

XIANGYUN QIU

9 Memorial Drive, MSC 0924
Bldg 9, Rm 1E116, NIH/NICHD
Bethesda, MD 20892-0924, USA

Email: xiangyun@mail.nih.gov
Office : (301) 402-9504 Fax: (301) 496-2172
Cell: (607) 316-6522 Web: <http://www.xqiu.org>

Education

- August 2004 **Ph.D.** in *Experimental Condensed Matter Physics*, Michigan State University, USA
July 1999 **Dual B.S.** in *Physics & Engineering*, University of Science & Technology of China, CHINA

Research Experience

- 2007 - now **Research Fellow**, Lab of Physical & Structural Biology, **National Institutes of Health**
Supervisor: Dr. V. Adrian Parsegian
- Physics of DNA packaging inside bacterial viruses, such as bacteriophage λ , T4.
 - Hydration and electrostatic forces of DNAs, such as triple-strand DNA, Z-DNA; sequence dependence of DNA-DNA interactions modulated by counterions.
 - DNA persistence length measurement with electric birefringence. Fluorescence measurement of the diffusion of short peptides in condensed DNA.
- 2004 - 2007 **Postdoctoral Associate**, School of Applied & Engineering Physics, **Cornell University**
Supervisor: Prof. Lois Pollack
- Electrostatic interactions of nucleic acids in solution modulated by counterions; quantitative analysis of Small Angle X-ray Scattering (SAXS) profiles.
 - Kinetics of catalytic RNA folding using stopped-flow mixers coupled with SAXS; large scale cloning of protein and DNA; *in vitro* transcription from DNA to RNA.
 - Fluid dynamics finite element method (FEM) simulation of rapid microfluidic mixers using FEMLAB; significant clean room experience in microfabrication.
- 2000 - 2004 **Graduate Researcher**, Department of Physics & Astronomy, **Michigan State Univ.**
Supervisor: Prof. Simon J. L. Billinge
- High resolution local structure PDF analysis of neutron powder diffraction data of colossal magneto-resistive (CMR) manganites.
 - Development of the rapid acquisition pair distribution function (RA-PDF) method, allowing three orders of magnitude decrease in data collection time.
 - Software development and distribution of program PDFgetX2, 30,000+ lines, available at <http://www.pa.msu.edu/cmp/billinge-group/programs/PDFgetX2/>.

Teaching Experience

- 2009 **Supervisor** of one NIH Summer Student from Veterinary Medical School, MD, USA
June 2004 **Lecturer** of *Tutorial of neutron powder data PDF analysis*, College Park, MD, USA
May 2003 **Lecturer Assistant** of *Tutorial of neutron data PDF analysis*, Oak Ridge, TN, USA
Fall 2000 **Teaching Assistant** of *Advanced Electronics Lab*, Michigan State University, USA
Fall 1999 **Teaching Assistant** of *Introductory Physics II*, Michigan State University, USA
1999 - 2004 **Mentor** of two high school and six graduate students in academics and research, USA

Awards

- June 2006 **Best Science Award in Poster Competition**, Cornell High Energy Synchrotron Source (CHESS) User Meeting, Ithaca, NY, USA
- May 2002 **Oxford Cryosystems Low Temperature Poster Prize**, American Crystallographic Association (ACA) Annual Meeting, San Antonio, TX, USA
- 2001 - 2004 Six Conference Travel Grants to participate in scientific meetings, USA
- 1994 - 1999 **Yearly award for outstanding academic performance**, University of Science and Technology of China (USTC), Hefei, Anhui, CHINA

Extracurricular Training

- Fall 2008 *Scientists Teaching Science* workshop, National Institutes of Health, USA
- June 2008 *Write Winning Grants* workshop, National Institutes of Health, USA
- Spring 2007 *Postdoctoral Leadership Program*, Cornell University, USA
- June 2004 *Polarized Neutron School*, National Institute of Standard & Technology (NIST), USA
- June 2004 *NCNR School on Neutron Small-Angle Scattering & Reflectometry*, NIST, USA
- July 2002 *National School on Neutron & X-ray Scattering*, Argonne National Laboratory, USA
- May 2002 *Intermediate Programming with IDL*, Research Systems Inc., USA

