

## Matthew T. Eddy, PhD

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### APPOINTMENTS

#### **University of Florida, Gainesville, FL**

Assistant Professor, Department of Chemistry, 2018 - present

#### **National High Magnetic Field Lab, Tallahassee, FL**

Affiliated Faculty, 2018 – present

### EDUCATION

#### **Massachusetts Institute of Technology, Cambridge, MA**

Ph.D. in Physical Chemistry, 2012

#### **Oberlin College, Oberlin, OH**

B.A. in Chemistry with honors, 2004

### RESEARCH EXPERIENCE

2013 – 2018    Postdoctoral Research Fellow  
Laboratories of Professors Raymond Stevens and Kurt Wüthrich  
The Scripps Research Institute, San Diego, CA  
The Bridge Institute at the University of Southern California, Los Angeles, CA

2012 – 2013    Postdoctoral Research Fellow  
Laboratory of Professor Robert G. Griffin  
Massachusetts Institute of Technology, Cambridge, MA

2005 – 2012    Graduate Research Assistant  
Laboratory of Professor Robert G. Griffin  
Department of Chemistry and the Francis Bitter Magnet Laboratory  
Massachusetts Institute of Technology, Cambridge, MA  
Thesis Title: “Structural and Functional Investigation of the Human Voltage Dependent Anion Channel in Lipid Bilayers with Magic Angle Spinning NMR”

*Development of magic angle spinning NMR methodologies and application to determining the structure and function of the 32 kDa integral membrane protein VDAC1 in lipid bilayers*

2003 – 2004    Undergraduate Research Assistant  
Laboratory of Professor Manish A. Mehta  
Department of Chemistry and Biochemistry  
Oberlin College, Oberlin, OH

*Extended quantitative magic angle spinning NMR distance measurement experiments to high magnetic field strengths for high resolution structure determination of biomolecules*

## **GRANTS AND FELLOWSHIPS**

2020 – present NIH MIRA  
2014 – 2017 American Cancer Society Postdoctoral Fellowship  
2014 National Institutes of Health NRSA Postdoctoral Fellowship (declined)

## **AWARDS AND HONORS**

2020 Oak Ridge Affiliated Universities Ralph E. Powe Junior Faculty Award  
2015 Keystone Symposia on Hybrid Methods in Structural Biology, Travel Scholarship Award  
2012 Experimental Nuclear Magnetic Resonance Conference Travel Award  
2011 Biophysical Society Travel Award  
2009 Morse Graduate Student Travel Award, Massachusetts Institute of Technology  
2000 Recipient of the Marry Elizabeth Johnson Scholarship Award, Oberlin College

## **SERVICE AND PROFESSIONAL ACTIVITIES**

2019 Co-Chair, Southeast Magnetic Resonance Conference  
Mentor, NIH Chemistry-Biology Interfaces Training Grant, UF  
Member, American Society for Biochemistry and Molecular Biology  
Member, Biophysical Society  
Member, Ampere Society of Magnetic Resonance  
Member, American Association for the Advancement of Science

## **TEACHING**

2018 – 2021 CHM6306, Structural Pharmacology, UF  
2019 – 2020 CHM4413L, Biophysical Chemistry Laboratory, UF

## **PUBLICATIONS**

**Eddy MT**, Martin BT, Wüthrich K. “A<sub>2A</sub> Adenosine Receptor Partial Agonism Related to Structural Rearrangements in an Activation Microswitch,” *Structure* (2020), In Press.

Silvers RS, **Eddy MT**. “NMR Spectroscopic Studies of Ion Channels in Lipid Bilayers: Sample Preparation Strategies Exemplified by the Voltage Dependent Anion Channel.” *Methods Mol Bio* (2021), In Press.

Jacobson KA, Gao ZG, Matricon P, Eddy MT, Carlsson J. “Adenosine A<sub>2A</sub> Receptor Antagonists: From Caffeine to Selective Non-xanthines.” *British J Pharm* (2020), In Press.

Ferré G, **Eddy MT**. “Structural Biology of GPCR Drugs and Endogenous Ligands – Insights from NMR Spectroscopy,” *Methods* (2020) 180, 79-88.

