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## Curriculum Vitae Professor Dr Erin M. Schuman

**Name:** Erin Margaret Schuman

**Born:** 15 May 1963



Image: Private Source

### **Research Priorities: Neurobiology, synapses, neural networks, learning, memory**

Erin M. Schuman is an American psychologist and neuroscientist who studies the foundations of learning and memory formation. Her main focus is on synapses, structures that connect and facilitate communication between nerve cells. Erin Schuman made a remarkable discovery when she demonstrated that neuron proteins can also synthesise outside cell bodies, in dendrites – a phenomenon known as local protein synthesis.

### **Academic and Professional Career**

- since 2021 Professor by special appointment, Radboud University, Nijmegen, Netherlands
- since 2015 Professor of Neural-Synaptic Dynamics, Goethe University Frankfurt, Frankfurt am Main, Germany
- since 2009 Director, Max Planck Institute for Brain Research, Frankfurt am Main, Germany
- 2008 Guest Fellow, National Institute of Health and Medical Research (INSERM), École Normale Supérieure, Paris, France
- 2007 - 2009 Expert Representative, Division of Biology and Biological Engineering, Caltech, Pasadena, USA
- 2005 Guest Fellow, Russ Fernald Lab, Stanford University, Stanford, USA
- 2004 - 2010 Professor of Biology, California Institute of Technology (Caltech), Pasadena, USA
- 2004 - 2009 Investigator, Howard Hughes Medical Institute, Washington D.C., USA
- 2002 - 2004 Associate Investigator, Howard Hughes Medical Institute, Washington D.C., USA
- 2000 - 2006 Executive Officer for Biology, Caltech, Pasadena, USA

1999 - 2004 Adjunct Professor of Biology, Caltech Pasadena, USA

1997 - 2002 Assistant Investigator, Howard Hughes Medical Institute, Washington D.C., USA

1993 - 1999 Assistant Professor, Caltech, Pasadena, USA

1990 - 1993 Postdoctoral Fellow, Stanford University, Stanford, USA

1990 Postdoctoral Fellow, Princeton University, Princeton, USA

1985 - 1990 Doctoral Student, Princeton University, Princeton, USA

### **Functions in Scientific Societies and Committees (recent and selected)**

since 2024 Chair, Scientific Advisory Board, Biocenter (BZ) Basel, Basel, Switzerland

since 2024 Member, Scientific Advisory Board, Institut Jacques Monod, Paris, France

since 2023 Member, Pradel Prize Committee, National Academy of Sciences, USA

since 2023 Member, Scientific Advisory Board, Sainsbury Wellcome Centre, Neural Circuits and Behaviour, London, UK

since 2023 Member, Eric Kandel Young Neuroscientist Prize Committee, Hertie Foundation, Frankfurt am Main, Germany

since 2022 Chair, Talent Panel, Lundbeck Foundation, Copenhagen, Denmark

since 2021 Member, Scientific Advisory Board, UK Dementia Research Institute at Imperial College, London

since 2021 Member, Scientific Advisory Board, Paris Brain Institute (ICM), Paris, France

since 2021 Expert, Scientific Advisory Board, Norbrain, Trondheim, Norway

since 2021 Member, Jeantet Prize Committee, Louis-Jantet Foundation, Geneva, Switzerland

since 2020 Member, Scientific Advisory Board, CRC1315 on Memory Consolidation, Charité – Universitätsmedizin Berlin, Berlin, Germany

since 2019 Member, Scientific Advisory Board, Biocenter (BZ) Basel, Basel, Switzerland

since 2018 Member, Talent Panel, Lundbeck Foundation, Copenhagen, Denmark

since 2017 Expert, SAB, Simons Initiative for Developing Brain, University of Edinburgh, Edinburgh, UK

2017 - 2024 Member, Scientific Advisory Board, Innovative Training Network “ZENITH ZEBrafish Neuroscience Interdisciplinary Training Hub”, Marie Skłodowska-Curie Action, European Commission (EC)

- since 2016      Expert, Editorial Board, Neuron
- since 2016      Expert, Editorial Board, Annual Review of Cell and Developmental Biology
- since 2014      Associate Editor, Neuroscience Research (Japan)
- 2012 - 2014    Member, Working Group for the Promotion of Female Researchers, Max Planck Society (MPG) Munich, Munich, Germany
- seit 2009      Associate Editor, Current Opinion in Neurobiology
- since 2002      Member, Advisory Board, Kavli Institute for Systems Neuroscience, Trondheim, Norway

