, Spring, 2006
Molecular and Cellular Physiology, Stanford, Fall 2005
Villum Institute, Winter, 2005
Neuroscience, UT Southwestern, Dallas, Winter, 2005
Women in Life Sciences Speaker, UCSF, Winter, 2005
Montreal Neurological Institute, McGill University, Winter, 2004
Washington University Neuroscience, Spring, 2004
Penn Neurobiology, Spring, 2004
Harvard Medical School, Neurobiology, Spring, 2004
UT Southwestern Medical Center, Dallas, Winter, 2004
University of California, Santa Cruz, Winter, 2004
University of Colorado Denver, Winter, 2003
Pasteur Institute, Paris, 2003
Laboratoire de Physiologie Cerebrale, CNRS, Paris, Spring, 2002
USC, Winter, 2002
Stanford, Molecular and Cellular Physiology, Winter, 2002
Cellular and Molecular Medicine, UCSD, Winter, 2001
MIT, Center for Learning and Memory, Spring, 2001
Harvard Medical School, Spring, 2001
Harvard, Molecular and Cellular Biology, Spring, 2001
UCSD, Molecular Medicine, Spring, 2001
UCSF, Spring, 2000
Duke University, Winter, 2000
University of Pittsburgh, Winter, 2000

UC Berkeley, Winter, 2000
Harvey Mudd College, Spring, 1999
Institute for Neurobiology, Max Planck Institute, Martinsried, Munich, Summer, 1998
Wake Forest University, Bowman Gray School of Medicine, Spring, 1998
Washington University, McDonnell Neuroscience Speaker, Spring, 1998
University of Chicago, Dept. of Neurobiology, Spring, 1998
Salk Institute and UCSD Neuroscience, Spring, 1998
Northwestern University Neurobiology Dept., Winter, 1997-1998
NIH, Neuroscience Lecture Series, Winter, 1997-1998
NYU, Neural Sciences Dept., Winter, 1997-1998
Stanford University Neuroscience Retreat, Fall, 1997
UCI, Psychobiology Dept., Fall, 1997
UCLA, Neuroscience Dept., Spring, 1997
UC Berkeley, Neuroscience Dept., Spring, 1997
U. Washington, Dept. Pharmacology/Neuroscience, Winter, 1997
Johns Hopkins University, Neuroscience Dept., Winter, 1996-1997
LUMC, Neuroscience Dept., Fall, 1996
U. Iowa, Biology Dept., Fall, 1996
UC Davis, Center for Neuroscience, Winter, 1995-1996
Duke University, Dept. of Neurobiology, Durham, NC, Winter, 1995-1996
University of Texas, Dept. of Pharmacology, San Antonio, TX, Fall, 1995
University of Southern California, Neuroscience Dept., LA., CA, Spring, 1995
University of Minnesota, Dept. of Physiology, Minnesota, MI, Winter, 1995
City of Hope, Neuroscience group, Duarte, CA, Fall, 1994
University of Oregon, Neuroscience Institute, Eugene, OR, Fall, 1994
SUNY Stonybrook, Department of Pharmacology, Fall, 1994
Hopkins Marine Station, Monterey, CA, Spring, 1993
Duke University, Neurobiology Department, Durham, NC, Spring, 1992