**Eddy MT**, Yu T-Y, Wagner G, Griffin RG. “Structural Characterization of the Human Membrane Protein VDAC2 in Lipid Bilayers by Solid State NMR,” *J Bio NMR* (2019) 73, 451-460.

Shimada I, Ueda T, Kofuku Y, **Eddy MT**, Wüthrich K. “GPCR Drug Discovery: Integrating Solution NMR Data with Crystal and Cryo-EM Structures,” *Nature Reviews Drug Discovery* (2019) 19, 59-82.

Sušac L, **Eddy MT**, Didenko T, Stevens RC, Wüthrich K. “A<sub>2A</sub> adenosine receptor functional states characterized by <sup>19</sup>F-NMR,” *Proc Natl Acad Sci* (2018) 115, 12733-12738.

**Eddy MT**, Gao Z-G, Mannes P, Patel N, Jacobson KA, Katritch V, Stevens RC, Wüthrich K. “Extrinsic Tryptophans as NMR Probes of Allosteric Coupling in Membrane Proteins: Application to the A<sub>2A</sub> Adenosine Receptor,” *JACS* (2018) 140, 8228-8235.

**Eddy MT**, Lee M-Y, Gao Z-G, White KL, Didenko T, Horst R, Audet M, Stanczak P, McClary KM, Han GW, Jacobson KA, Stevens RC, Wüthrich K. “Allosteric Coupling of Drug Binding and Intracellular Signaling in the A<sub>2A</sub> Adenosine Receptor,” *Cell* (2018) 172, 68-80.

White K\*, **Eddy MT\***, Gao Z-G, Han GW, Lian T, Deary A, Patel N, Jacobson KA, Katritch V, Stevens RC. "Structural Connection between Activation Microswitch and Allosteric Sodium Site in GPCR Signaling," *Structure* (2018) 26, 1-11.

\*Co-first authors

**Eddy MT**, Didenko T, Stevens RC, Wüthrich K. "β<sub>2</sub>-Adrenergic Receptor Conformational Response to Fusion Protein in the Third Intracellular Loop," *Structure* (2016) 24, 2190-2197.

Andreas LB, Reese M, **Eddy MT**, Gelev V, Ni QZ, Miller EA, Emsley L, Pintacuda G, Chou JJ, Griffin RG. "Structure and Mechanism of the Influenza A M218-60 Dimer of Dimers," *J Am Chem Soc.* (2015) 137, 14877-14886.

**Eddy MT**, Su Y, Silvers R, Andreas L, Clark L, Wagner G, Pintacuda G, Emsley L, Griffin RG. "Lipid Bilayer-bound Conformation of an Integral Membrane Beta Barrel Protein by Multidimensional MAS NMR" *J Bio NMR* (2015) 61, 1-12.

**Eddy MT**, Andreas L, Teijido O, Su Y, Clark L, Noskov G, Wagner G, Rostovtseva K, Griffin RG. "Magic Angle Spinning Nuclear Magnetic Resonance Characterization of Voltage-Dependent Anion Channel Gating in Two-Dimensional Lipid Crystalline Bilayers" *Biochemistry* (2015) 54, 994-1005.

**Eddy MT**, Yu T-Y. "Membranes, Peptides, and Disease: Unraveling the Mechanisms of Viral Proteins with Solid State Nuclear Magnetic Resonance Spectroscopy" *Solid State NMR* (2014) 61, 1-7.

Su Y, Sarell CJ, **Eddy MT**, Pashley C, Radford SE, Griffin RG. "Secondary Structure in the Core of Amyloid Fibrils Formed from Human β<sub>2</sub>-Microglobulin and its Truncated Variant ΔN6" *J Am Chem Soc* (2014) 136, 6313-6325.

**Eddy MT**, Belenky M, Sivertsen AC, Griffin RG, Herzfeld J. "Selectively Dispersed Isotope Labeling for Protein Structure Determination by Magic Angle Spinning NMR." *J Bio NMR* (2013) 57, 129-139.

Daviso, E, **Eddy MT**, Andreas LB, Griffin RG, Herzfeld J. "Efficient Resonance Assignment of Proteins in MAS NMR by Simultaneous Intra- and Inter-residue 3D Correlation Spectroscopy." *J Bio NMR* (2013) 55, 257-265.

