

DANIELA FERA

Assistant Professor

Department of Chemistry and Biochemistry

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Education

09/06 – 08/12 **University of Pennsylvania**, Graduate School of Arts and Science, Philadelphia, PA
Ph.D. in Biological Chemistry, 06/12
Dissertation Title: "Identification and Characterization of Small Molecule Antagonists of Human Papillomavirus Oncoproteins"

09/01– 05/05 **New York University**, College of Arts and Science, New York, NY
B.A. in Chemistry, with Honors; B.A. in Mathematics, 05/05; *cum laude*

Postdoctoral Training:

11/12 –07/17 **Boston Children's Hospital / Harvard Medical School**
Research Fellow, Structural Biology with Stephen C. Harrison, Ph.D.

- Investigated the interplay between broadly neutralizing antibody (bnAb) development and virus evolution in donors infected with HIV using X-ray crystallography, electron microscopy, and biochemical methods, in conjunction with data from collaborators.
- Probed the immune response to immunization in non-human primates and in human clinical trials using similar approaches as above.
- Contributed an understanding of developmental pathways and envelope-antibody interactions for two HIV envelope epitopes (the CD4 binding site and V3-loop base glycans) to guide immunogen design.

Faculty Academic Appointments:

08/17 - Present **Assistant Professor of Biochemistry**, Department of Chemistry and Biochemistry, Swarthmore College, Swarthmore, PA

09/16 – 12/16, **Adjunct Professor of Chemistry**, School of Arts and Sciences, Massachusetts
09/15 – 12/15 College of Pharmacy and Health Sciences, Boston, MA

09/14 – 05/15 **Adjunct Faculty**, Department of Chemistry and Physics, Emmanuel College, Boston, MA

09/14 – 12/14 **Adjunct Faculty**, Department of the Sciences, Wentworth Institute of Technology, Boston, MA

Awards and Honors:

08/17	Kiehl's LifeRide for amFAR Grant Recipient
02/17	Travel Award, Boston Children's Hospital Postdoctoral Association
09/15	Postdoctoral Award, CHAVI-ID Annual Retreat
09/15	Poster Prize, CHAVI-ID Annual Retreat
05/12	Second Place Poster Prize, Wistar Institute Cancer Retreat
04/07	Penn Prize for Excellence in Teaching by Graduate Students
04/07	Chemistry Department Teaching Award
05/05	Merck Award
09/02 – 05/05	College of Arts and Science Presidential Scholar

Grants:

08/17 – 07/18	Structural analyses of antibody-virus complexes to guide immunogen design. amFAR Mathilde Krim Fellowship in Basic Biomedical Research, Phase II PI (\$69,565.22 – total direct costs for 1-year period) The major goal is to biochemically and structurally investigate an earlier member of a broadly neutralizing N332-glycan dependent antibody lineage in complex with the HIV envelope to determine features of the HIV envelope that triggered this lineage, and contribute to vaccine design strategies.
11/16 – 07/17	Structural analyses of antibody-virus co-evolution to guide immunogen design. amFAR Mathilde Krim Fellowship in Basic Biomedical Research PI (\$136,000 – total direct costs for 2-year period) The major goal is to biochemically and structurally investigate, using cryo-electron microscopy (cryo-EM), the significance of long antibody CDR loops for penetrating the HIV envelope glycan shield and the stability of difficult to neutralize envelope trimers to inform immunogen design.
12/14 – 10/16	Interplay between antibody affinity maturation and HIV evolution in a single host NIH NIAID 1F32AI116355-01 PI (\$110,236 – total direct costs for 2-year period) The major goal is to determine pathways of antibody affinity maturation that have led to specific broadly neutralizing antibodies against HIV, and track the co-evolution in an infected individual of virus and antibody response.
09/09 – 08/10	Structure-Based Design of HPV-E7 Inhibitors BMB Structural Biology Training Grant / University of Pennsylvania Graduate student/Trainee The major goal was to co-crystallize human papillomavirus E7 inhibitors with their protein target and use the crystal structure to improve the potency and specificity of the inhibitors.
09/07 – 08/09	Structure-Based Design of HPV-E7 Inhibitors NIH Chemistry-Biology Interface Pre-doctoral Training Grant

NIH NIGMS GM071339

Graduate student/Trainee

The major goal was to identify and characterize small molecule inhibitors against the human papillomavirus E7 oncoprotein, and investigate the interaction between E7 and the p300 transcriptional co-activator.