### **Project Coordination, Membership in Collaborative Research Projects**

- 2022 - 2027    Principal Investigator, Advanced Grant “DiverseSynapse – Revealing the Landscape of Synaptic Diversity by Cell type- and Synapse-specific Proteomics and Transcriptomics”, ERC
- since 2017      Principal Investigator, Subproject “Coordination of Protein Synthesis and Degradation in Neurons”, Collaborative Research Centre (CRC) 1080, German Research Foundation (DFG), Germany
- 2017 - 2022    Principal Investigator, Advanced Grant “NeuroRibo Specialized Ribosomes for Neuronal Protein Synthesis”, ERC
- 2016 - 2020    Principal Investigator, Subproject “Developing a zebrafish model to identify novel mediators of resilience mechanisms”, CRC 1193, DFG, Germany
- 2013 - 2016    Principal Investigator, Subproject “Decoding neural activity through changes in the synaptic proteome”, CRC 1080, DFG, Germany
- 2012 - 2020    Principal Investigator, Project “Dynamics of RNA and RNP distribution in neural cells”, Cluster of Excellence (EXC) 115, DFG, Germany
- 2011 - 2015    Spokesperson, International Max Planck Research School “Neural Circuits”, MPG Munich, Munich, Germany
- 2011 - 2015    Principal Investigator, Subproject “Regulation of mRNA in neurons”, CRC 902, DFG, Germany
- 2012 - 2016    Principal Investigator, Advanced Grant “Dynamics of local transcriptomes and proteomes in neurons”, ERC

### **Honours and Awarded Memberships**

- 2024            Körber European Science Prize, Körber-Stiftung, Hamburg, Germany

- since 2023 Elected Member, American Academy of Arts and Sciences, USA
- 2023 Brain Prize (with Christine Holt and Michael Greenberg), Lundbeck Foundation, Copenhagen, Denmark
- 2023 52nd Lewis S. Rosenstiel Award (with Christine Holt), Rosenstiel Basic Medical Sciences Research Center, Brandeis University, Waltham, USA
- 2022 FEBS | EMBO Women in Science Award, Federation of European Biochemical Societies (FEBS) sowie European Molecular Biology Organization (EMBO)
- 2021 Vallee Visiting Professorship, Vallee Foundation, Cambridge, USA
- 2020 Diversity Prize, ALBA Network and FENS Kavli Network of Excellence (FKNE), Federation of European Neuroscience Societies
- since 2020 Elected Member, National Academy of Sciences, USA
- 2020 Louis-Jeantet Prize for Medicine, Louis-Jeantet Foundation, Geneva, Switzerland
- 2018 Mika Salpeter Lifetime Achievement Award, Society for Neuroscience, Washington D.C., USA
- since 2017 Elected Member, German National Academy of Sciences Leopoldina, Germany
- since 2017 Elected Member, Academia Europaea
- 2016 Forbes Lectures, Marine Biological Laboratory, University of Chicago, Illinois USA
- since 2014 Elected Member, EMBO
- 2013 Alexander Cruickshank Lecture, Gordon Research Conference, Lucca (Barga), Italy
- 2013 Hodgkin-Huxley-Katz Prize Lecture, Physiological Society, London, UK
- 2013 Norbert Elsner Lecture, German Neuroscience Society, Germany
- 2008 Gerard Lecture, University of California, Irvine, USA
- 1996 Ferguson Biology Undergraduate Teaching Prize, Caltech, Pasadena, USA
- 1996 - 1998 Beckman Young Investigator Award, Arnold and Mabel Beckman Foundation, Irvine, USA
- 1995 - 1999 Pew Biomedical Scholar, Pew Charitable Trusts, Philadelphia, USA
- 1995 Women Emerging Grant, American Association of University Women (AAUW), USA
- 1995 Ferguson Biology Graduate Teaching Prize, Caltech, Pasadena, USA
- 1994 - 1998 John Merck Scholar, John Merck Fund, Harrison, USA
- 1994 - 1996 Alfred P. Sloan Research Fellow, Alfred P. Sloan Foundation, New York City, USA

## Research Priorities

Erin M. Schuman is an American psychologist and neuroscientist who studies the foundations of learning and memory formation. Her main focus is on synapses, structures that connect and facilitate communication between nerve cells. Erin Schuman made a remarkable discovery when she demonstrated that neuron proteins can also synthesise outside cell bodies, in dendrites – a phenomenon known as local protein synthesis.

Nerve cells demonstrate considerable plasticity in order to continuously adapt to new tasks and changing conditions. An individual neuron communicates via numerous synapses with various cell types, such as sensory cells, muscle cells, gland cells, and other nerve cells. This complex interaction would be impossible without numerous proteins that function as messengers. Erin Schuman managed to show that all the structures required for the constant regeneration of some 250 million protein molecules are present in the nerve cells. These structures include ribosomes, which act as catalysts for protein biosynthesis, as well as mRNAs, which transmit the necessary information and blueprints to the entire cell.

The neuroscientist has studied, in particular, the formation of long-term memory. While new information is initially forwarded by electrical impulses, a new synthesis of proteins is necessary for long-term memory storage. For a long time it was unclear how proteins reached their destination and how one nerve cell can change specific contacts while others remain unchanged.

Erin Schuman's team showed that new proteins can be created locally as a reaction to special signals close to synapses. The cell's machinery for protein synthesis and degradation is found not only in the cell body, but also in dendrites; mRNAs have even been detected in the direct proximity of synapses. Initially, this was considered an exception that merely enabled the local production of a small number of selected proteins. However, Schuman and her colleagues found a quantity of mRNAs in neuron extensions that is significantly higher than was first assumed. Local protein synthesis is thus presumably a far more significant phenomenon for normal nerve cell operation than was previously supposed.

Erin Schuman is now using the latest technology to study the molecular diversity of synapses by precisely characterising and quantifying the mRNAs, proteins, and lipids present in them. Her pioneering research has enriched our understanding of how information is stored. She has helped make the learning process visible.