Saveez Saffarian, Ph.D.

Department of Physics and Astronomy, Center for Cell and Genome Sciences

Department of Biology, University of Utah: Saffarian@Physics.Utah.edu

Education and training

Postdoctoral Training Cell Biology, Harvard Medical School 2004-2009

Advisor: Tomas Kirchhausen

Doctor of Philosophy Physics, Washington University in St. Louis 1999-2002

Advisor: Elliot Elson

Bachelor of Science Physics, Sharif University of Technology 1993-1998

Academic Appointments

Associate Professor 2016-Present

Department of Physics and Astronomy, University of Utah

Adjunct Associate Professor 2020-Present

Department of Biology, University of Utah

Assistant Professor 2010-2016

Department of Physics and Astronomy, University of Utah

Instructor 2003-2004

Department of Biochemistry and Molecular Biophysics Washington University School of Medicine

Publications

**Competitive HIV budding suggests that a self-packaging gRNA:Gag-Pol complex directs HIV assembly and enforces infectivity.**

Durden, H., Saha, I., Preece, B., MacArthur, B., Petersen, A., Peppel, W., Gallegos, R., and Saffarian S

bioRxiv, 2022.08.03.502595.

**Defects in the HIV immature lattice support essential lattice remodeling within budded virions.**

Guo, S., Saha, I., Saffarian, S., and Johnson, M.E.

Last stages of editorial process **eLife (2023)** 2022.11.21.517392

**Optimized production and fluorescent labeling of SARS-CoV-2 virus-like particles**

Manon Gourdelier, Jitendriya Swain, Coline Arone, Anita Mouttou, David Bracquemond, Peggy Merida, Saveez Saffarian, Sébastien Lyonnais, Cyril Favard & Delphine Muriaux

Scientific Reports, 2022, **12**, 16451

**Coexistence of vitreous and crystalline phases of H2O at ambient temperature.**

Shargh AK, Picard A, Hrubiak R, Zhang D, Hemley RJ, Deemyad S, Abdolrahim N, Saveez Saffarian

Proceedings of the National Academy of Sciences 2022;119:e2117281119.

**Gag-Gag Interactions Are Insufficient to Fully Stabilize and Order the Immature HIV Gag Lattice**

Ipsita Saha, Benjamin Preece, Abby Peterson, Haley Durden, Brian MacArthur, Jake Lowe, David Belnap, Michael Vershinin, Saveez Saffarian, Viruses, 2021 Sep 28;13(10):1946.

**Application of Advanced Light Microscopy to the Study of HIV and Its Interactions with the Host.**

S. Saffarian, 2021, Viruses, **13**.

**Structural stability of SARS-CoV-2 virus like particles degrades with temperature.**

A. Sharma, B. Preece, H. Swann, X. Fan, R. J. McKenney, K. M. Ori-McKenney, S. Saffarian, M. D. Vershinin. 2021, Biochemical and Biophysical Research Communications, **534**, 343–346.

**Minimal system for assembly of SARS-CoV-2 virus like particles.**

H. Swann, A. Sharma, B. Preece, A. Peterson, C. Eldridge, D. M. Belnap, M. Vershinin, S. Saffarian, Scientific Reports. 2020, **10**, 21877.

**Abrogating ALIX Interactions Results in Stuttering of the ESCRT Machinery.**

Gupta S, Bendjennat M, S. Saffarian. 2020 Viruses, 12(9): 1032

**Dynamics of the HIV Gag Lattice Detected by Localization Correlation Analysis and Time-Lapse iPALM.**

Saha, I., and S. Saffarian. 2020. Biophysical Journal. 119(3):581-592.

**High-speed imaging of ESCRT recruitment and dynamics during HIV virus like particle budding.**

Gupta, S., J. Bromley, and S. Saffarian. 2020. PLOS One 15(9):e0237268.

**Interferometric Fluorescent Cross Correlation Spectroscopy.**

Ipsita Saha and Saveez Saffarian, PLOS One (2019); 14(12):e0225797

**Abrogating ALIX interactions results in stuttering of the ESCRT machinery**.

Shilpa Gupta, Mourad Bendjennat and Saveez Saffarian BiorXive (2019)

**Fluorescent Protein Inserts in between NC and SP2 Are Tolerated for Assembly, Release and Maturation of HIV with Limited Infectivity.**

Mourad Bendjennat and Saveez Saffarian. Viruses (2019); 11(11), 973

**Correlative iPALM and SEM resolves virus cavity and Gag lattice defects in HIV virions.**

Peterson M, Jamali S, Daum R, Bendjennat M, Saffarian S. European Biophysical Journal (2019),

**The Race against Protease Activation Defines the Role of ESCRTs in HIV Budding.**

Bendjennat M, Saffarian S. PLoS Pathogens (2016);12(6):e1005657.