**Eddy MT**, Ong T-C, Clark L, Teijido O, van der Wel PCA, Garces R, Wagner G, Rostovtseva TK, Griffin RG. "Lipid Dynamics and Protein-Lipid Interactions in 2D Crystals Formed with the □-Barrel Integral Membrane Protein VDAC1." *J Am Chem Soc* (2012) 134, 6375-6387.

Andreas LB, **Eddy MT**, Chou JJ, Griffin RG. "MAS NMR of the Drug Resistant S31N M2 Proton Transporter from Influenza A." *J Am Chem Soc* (2012) 134, 7215-7218.

**Eddy MT**, Ruben D, Griffin RG, Herzfeld J. "Deterministic schedules for robust and reproducible non-uniform sampling in multidimensional NMR." *J Mag Res* (2011) 214, 296-301.

Bayro MB, Debelouchina GT, **Eddy MT**, Birkett NB, MacPhee CE, Rosay M, Maas WE, Dobson CM, Griffin RG. "Intermolecular Structure Determination of Amyloid Fibrils with Magic-Angle Spinning and Dynamic Nuclear Polarization NMR." *J Am Chem Soc* (2011) 133, 13967-74.

De Paepe G, Lewandowski JR, Loquet A, **Eddy MT**, Megy S, Bockmann A, Griffin RG. "Heteronuclear proton assisted recoupling." *J Chem Phys* (2011) 134, 095101.

Matsuki Y, **Eddy MT**, Griffin RG, Herzfeld J. "Rapid Three-Dimensional MAS NMR Spectroscopy at Critical Sensitivity." *Angewandte Chemie* (2010) 49, 9215-18.

Andreas LB, **Eddy MT**, Pielak RM, Chou JJ, Griffin RG. "Magic Angle Spinning NMR Investigation of Influenza A M2<sub>18-60</sub>: Support for an Allosteric Mechanism of Inhibition." *J Am Chem Soc* (2010) 132, 10958-10960.

van der Wel PCA, **Eddy MT**, Ramachandran R, Griffin RG. "Targeted  $^{13}\text{C}$ - $^{13}\text{C}$  Distance Measurements in a Microcrystalline Protein via J-Decoupled Rotational Resonance Width Measurements." *ChemPhysChem* (2009) 10,1656-63.

Lewandowski JR, De Paepe G, **Eddy MT**, Struppe J, Maas W, Griffin RG. "Proton Assisted Recoupling at High Spinning Frequencies." *J Phys Chem B* (2009) 113, 9062-69.

Lewandoski JR, De Paepe G, **Eddy MT**, Griffin RG. " $^{15}\text{N}$ - $^{15}\text{N}$  Proton Assisted Recoupling in Magic Angle Spinning NMR." *J Am Chem Soc* (2009) 131, 5769-76.

Matsuki Y, **Eddy MT**, Herzfeld J. "Spectroscopy by Integration of Frequency and Time Domain Information for Fast Acquisition of High-Resolution Dark Spectra." *J Am Chem Soc* (2009) 131, 4648-56.

Bayro MB, Ramachandran R, Caporini MA, **Eddy MT**, Griffin RG. "Radio frequency-driven recoupling at high magic-angle spinning frequencies: Homonuclear recoupling sans heteronuclear decoupling." *J Chem Phys* (2008) 128, 052321.

Mehta MA, **Eddy MT**, McNeill SA, Mills FD, Long JR. "Determination of Peptide Backbone Torsion Angles Using Double-Quantum Dipolar Recoupling Solid-State NMR Spectroscopy." *J Am Chem Soc* (2008) 130, 2202-12.

Mehta MA, Fry EA, **Eddy MT**, Dedeo MT, Anagnost AE, Long JR. "Structure of the alanine dipeptide in condensed phases determined by  $^{13}\text{C}$  NMR." *J Phys Chem B* (2004) 108, 2777-80.

## **PRESENTATIONS**

Invited Speaker, Australian and New Zealand Society for Magnetic Resonance Conference, "Structural Plasticity of a Human GPCR Studied by NMR Spectroscopy" November 2019, Perth, Australia.