- 05/07 – Center for Teaching and Learning Graduate Fellowship
05/08 Center for Teaching and Learning / University of Pennsylvania
Graduate Fellow – organizer of workshops (\$6000)
The major goal was to organize and lead teaching workshops, observe graduate students teaching and offer feedback, and meet regularly as a fellows group to discuss teaching practices and ideas.
- 06/03 – Secondary RNA Structure Motifs
08/03 Department of Chemistry Research Fellowship / New York University
Undergraduate student PI (\$3000)
The major goal was to write computer codes and use bioinformatics to analyze RNA sequences and secondary structures across genomes to try to correlate structure to function.
- 01/03 – RAG: RNA-As-Graphs Database
05/03 Dean's Undergraduate Research Fund / New York University
Undergraduate student PI (\$500)
The major goal was to aid in the development of an RNA secondary structure database to catalogue structures found in nature.

Memberships:

- 2012 American Chemical Society
2005 Phi Lambda Upsilon

Academic Committees (at Swarthmore College):

- 09/18 – Present Fellowships and Prizes

Academic Committees (before Swarthmore College):

- 06/16 – 07/17 Boston Children's Hospital Postdoctoral Association, Mentoring Committee Chair
06/15 – 07/17 Boston Children's Hospital Postdoctoral Association, Mentoring Committee
03/15 – 07/17 HMS Biological Chemistry and Molecular Pharmacology Training Committee
11/09, 05/11 Organizing Committee, Chemical Biophysics Mini-Symposium
07/09, 07/10 Organizing Committee, Chemistry-Biology Interface Scientific Retreat
09/08 – 05/09 Graduate & Professional Student Assembly Student Life Policy Council
09/08 – 05/09 Graduate & Professional Student Assembly Recreation Advisory Board
03/08 – 04/08 Selection Committee for Penn Prize for Excellence in Teaching by Graduate Students

Teaching Activities (*at* Swarthmore College):**Courses:**

Fall 2018	Biological Chemistry II (CHEM048)
Fall 2018	Advanced Experimental Biological Chemistry (CHEM058)
Fall 2018	Honors – Thesis Research (CHEM180)
Fall 2018	Research Project (CHEM094)
Spring 2018	Research Project (CHEM094)
Spring 2018	Special Topics in Biochemistry and its Applications (CHEM118)
Spring 2018	Biological Chemistry I Laboratory (CHEM038)
Fall 2017	Biological Chemistry II (CHEM048)

Teaching Activities (*before* Swarthmore College):

09/16 – 12/16, 09/15 – 12/15	Adjunct Professor of Chemistry , School of Arts and Sciences, Massachusetts College of Pharmacy and Health Sciences Principles of Chemistry Laboratory I (academic courses) – teaching undergraduate science and nursing majors, 2.5hr session per week per semester
09/14 – 05/15	Adjunct Faculty , Department of Chemistry and Physics, Emmanuel College Principles of Chemistry I Lecture and Laboratory (academic course) – teaching undergraduate science majors, 3hr lecture per week per semester, 2.5hr laboratory session per week per semester
09/14 – 12/14	Adjunct Faculty , Department of the Sciences, Wentworth Institute of Technology Engineering Chemistry I Lecture and Laboratory (academic course) – teaching undergraduate engineering majors, 2.5hr lecture per week per semester, 2hr laboratory session per week per semester
05/07 – 05/08	CTL Graduate Fellow , Center for Teaching and Learning, University of Pennsylvania Teaching Workshops – organized and held teaching workshops for graduate students and postdoctoral fellows, 1.5hr workshop per month, 1.5hr organizational meeting per month.
09/06 – 12/07	General Chemistry Teaching Assistant , Chemistry Department, University of Pennsylvania Principles of Chemistry I/II Lecture and Recitations (academic courses) – teaching regular and honors undergraduate courses, 1hr recitation per week per semester, prepared and performed experimental demonstrations during lecture on occasion
11/05 – 05/06	Math Teacher , College Now Program, York College/Far Rockaway HS SAT preparatory course (academic course) – teaching high school students, 4hr lecture/classwork per week per semester
09/05 – 06/06	Math Teacher of Algebra and Trigonometry , Math Department, Frederick Douglass Academy VI High School