**Vesicular Stomatitis Virus Polymerase's Strong Affinity to Its Template Suggests Exotic Transcription Models.**

Tang X, Bendjennat M, Saffarian S**.** (2014) PLoS Comput Biol. (2014);10(12):e1004004.

**ALIX is recruited temporarily into HIV-1 budding sites at the end of Gag assembly.**

Ku, P.-I., Bendjennat, M., Ballew, J., Landesman, M.B. and Saffarian, S. PLoS ONE, (2014);9(5):e96950.

**Sample Preparation for Single Virion Atomic Force Microscopy and Super-resolution Fluorescence Imaging.**

Hodges, J.A., and Saffarian, S. (2014). JoVE, Jan 2;(83):e51366.

**Identification of Pauses during Formation of HIV-1 Virus Like Particles.**

Ku, P.-I., Miller, Anna K., Ballew, J., Sandrin, V., Adler, Frederick R., and Saffarian, S. Biophysical Journal (2013) 105, 2262-2272.

**Asymmetric packaging of polymerases within vesicular stomatitis virus.**

Hodges, J., Tang, X., Landesman, M.B., Ruedas, J.B., Ghimire, A., Gudheti, M.V., Perrault, J., Jorgensen, E.M., Gerton, J.M., and Saffarian, S.

Biochemical and Biophysical Research Communications (2013) 440, 271-276.

**Diffusion of MMPs on the Surface of Collagen Fibrils: The Mobile Cell Surface – Collagen Substratum Interface.**

Collier IE, Legant W, Marmer B, Lubman O, Saffarian S, Wakatsuki T, Elson EandGoldberg GI.

PLoS ONE. 2011;6(9):e24029

**Roles of AP-2 in Clathrin-Mediated Endocytosis.**

Boucrot E, Saffarian S, Zhang RandKirchhausen T. PLoS ONE. 2010;5(5):e10597

**Perforin activates clathrin- and dynamin-dependent endocytosis, which is required for plasma membrane repair and delivery of granzyme B for granzyme-mediated apoptosis.**

Thiery J, Keefe D, Saffarian S, Martinvalet D, Walch M, Boucrot E, Kirchhausen TandLieberman J.” Blood. 2010;115(8):1582-93

**Distinct Dynamics of Endocytic Clathrin-Coated Pits and Coated Plaques.**

Saffarian S, Cocucci E and Kirchhausen T “PLoS Biol. 2009;7(9):e1000191

**Differential Evanescence Nanometry: Live Cell Fluorescence Measurements with 10 nm Axial Resolution on the Plasma Membrane**

Saveez Saffarian and Tom Kirchhausen (2008) Biophysical Journal 94(6)2333-42

**Oligomerization of the EGF Receptor Investigated by Live Cell Fluorescence Intensity Distribution Analysis**

Saveez Saffarian, Yu Li, Elliot Elson and Linda Pike (2007) Biophysical Journal 93:1021-31

**Role of lipids and actin in the formation of clathrin-coated pits.**

EmannuelBoucrot, Saveez Saffarian, Ramiro Massol, Tom Kirchhausen and Marcelo Ehrlich

(2006) Experimental CellResearch 312(20): 4036-4048

**Powering a Burnt Bridges Ratchet: A Model for an Extracellular Motor Driven by Proteolysis of Collagen**

Saveez Saffarian, Hong Qian, Ivan E. Collier, Elliot L. Elson and Gregory Goldberg (2006) Phys Rev E. 73: 041909

**Measuring unfolding of proteins in the presence of denaturant using fluorescence correlation spectroscopy**

KrishnanandaChattopadhyay, Saveez Saffarian, Elliot L. Elson and Carl Frieden

(2005) Biophysical Journal 88: 1413-1422

**Interstitial Collagenase is an ATP - independent Molecular Motor Driven by Proteolysis of Collagen**

Saveez Saffarian, Ivan E. Collier, Barry L. Marmer, Elliot L. Elson and Gregory Goldberg

(2004) Science 306: 108-111

**Statistical Analysis of Fluorescence Correlation Spectroscopy: The Standard Deviation and Bias**

SaveezSaffarian and Elliot L. Elson (2003) Biophysical Journal 84(3): 2030-2042

**Measurement of Microsecond Dynamic Motion in the Intestinal Fatty Acid Binding Protein using Fluorescence Correlation Spectroscopy**