Invited Speaker, Drug Discovery Chemistry, "Biophysical Studies of Human GPCRs" April 2019, San Diego, CA.

Selected Speaker, Biophysical Society Meeting, "Structural Plasticity of a Human GPCR Studied by NMR Spectroscopy" February 2019, Baltimore, MD.

Invited Speaker, Southeast Magnetic Resonance Conference, "Human GPCR Structure-Function as Studied by Solution NMR." October 2018, Clemson, SC.

Invited Speaker, Drug Discovery Chemistry, "GPCR Allosteric Coupling Investigated by NMR and X-ray Diffraction." April 2018, San Diego, CA

Invited Speaker, Drug Discovery Chemistry, "Biophysical Characterization of GPCRs with Crystallization-Enhancing Modifications." April 2018, San Diego, CA

Invited Speaker, LabRoots: Drug Discovery, "New Tools for Understanding Allosteric Signaling in G Protein Coupled Receptors." February 2018, Virtual Symposium

Invited Speaker, Drug Discovery Chemistry, "Conformational Dynamics of G Protein-Coupled Receptors as Studied by NMR Spectroscopy in Solution." April 2017, San Diego, CA.

Invited Speaker, Discovery on Target, "GPCR Dynamics as Revealed by NMR." September 2016, Boston, MA.

Selected Speaker, 3<sup>rd</sup> Annual GPCR Forum. "Conformational Dynamics of the Human Adenosine A<sub>2A</sub> Receptor." November 2016, Shanghai, China.

Keystone Symposia: Hybrid Methods in Structural Biology. "Conformational Dynamics of G Protein-Coupled Receptors Studied by  $^{19}\text{F}$  NMR and Novel Isotopic Labeling Approaches." March 5, 2015, Tahoe City, CA

Invited Speaker, Experimental NMR Conference. "MAS NMR of Membrane Protein 2D Crystals: The role of VDAC1's N-terminus in Channel Gating." April 2012, Miami, FL

Selected Speaker, Biophysical Society Meeting. "Investigating VDAC Gating via Magic Angle Spinning NMR and Electrophysiological Measurements Under Extreme pH Conditions: Implications for the Voltage-Gating Mechanism." March 2011, Baltimore, MD

### **POSTER PRESENTATIONS**

Keystone Symposia: GPCR Structure and Function, "Globally Monitoring Allosteric Coupling in the A<sub>2A</sub> Adenosine Receptor by NMR in Solution." February 2018, Santa Fe, NM.

Keystone Symposia: Frontiers of NMR in Life Sciences, "Production of the Isotope-labeled Human GPCR A<sub>2A</sub>AR in *Pichia pastoris* and Characterization by NMR." March 2017, Keystone, CO.

American Cancer Society Jiler Professors and Fellows Conference, "Conformational Dynamics of the Human A<sub>2A</sub> Receptor." September 2016, Salt Lake City, UT.

Biophysical Society Meeting, "Conformational Dynamics of a GPCR Chimera Studied by <sup>19</sup>F NMR Spectroscopy." February 2014, San Francisco, CA

Solid State NMR Winter School, "Characterization of VDAC1 in Lipid Bilayers with Magic Angle Spinning NMR." January 2010, Stowe, VT

Biophysical Society Meeting, "Characterization of VDAC1 in Lipid Bilayers with Magic Angle Spinning NMR." March 2009, Boston, MA

Magnetic Resonance Gordon Research Conference, "Third Spin Assisted Recoupling: Applications for High MAS and Perdeuterated Systems." June 2009, Biddeford, ME

Experimental Nuclear Magnetic Resonance Conference, "Determination of Peptide Backbone Torsion Angles Using Double-Quantum Dipolar Recoupling Solid-State NMR Spectroscopy." April 2004, Pacific Grove, CA

### **CONSULTING ACTIVITIES**

Merck, 2018-2019

### **INVITED PEER REVIEWER**

Nature Chemical Biology

Nature Communication

Plos One

Science Advances

FEBS Letters

Journal of Physical Chemistry B

Methods

Biophysical Journal