Invited Talks at Conferences

15th EMBL/EMBO Science and Society Conference, Chair, Fall 2014
Janelia Farm Conference on High-Throughput Sequencing for Neuroscience, Fall 2014
Translational Control Meeting by the Wellcome Trust, Keynote Address, London, Spring 2014
LTP Meeting by the Royal Society, London, Fall 2013
IFM International Colloquium 2013, Paris, Fall 2013
10th Horizons in Molecular Biology Symposium, Göttingen, Summer 2013
Hodgkin-Huxley-Katz Prize Lecture, IUPS, Birmingham, UK, Keynote lecture, Summer 2013
Gordon Research Conference on Dendrites, Les Diablerets, Switzerland, Spring 2013
10th Meeting of the German Society of Neuroscience, Göttingen, Spring 2013
107th International Titisee Conference, Titisee, Germany, Spring 2013
Champalimaud Neuroscience Symposium, Lisbon, Portugal, Fall 2012
Kavli Prize Symposium on Neuroscience 2012, Bergen, Norway, Summer 2012
RIKEN BSI Summer Program 2012, Japan, Summer 2012
14th International Winter Neuroscience Conference, Soelden, Austria, Spring 2012
Janelia Research Campus, Dendrites: Substrates for Information Processing, Spring 2012
NeuroWiSe – Molecular Neurobiology, Weizmann Institute of Science, Rehovot, Israel, 2012
Society for Neuroscience Special Lecture, SfN Meeting, Washington DC, USA, 2011

Nobel Forum Lecture, Brain Circuits Symposium, Karolinska Institutet, Stockholm, 2011
Ascona Neuronal Circuits Meeting, Ascona, Switzerland, 2011
ISN 2011 Meeting, Athens, Greece, 2011
IEEE • ICDL • EPIROB 2011, Frankfurt, Germany, Keynote lecture, 2011
EMBO Conf. on Intracellular RNA Localization & Localized Translation, Italy, 2011
8th IBRO World Congress of Neuroscience, Florence, Italy, 2011
34th German Society for Cell Biology (DGZ), Bonn, Germany, 2011
Symp. on Translational Regulation in the CNS, German SfN, Göttingen, Germany, 2011
Europ. Symp. on Imaging Structure & Function in the Zebrafish Brain, Lisbon, P, 2010
XIIth Magdeburg International Neurobiological Symposium, Magdeburg, Germany, 2010
FENS Forum, Amsterdam, The Netherlands, 2010
GRC on the Cell Biology of the Neuron, Waterville Valley Resort, NH, 2010
AREADNE 2010, Encoding & Decoding of Neural Ensembles, Santorini, GR, 2010
Ribosomes 2010, Orvieto, Italy, 2010
1st Francis Crick Symposium on Neuroscience, Suzhou, China, 2010
Janelia Farm Conference on Structural Plasticity in the Mammalian Brain, 2010
SFB Initiative Mainz-Frankfurt on Mechanisms of Molecular Adaptation, 2010
Janelia Meeting on Dendritic Translation, 2009
Gordon Conference on Cell Adhesion, 2009
FASEB Meeting on RNA translation, 2009
Gordon Conference on Dendrites, 2009
Learning and Memory meeting, UCI, 2009
Hippocampus Conference, Spitsbergen Norway, 2008
Hinxton meeting, Cambridge, 2008
Bergamo Scienza, Keynote public lecture, 2008
CSHL and EMBL Protein Translation, Keynote address, Heidelberg, 2007
Protein Translation at the Synapse, Janelia Farm, 2007
Mass Spectrometry in the Health & Life Sciences, San Francisco, 2007
Gordon Research Conference on Neural Circuits, 2007
Banbury Center Fragile X meeting, 2007
Cold Spring Harbor, Learning and Memory, 2006
RNA and Protein Synthesis, Kfar Blum, Israel, 2005
Picower Center for Learning and Memory, Learning Meeting, 2004
Molecular mechanisms of long-term memory, SFN symposium speaker, 2004
The Cytoskeleton and Synaptic Function, San Diego, 2004
Gordon Research Conference on the Cell Biology of the Neuron, 2004
Neuron's 15th anniversary symposium: Cell Biology of the Neuron, New Orleans, 2003
Assembly of Neural Circuits, Ascona, Switzerland, 2003
Formation and Function of Neural Circuits, Varenna, Italy, 2003
30th Anniversary of LTP, Royal Society, London, 2003
Learning and Behavior, UCLA, 2002
Cellular Motility and Signaling, Keystone, Taos, 2002
Learning and Memory Symposium, UCI, 2001
Harvard-Armenise Foundation Symposium, Milano, 2001
Keystone Meeting on Synaptic Function and the Hippocampus, Taos, NM, 2001
Cold Spring Harbor Learning and Memory Meeting, CSH, 2001
Gordon Research Conference on Neural Development, Salve Regina, RI, 2000
Gordon Research Conference on The Cell Biology of the Neuron, Plymouth, NH, 2000