Chattopadhyay, Krishnananda, Saveez Saffarian, Elliot L Elson and Carl Frieden (2002) PNAS 99: 14171-14176

**Concentration fluctuations in a mesoscopic oscillating chemical reaction system**

Qian, Hong, Saveez Saffarian and Elliot L. Elson (2002) PNAS 99: 10376-10381

**Substrate Recognition by Gelatinase A: The C-Terminal Domain Facilitates Surface Diffusion**

Collier, Ivan E., Saveez Saffarian, Barry L. Marmer, Elliot L. Elson and Greg Goldberg “”

(2001) Biophysical Journal 81: 2370-2377

**Funding**

PENDING SUPPORT

National Institute of Health, RO1

(Saffarian PI Vershinin Co-PIs, Subcontract Margaret Johnson)), $2,900,000

Sep 2024-Sep 2029

Title: Architecture and dynamics of immature HIV lattice

CURRENT SUPPORT

National Science Foundation, Physics of Living Systems (Vershinin PI, Saffarian Co-PI) $650,000

Sep 2021-Sept 2024

Mechanics of SARS-CoV-2 virus like particles

NIH R13 AI179557-01 Saffarian (PI) $25,000

July 2023- July 2024

International Retroviral Symposium: Assembly, Maturation and Uncoating

ViiV Saffarian (PI) $15,000

July 2023- July 2024

International Retroviral Symposium: Assembly, Maturation and Uncoating

Gilead Saffarian (PI) $11,000

July 2023- July 2024

International Retroviral Symposium: Assembly, Maturation and Uncoating

National Institute of Health, R56 (Saffarian PI, Vershinin Co-PI), $462,000

Sep 2023-Sept 2025

Title: Architecture and dynamics of immature HIV lattice

COMPLETED SUPPORT

National Institute of Health, RO1 (Single PI no subcontracts), $1,970,000

Sep 2017-Sep 2023

Title: Dynamics of Gag-Pol auto-processing and ESCRT recruitment during HIV budding

National Science Foundation, (Vershinin PI, Saffarian Co-PI) $200,000

March 2020-March 2021

PAPID: Physics of coronavirus sars-cov-2 survival outside a host and implications for seasonal dependence of covid-19 outbreaks

National Science Foundation, (Co-PI David Grunwald) $650,000

Sep 2016-Sep 2020

Collaborative Research: Dynamics of RNA dependent RNA polymerases

National Institute of Health, R21, $410,000

July 2014-July 2016

Dynamics of early ESCRT recruitment during HIV budding

National Science Foundation $319,723 Jan 2013-Jan 2016

REU Physics and Astronomy at University of Utah

National Science Foundation, $720,000

Sep 2011-Sep 2015

Developing Methods for High-resolution Measurements of Enveloped Virus Budding in Live Cells

Seed Grant University of Utah, $28,000

July 2011-July 2012

Developing methods for detection of the exact moment of membrane fission during enveloped virus budding.

American Heart Association, Postdoctoral Fellowship.

July 2005-July2007

Awards

Young Fluorescence Investigator Award

Biophysical Society, Salt Lake City 2006

Finalist in Gregorio Weber International Prize in Biological Fluorescence

Weber Symposium**,** Kauai 2005

Student Research Achievement Award

Biophysical Society, San Francisco 2002

Jill Abrams Scholarship in Physics

Washington University in St Louis 2001

IPM (Institute of Physics and Mathematics)

Fellowship 1994-1997

Honorable Mention XXIV International Physics Olympiad

College of William& Mary 1993

Teaching Experience

“Physics in Biology 6310/4310” 2012-Present

Course Developer, Instructor

Department of Physics and Astronomy

University of Utah

“Science on Stage 2790” 2012-Present

Co-Course Developer, Instructor

Department of Physics and Astronomy

University of Utah

“Optics in Biology 6210/4210” 2010-Present

Course Developer, Instructor

Department of Physics and Astronomy

University of Utah

“Introduction to fluorescence microscopy” 2004

Co-Lecturer, Graduate level

Department of Physics/ Department of Biochemistry and Molecular Biophysics

Washington University in St Louis

“Introductory Physics” 2001-2002

Tutor, Student Educational Services

Washington University in St Louis

“Advanced Solid State Physics” 1999

Teaching Assistant, Graduate level

Department of Physics, Washington University in St Louis

“Physics Olympiad Preparation Course” 1994

Tutor for the Olympiad Team

Department of Physics, Sharif University of Technology