Presentations

- Invited Talks

1. 07/2009, Center for Functional Nanomaterials, Brookhaven National Laboratory (BNL), USA. *Charge-driven assembly of liquid crystalline DNA*
2. 05/2009, Program in Physical Biology, National Institutes of Health, MD, USA. *Physics of Biomolecules: repulsion and attraction between DNA helices*
3. 09/2006, Center for Functional Nanomaterials, Brookhaven National Laboratory (BNL), USA. *Measuring the force between DNAs in solution*
4. 09/2006, Chocolate Talk at Laboratory of Physical and Structural Biology, National Institutes of Health (NIH), USA. *Probe the inter-DNA potentials in solution by Small Angle X-ray Scattering*
5. 09/2006, Cornell High Energy Synchrotron Source (CHESS) G-line Symposium, Ithaca, NY, USA. *Measuring the force between DNAs in solution*
6. 06/2004, Advanced Photon Source (APS) Lunch Seminar, Argonne National Laboratory, USA. *Local structural analysis of disorder in crystalline materials by the atomic pair distribution function (PDF) method*
7. 06/2004, Cornell High Energy Synchrotron Source (CHESS) Journal Club Talk, Ithaca, NY, USA. *Local structural analysis of disorder in crystalline materials by the atomic pair distribution function (PDF) method*
8. 06/2004, Short Course of Local Atomic Structure Using Neutron Pair Distribution Function (PDF) Analysis, College Park, MD, USA. *Part II: obtaining the PDF from neutron powder diffraction data and model refinement*
9. 02/2004, Advanced Photon Source User Science Seminar, Argonne National Lab, USA. *Probing local structures with the rapid acquisition pair distribution function (RA-PDF) method*

Distributed Software

1. X. Qiu, J. W. Thompson, and S. J. L. Billinge, **PDFgetX2: a GUI driven program to obtain the atomic pair distribution from x-ray powder diffraction data**, available at:
<http://www.pa.msu.edu/cmp/billinge-group/programs/PDFgetX2/>

Publications (number of citations as of 05/18/2009)

- Manuscripts in Preparation/Submitted

1. X. Qiu, D. C. Rau, V. A. Parsegian, L. T. Fang, C. M. Knobler, and W. M. Gelbart, *Charting the structure and energetics of tightly packaged DNA in bacteriophage λ* .
2. X. Qiu, P. Setlow, *Structural and genetic analysis of x-ray scattering of spores*.

- Significant Peer-reviewed Journal Articles

3. S. A. Pabit, X. Qiu, J. S. Lamb, L. Li, S. P. Meisburger, and L. Pollack, *Counterions more effectively screen dsRNA than dsDNA*, **Nucleic Acids Research**, **37** (12), 3887 (2009).
4. X. Qiu, K. Andresen, J. S. Lamb, L. W. Kwok, and L. Pollack, *Abrupt transition from free, repulsive to condensed, attractive DNA phase, induced by multivalent polyamine cations*, **Physical Review Letters**, **101**, 228101 (2008).
5. X. Qiu, K. Andresen, L. W. Kwok, J. S. Lamb, H.-Y. Park, and L. Pollack, *Inter-DNA attraction mediated by divalent counterions*, **Physical Review Letters**, **99**, 038104 (2007). (Times Cited: **14**)
6. X. Qiu, L. W. Kwok, H.-Y. Park, J. S. Lamb, K. Andresen, and L. Pollack, *Measuring Inter-DNA Potentials in Solution*, **Physical Review Letters**, **96**, 138101 (2006). (Times Cited: **22**) (*selected as a science highlight by Synchrotron News at lightsources.org*)
7. H.-Y. Park, X. Qiu, E. Rhoades, J. Korlach, L. W. Kwok, W. R. Zipfel, W. W. Webb, and L. Pollack, *Achieving uniform mixing in a microfluidic device: hydrodynamic focusing prior to mixing*, **Analytical Chemistry**, **78** (13), 4465–4473 (2006). (Times Cited: **16**)
8. X. Qiu, Th. Proffen, J. F. Mitchell, and S. J. L. Billinge, *Orbital correlations in the pseudo-cubic O and rhombohedral R-phases of LaMnO₃*, **Physical Review Letters**, **94**, 177203 (2005). (Times Cited: **38**)
9. X. Qiu, J. W. Thompson, and S. J. L. Billinge, *PDFgetX2: A GUI driven program to obtain the pair distribution function from x-ray powder diffraction data*, **Journal of Applied Crystallography**, **37**, 678 (2004). (Times Cited: **86**)
10. P. J. Chupas, X. Qiu, J. C. Hanson, P. L. Lee, C. P. Grey, and S. J. L. Billinge, *Rapid-acquisition pair distribution function (RA-PDF) analysis*, **Journal of Applied Crystallography**, **36**, 1342–1347 (2003). (Times Cited: **64**)

- Other Peer-reviewed Journal Articles

11. K. Andresen, X. Qiu, J. S. Lamb, H.-Y. Park, L. W. Kwok, and L. Pollack, *Mono- and Tri-valent Ions around DNA: A Small-Angle Scattering Study of Competition and Interactions*, **Biophysical Journal**, **95**, 287–295 (2008).