Algebra and Trigonometry (academic course) – teaching high school students, 20hr lecture/classwork per week per semester

- 07/06 – 08/06, 09/03 – 05/05 **General Chemistry Recitation Teaching Assistant**, Chemistry Department, New York University
Principles of Chemistry I/II Recitations (academic courses) – teaching undergraduates, up to 3 1hr recitation sections per week per semester
- 09/02 – 12/04 **General Chemistry Clinic Instructor**, Chemistry Department, New York University
Principles of Chemistry I/II Clinics (academic courses) – teaching undergraduates, up to 3 1hr clinic (group learning) sections per week per semester

Supervision of Student Research (at Swarthmore College):

Year	Student	Last Career Path Known
2018	Julia Morriss, '19	Current Student
2018	Diep Nguyen, '19	Current Student
2018	Emilie Morse, '20	Current Student
2017 - 2018	Therese Ton, '19	Current Student
2017 - 2018	Jeffrey Zhou, '19	Current Student

Mentoring (before Swarthmore College):

- 2016 - 2017 Weekly supervision of research technician (Mr. Matthew Lee), still working in the Harrison laboratory as a technician.
- 2015 Supervision of research technician (Ms. Claudia Jette, currently Ph.D. student at California Institute of Technology). Daily supervision for fall semester.
- 2014 – 2015 Daily supervision of research technician (Mr. Brendan Pier, now M.D. student at University of Connecticut Medical School) for one year.
- 2014 – 2015 Supervision of HHMI Exceptional Research Opportunities Program student (Ms. Claudia Jette, currently Ph.D. student at California Institute of Technology) for two summers.
- 2011 Supervision of high school student (Mr. Andrew Marmorstein, graduated from Case Western University with bachelor's degree in computer science) for one summer.
- 2010 Supervision of pre-doctoral student (Ms. Stephanie Barros, completed Ph.D. at University of Pennsylvania, now a postdoctoral research fellow at New York University). Daily supervision for graduate rotation (~2 months).
- 2009 - 2010 Supervision of undergraduate student (Ms. Catherine Tang, now Associate at PJT Partners). Daily supervision for one academic year.

2007 - 2008 Supervision of undergraduate student (Ms. Sarah Johnson, obtained Ph.D. from Princeton University and now a licensing officer at Penn Center for Innovation). Daily supervision for one academic year.

Invited Oral Presentations:

- 10/17 Structural Mimic of the HIV Envelope V3 Region Reveals Key Features of the DH270 Broadly Neutralizing Antibody Lineage Epitope and Stages of Affinity Maturation (Selected oral abstract) Duke Center for HIV/AIDS Vaccine and Immunology and Immunogen Discovery, Duke University, Durham, NC
- 10/16 A Structural Analysis of the Interaction with Env of the DH270 Broadly Neutralizing Glycan-Dependent B-Cell Lineage from Donor CH848, and its Cooperating Lineages DH475 and DH272 (Selected oral abstract) Duke Center for HIV/AIDS Vaccine and Immunology and Immunogen Discovery, Duke University, Durham, NC
- 10/16 Structural Analysis by Negative Stain EM of Env-Fab Complexes from NHP79 and RV305 (Selected oral abstract) Duke Center for HIV/AIDS Vaccine and Immunology and Immunogen Discovery, Duke University, Durham, NC
- 03/16 Structural Analysis of an HIV-1 Broadly Neutralizing B-Cell Lineage Targeting the Env N332 Glycan (Selected oral abstract) HIV Vaccines (X8) Keystone Symposia, Olympic Valley, CA
- 03/16 Structural Analysis of an HIV-1 Broadly Neutralizing B-Cell Lineage Targeting the Env N332 Glycan (Selected oral abstract) Antibody Viral Co-evolution Workshop, Los Alamos, NM (New Mexico Consortium)
- 09/15 Crystal Structure Reveals Why Antibodies from Rhesus Macaque Immunizations Can Neutralize Tier-2 Autologous Envs (Selected oral abstract) Duke Center for HIV/AIDS Vaccine and Immunology and Immunogen Discovery, Duke University, Durham, NC
- 09/14 Structural Investigations of the HIV “Arms Race” in Glycan-Dependent Antibody Lineages (Selected oral abstract) Duke Center for HIV/AIDS Vaccine and Immunology and Immunogen Discovery, Duke University, Durham, NC
- 04/14 Structural Analysis of Antibody Affinity Maturation in the CH103 Lineage (Selected oral abstract) Duke Center for HIV/AIDS Vaccine and Immunology and Immunogen Discovery, Duke University, Durham, NC
- 09/13 Investigating the Mechanisms of the HIV “Arms Race” in the CH103 Lineage (Selected oral abstract) Duke Center for HIV/AIDS Vaccine and Immunology and Immunogen Discovery, Duke University, Durham, NC