Neuronal Circuits, Monte Verita, Ascona, Switzerland, Summer, 1999
FASEB Meeting, Symposium on Local Protein Synthesis, Washington, D.C., 1999
Whitehead Institute Symposium on Neurobiology, Boston, Fall, 1998
Frontiers of Science, National Academy of Sciences, Irvine, Fall, 1998
Cortical Plasticity: the representation of experience, Berlin, Summer, 1998
Gordon Research Conference on The Cell Biology of the Neuron, Plymouth, NH, 1998
Keystone Symp. The Hippocampus: twd a molecular model of cognition, Park City, 1998
Society for Neuroscience, Molecular Basis of Long-term Memory, New Orleans, 1997
Gordon Research Conference on Neural Plasticity, NH, 1997
Gordon Research Conference on Neurotrophins, Newport, RI, 1997
Neurotrophins in Development and Plasticity, Osaka, Japan, 1997
Dahlem Conference on Learning and Development, Berlin, 1997
4th NGF Conference, London, Summer, 1996
Spring Hippocampus Meeting, Grand Cayman, BWI, Spring, 1996
Keystone Symposium on Signal Transduction, Taos, Spring, 1996
Neurotrophic factors in development, plasticity & survival, Madison, WI, Fall, 1995
Gordon Research Conference on Neurotrophins, Plymouth, NH, Summer, 1995
Gif sur Yvette: The latest in synaptic transmission, Paris, France, Fall, 1994
European Society for Neurochemistry, Jerusalem, Israel, Summer, 1994
Brain Development and Function Course, Cold Spring Harbor, NY, Summer, 1994
FASEB Meeting, Anaheim, CA, Spring, 1994
Banbury Meeting: Molecular Aspects of NO and NO Synthase, Fall, 1993
IUBMB Meeting: Biochemistry of Cellular Membranes, Bari Italy, Fall, 1993
Keystone Meeting: Molecular aspects of signal transduction. Taos, NM, Spring, 1993
American Chemical Society, NO symposium, Richmond, VA, Spring, 1993
Nitric Oxide: Brain and Immune system, Calabria, Italy, Summer, 1992
Brain Development and Function Course, Cold Spring Harbor, NY, Summer, 1992
Keystone Meeting: Synapse Formation and Function, Big Sky, Montana, Spring 1992
Cold Spring Harbor Conference on Learning and Memory, NY, Fall, 1992

Caltech and Community Seminars

TedX Brain, Pasadena, CA 2013
Ernest Watson Public Lecture, 2007
Caltech Trustee's Board Meeting, 2007
Caltech Associate's President's Circle speaker, 2006
SURF summer speaker, 2003, 2005
WEST evening speaker, Fall, 2001
Caltech Discovery Weekend, Spring, 1997
Caltech Board of Trustees, Winter, 1997
Watson Lecture, Fall, 1996
Discovery Weekend, Caltech Development, Spring, 1996
Sigma Xi, L.A. Hughes Chapter, Spring, 1996
Caltech Physics Colloquium, Winter, 1995-1996
Keynote Address, AAUW, Bridges to Tomorrow, Fullerton, CA, Winter, 1995-1996
Helmholtz Lecture, UCI, Spring, 1995
Caltech Associates, Pasadena, CA, Fall, 1995
American Assoc. of University Women Foundation, Orlando, FL, Summer, 1995
Alzheimer's Disease: Causes and Effects, Caltech, Spring, 1995

West Coast Nerve Net, Caltech, Spring, 1995
Caltech Seminar Day, Spring, 1995
Caltech CNS Seminar, Spring, 1993
Caltech, Biology Division, Spring, 1992