12. J. S. Lamb, L. W. Kwok, X. Qiu, K. Andresen, H.-Y. Park, and L. Pollack, *Reconstructing three dimensional shape envelopes from time resolved small angle x-ray scattering data*, **Journal of Applied Crystallography**, **41**, 1046–1052 (2008).
 13. G. Campi, Th. Proffen, X. Qiu, E. S. Božin, S. J. L. Billinge, S. Agrestini, N.L. Saini, and A. Bianconi, *Local lattice dynamics in the $Mg_{0.5}Al_{0.5}B_2$ superconductor*, **Journal of Superconductivity and Novel Magnetism**, **20**, 505–510 (2007).
 14. J. S. Lamb, S. Cornaby, K. Andresen, L. Kwok, H.-Y. Park, X. Qiu, D. M. Smilges, D. H. Bilderback, and L. Pollack, *Focusing capillary optics for use in SAXS*, **Journal of Applied Crystallography**, **40**, 193–195 (2007).
 15. E. Božin, X. Qiu, R. J. Worhatch, G. Paglia, M. Schmidt, P. G. Radaelli, J. F. Mitchell, T. Chatterji, Th. Proffen, and S. J. L. Billinge, *Utilizing total scattering to study the Jahn-Teller transition in $La_{1-x}Ca_xMnO_3$* , **Z. Kristallography**, Suppl. **26**, 429–434 (2007).
 16. G. Campi, E. Cappelluti, Th. Proffen, X. Qiu, E. S. Božin, S. J. L. Billinge, S. Agrestini, N.L. Saini, and A. Bianconi, *Study of temperature dependent atomic correlations in MgB_2* , **The European Physical Journal B**, **52**, 15–21 (2006).
 17. E. S. Božin, X. Qiu, M. Schmidt, G. Paglia, J. F. Mitchell, P. G. Radaelli, Th. Proffen, and S. J. L. Billinge, *Local structural aspects of the orthorhombic to pseudo-cubic phase transformation in $La_{1-x}Ca_xMnO_3$* , **Physica B**, (385–386), 110–112 (2006).
 18. P. J. Chupas, S. Chaudhuri, J. C. Hanson, X. Qiu, P. L. Lee, S. D. Shastri, S. J. L. Billinge and C. P. Grey, *Simultaneous local and long range structure determination: application to in-situ studies of the high temperature phase transition of $\alpha-AlF_3$* , **Journal of the American Chemical Society**, **126**, 4756–4757 (2004).
 19. S. Derakhshan, A. Assoud, E. Dashjav, X. Qiu, S. J. L. Billinge, and H. Kleinke, *Distorted nets of Ti atoms comprising squares and rhombs in the new binary antimonide Ti_2Sb* , **Journal of the American Chemical Society**, **126**, 8295–8302 (2004).
 20. X. Qiu, S. J. L. Billinge, C. R. Kmetz, and J. F. Mitchell, *Evidence for nano-scale inhomogeneities in bilayer manganites in the Mn^{4+} rich region: $0.54 \leq x \leq 0.80$* , **Journal of Physics and Chemistry of Solids**, **65**, 1423–1429 (2004).
 21. X. Qiu, E. S. Bozin, P. Juhas, Th. Proffen, and S. J. L. Billinge, *Reciprocal-space instrumental effects on the real-space neutron atomic pair distribution function*, **Journal of Applied Crystallography**, **37**, 110–116 (2004). (Times Cited: **14**)
- Newsletter & Others
 22. X. Qiu and S. J. L. Billinge, **PDFgetX2: a user friendly program to obtain the atomic pair distribution from x-ray powder diffraction data**, Commission on Powder Diffraction Newsletter, International Union of Crystallography, No.30, 36 (2005).
 23. P. J. Chupas, C. P. Grey, J. C. Hanson, J.-Y. Kim, J. Rodriguez, X. Qiu, S. J. L. Billinge, and P. L. Lee, *In-Situ time resolved powder diffraction studies in heterogeneous catalysis; coupling the study of long range and local structural changes*, Commission on Powder Diffraction Newsletter, International Union of Crystallography No. 29, 24 (2003).

Journal Referee Services

Physical Review Letters
Physical Review E
Proteins: Structure, Function, and Bioinformatics
Journal of Physical Chemistry

Memberships

Biophysical Society
American Physical Society
American Crystallographic Association
Neutron Scattering Society of America

References

Dr. V. Adrian Parsegian, Ph.D.

Lab Chief, Lab of Physical & Structural Biology
National Institutes of Health
9 Memorial Drive, MSC 0924
Bethesda, MD 20892-0924, USA
Phone: (301) 496-6561
Fax: (301) 496-2172
Email: parsegia@mail.nih.gov

Dr. Donald C. Rau, Ph.D.

Section Chief, Lab of Physical & Structural Biology
National Institutes of Health
9 Memorial Drive, MSC 0924
Bethesda, MD 20892-0924, USA
Phone: (301) 402-4698
Fax: (301) 496-2172
Email: raud@mail.nih.gov

Prof. Lois Pollack, Ph.D.

School of Applied & Engineering Physics
254 Clark Hall, Cornell University
Ithaca, NY 14853, USA
Phone: (607) 255-8695
Fax: (607) 255-7658
Email: lp26@cornell.edu

Prof. Simon J. L. Billinge, Ph.D.

Applied Physics & Applied Mathematics Department
200 S.W. Mudd, Columbia University
Mail Code: 4701, New York, NY 10027, USA
Phone: (212) 854-2918
Fax: (212) 854-8257
Email: sb2896@columbia.edu