Organizing Roles:

2016 Moderator, Antibody Viral Co-evolution Workshop, Los Alamos, NM (New Mexico Consortium)

Publications (Swarthmore College undergraduate researchers underlined):

1. Zhou, J.O., Ton, T., Morriss, J.W., Nguyen, D., **Fera, D.**, (2018) Structural Insights from HIV-Antibody Co-Evolution and Related Immunization Studies. *AIDS Research and Human Retroviruses*. 34(9):760-768. doi: 10.1089/AID.2018.0097.
2. **Fera, D.**, Lee, M.S., Wiehe, K., Meyerhoff, R.R., Piai, A., Bonsignori, M., Aussedat, B., Walkowicz, W.E., Ton, T., Zhou, J.O., Danishefsky, S., Haynes, B.F., and Harrison, S.C. (2018) HIV Envelope V3 Region Mimic Embodies Key Features of a Broadly Neutralizing Antibody Lineage Epitope. *Nat Commun*. 16;9(1):1111
3. Williams*, W.B., Zhang*, J., Jiang*, C., Nicely*, N.I., **Fera*, D.**, Luo, K., Moody, M.A., Liao, H.X., Alam, S.M., Kepler, T.B., Ramesh, A., Wiehe, K., Holland, J.A., Bradley, T., Vandergrift, N., Saunders, K.O., Parks, R., Foulger, A., Xia, S.M., Bonsignori, M., Montefiori, D.C., Louder, M., Eaton, A., Santra, S., Searce, R., Sutherland, L., Newman, A., Bouton-Verville, H., Bowman, C., Bomze, H., Gao, F., Marshall, D.J., Whitesides, J.F., Nie, X., Kelsoe, G., Reed, S.G., Fox, C.B., Clary, K., Koutsoukos, M., Franco, D., Mascola, J.R., Harrison, S.C., Haynes, B.F., Verkoczy, L. (2017) Initiation of HIV neutralizing B cell lineages with sequential envelope immunizations. *Nat Commun*. 23;8(1):1732 (*equal contribution)
4. Horwitz*, J.A., Bar-On*, Y., Lu*, C.L., **Fera, D.**, Lockhart, A.A.K., Lorenzi, J., Nogueira, L., Golijanin, J., Scheid, J.F., Seaman, M.S., Gazumyan, A., Zolla-Pazner, S. and Nussenzweig, M.C. (2017) Non-Neutralizing Antibodies Alter the Course of HIV-1 Infection *in vivo*. *Cell*. 10;170(4):637 (*equal contribution)
5. Bonsignori*, M., Kreider*, E.F., **Fera*, D.**, Meyerhoff*, R.R., Bradley*, T., Wiehe, K., Alam, S. A., Aussedat, B., Walkowicz, W.E., Hwang, K.K., Saunders, K.O., Zhang, R., Gladden, M.A., Monroe, A., Kumar, A., Xia, S.M., Cooper, M., Louder, M.K., McKee, K., Bailer, R.T., Pier, B.W., Jette, C.A., Kelsoe, G., Williams, W.B., Morris, L., Kappes, J., Wagh, K., Kamanga, G., Cohen, M.S., Hraber, P.T., Montefiori, D.C., Trama, A., Liao, H.X., Kepler, T.B., Moody, M.A., Gao, F., Danishefsky, S.J., Mascola, J.R., Shaw, G.M., Hahn, B.H., Harrison, S.C., Korber, B.T., Haynes, B.F. (2017) Staged induction of HIV-1 glycan-dependent broadly neutralizing antibodies. *Science Translational Medicine*. 9(381). (*equal contribution)
6. Easterhoff, R., Moody, M. A., **Fera, D.**, Cheng, H., Ackerman, M., Wiehe, K., Saunders, K.O., Vandergrift, N., Parks, R., Kim, J., Michael, N.L., O'Connell, R.J., Excler, J.L., Robb, M.L., Vasan, S., Rerks-Ngarm, S., Kaewkungwal, J., Pitisuttithum, P., Nitayaphan, S., Sinangil, F., Tartaglia, J., Phogat, S., Kepler, T.B., Alam, S.M., Liao, H.X., Ferrari, G., Seaman, M.S., Montefiori, D.C., Tomaras, G.D., Harrison, S.C. and Haynes, B.F. (2017) HIV envelope CD4 binding site antibodies with long variable heavy third complementarity determining region boosted with a HIV vaccine. *PLoS Pathogens*. 13(2).

7. Bradley*, T., **Fera*, D.**, Bhiman, J., Eslamizar, L., Lu, X., Anasti, K., Zhang, R., Sutherland, L.L., Scearce, R.M., Stolarchuk, C., Lloyd, K.E., Parks, R., Martelli, A., Foulger, A., Abdool-Karim, S.S., Barnett, S., Kepler, T.B., Alam, S.M., Montefiori, D.C., Moody, M.A., Liao, H.X., Morris, L., Santra, S., Harrison, S.C., and Haynes, B.F. (2016) Structural Constraints of Vaccine-Induced Tier-2 Autologous HIV Neutralizing Antibodies Targeting the Receptor Binding Site. *Cell Reports*, 14; 1-12. (*equal contribution)
8. **Fera, D.**, Schmidt, A.G, Haynes, B.F., Gao, F., Liao, H.X., Kepler, T.B., and Harrison, S.C. (2014) Affinity Maturation in an HIV Broadly Neutralizing B-cell Lineage Through Reorientation of Variable Domains. *PNAS*, 111; 10275-10280
9. Malecka*, K.A., **Fera*, D.**, Schultz, D.C., Hodawadekar, S., Reichman, M., Donover, P.S., Murphy, M., and Marmorstein, R. (2014) Identification and characterization of small molecule human papillomavirus E6 inhibitors. *ACS Chemical Biology*, 9; 1603-12. (*equal contribution)
10. **Fera, D.** and Marmorstein R. (2012) Different Regions of the HPV E7 and Ad E1A Viral Oncoproteins Bind Competitively but Through Distinct Mechanisms to the CH1 Transactivation Domain of p300. *Biochemistry*, 51; 9524-9534
11. **Fera, D.**, Schultz, D.C., Hodawadekar, S., Reichman, M., Donover, P.S., Melvin, J., Huryn, D.M., and Marmorstein, R. (2012) Identification and Characterization of Small Molecule Antagonists of pRb Inactivation by Viral Oncoproteins. *Chemistry and Biology*, 19; 518-528
12. Yi, C., Troutman, S., **Fera, D.**, Stemmer-Rachamimov, A., Avila, J. L., Christian, N., Luna Persson, N., Shimono, A., Speicher, D. W., Marmorstein, R., Holmgren, L., and Kissil, J.(2011) Tight Junction- Associated Merlin-Angiomin Complex Mediates Merlin's Regulation of Mitogenic Signaling and Tumor Suppressive Functions. *Cancer Cell*, 19; 527-540
13. Elmatad, Y., Zitolo, M., **Fera, D.**, and Jerschow, A. (2007) Examining Gas Kinetics in MATLAB. *Chem. Educator*. 12; 89-93
14. **Fera, D.**, Kim, N., Shiffeldrim, N., Zorn, J, Laserson, U., Gan, H.H., and Schlick, T. (2004) RAG: RNA-As-Graphs web resource. *BMC Bioinformatics*. 5:88
15. Gan, H.H, **Fera, D.**, Zorn, J, Shiffeldrim, N., Laserson, U., Kim, N., and Schlick, T. (2004) RAG: RNA-As-Graphs Database - Concepts, Analysis, and Features. *Bioinformatics*, 20; 1285-1291

Patents:

1. WO 2013070586 A1, Issued: 05-16-2013; "Small molecule modulators of pRb inactivation"