Rhiju Das

Curriculum Vitae

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Personal

Birthdate/birthplace: January 20, 1978, Houston, Texas.

Position

Assistant Professor, Biochemistry Department and, by courtesy, Physics Department, Stanford University.

Education

2000–2005	Ph.D., Physics, Stanford University
1999–2000	M.Res., Biocomplexity, Centre for Mathematics and Physics in the Life Sciences and Experimental Biology, University College London
1998–1999	M.Phil., Physics, Trinity College, Cambridge University
1995–1998	A.B. summa cum laude, Physics, Harvard University
1993–1995	Oklahoma School of Science and Mathematics

Research Experience

2005–present	Postdoctoral research with Dr. David Baker, Howard Hughes Medical Institute and University of Washington, on *de novo* prediction of protein and RNA folds from sequence.
2001–2005	Graduate research with Drs. D. Herschlag and S. Doniach, Stanford University. Thesis: "Visualizing Forces and Folds of Self-Assembling RNA Molecules".
1999–2000	Graduate research with Drs. Z. Yang and J. Mallet, University College London. Thesis: "Theoretical basis of likelihood methods in molecular phylogenetic inference".
1998–1999	Graduate research with Dr. R. Saunders, Cambridge University, at Ryle Telescope, Mullard Radio Astronomy Observatory. Thesis: "Analysis of Sunyaev-Zel'dovich decrements".
1995–1998	Research with Dr. S. Mishra, Harvard University; searches for new exotic particles and neutrino oscillations, decays, and magnetic moments at Neutrino Oscillation Magnetic Detector (CERN).
1995	Research with Dr. D. Seidel, Sandia National Laboratories; inertial beam confinement fusion.
1995	Research with Dr. K. Milton, University of Oklahoma; finite element lattice formulation of quantum mechanics.
1994	Research with Dr. A. Ram, M.I.T.; tokamak plasma electron streaming.

Honors and Awards

2007	Burroughs-Wellcome Career Award at the Scientific Interface (begins January 2008)
2006-present	Jane Coffin Childs Foundation Fellowship
2006	Damon Runyon Fellowship (declined due to J.C.C. acceptance)

2000–2005	Abbott Laboratories Stanford Graduate Fellow
2000–2003	National Science Foundation Graduate Fellow (Stanford)
1998–2000	British Marshall Scholar (Cambridge; University College London)
1996–1998	John Harvard Scholar; Goldwater Scholar; Phi Beta Kappa (Harvard)
1995	Scholar: National Merit, Robert C. Byrd Honors, Harvard National.
1995	Gold medal, International Physics Olympiad; second place overall; top American score
1994,1995	Top 20 placement in US Physics Olympiad and National Chemistry Olympiad; top 100 placement in US Mathematical Olympiad

Talks

2007-8	RosettaCon
2008	NIH/UCSF workshop, Modeling in Biomedical Research (invited)
2008	Berkeley, Computational Biology (invited)
2008	Harvard, Chemistry (invited)
2008	Stanford, Biochemistry (invited)
2008	CCP4 Study Weekend (invited)
2007	Case Western Reserve University Center for Proteomics (invited)
2007	American Crystallographic Association (selected)
2005	RNA Society (selected)
2005	Biophysical Society (selected)
2005	American Crystallographic Association (invited)
2003	Cornell High Energy Synchrotron Source Users Meeting (invited)
2003	Stanford Synchrotron Radiation Laboratory Users Meeting (invited)

Professional Memberships

2005–present	American Chemical Society

Teaching Experience

2006–2007	Supervisor, Univ. of Washington, for graduate students in protein structure prediction
2001–2005	Supervisor, Stanford, for graduate students in biophysics, physics, and biochemistry for RNA folding projects in Herschlag and Doniach labs.
2000–2001	Teaching fellow, Stanford, for Physics 47 (light & heat), and full year of Advanced Freshman Physics (mechanics, electricity & magnetism, relativity).
1998–1999	Supervisor, Trinity College, Cambridge University; tutoring second-year physics undergraduates.

Personal Interests

Classic cinema; food

Publication List

Jonikas, M.A., Radmer, R.J., Laederach, A., **Das, R.**, Pearlman, S., Herschlag, D., and Altman, R.B., "Coarse-grained modeling of large RNA molecules with knowledge-based potentials and structural filters", submitted to *RNA*.

Fenn, R.M.,* **Das, R.***, and Harbury, P.B. "Remeasuring the double helix", submitted to *Science*.

Fenn, R.M., **Das, R.**, Silverman, J.A., Fenn, T.D., Walker, P. and Harbury, P.B. "An X-ray molecular ruler for the measurement of distance distributions in solution", submitted to *PLoS One*.

25. **Das, R.**, and Baker, D. "Prospects for *de novo* phasing with protein *de novo* models". *Acta Cryst. D.,* in press.
24. Laederach, A., **Das, R.**, Vicens, Q., Pearlman, S., Brenowitz, M., Herschlag, D., and Altman, R.B. "Semi-automated and rapid quantification of nucleic acid footprinting and structure mapping experiments", *Nature Protocols*, in press. [cover figure]
23. **Das, R.** and Baker, D. (2008) "Macromolecular modeling with Rosetta", *Annual Review of Biochemistry* **77**, 363-382.
22. **Das, R.,** Kudaravalli, M., Jonikas, M., Laederach, A., Fong, R., Schwans, J.P., Baker, D., Piccirilli, J.A., Altman, R.B., and Herschlag, D. (2007) "Structural inference of native and partially folded RNA by high throughput contact mapping", *Proceedings of the National Academy of Sciences U.S.A* **105**, 4144-4149. (Track II†)
21. Qian, B.,* Raman, V.S.,* **Das, R.**,* Bradley, P., McCoy, A.J., Read, R.J., Baker, D. (2007) "High resolution structure prediction and the crystallographic phase problem", *Nature* **450**, 259-264. [highlighted in Dodson, E., "News and Views, computational biology: protein predictions", *Nature* **450**, 176-177.]
20. **Das, R.**,* Qian, B.,* Raman, V.S., Vernon, R., Thompson, J., Bradley, P., Khare, S., Tyka, M., Bhat, D., Chivian, D.C., Kim, D.E., Sheffler, W., Malmström, L., Wollacott, A., Wang, C., Andre, I., and Baker, D. (2007) "Structure prediction for CASP7 targets using extensive all-atom refinement with Rosetta@home", *Proteins* **69**, S118-128.
19. **Das, R.** and Baker, D. (2007) "Automated *de novo* prediction of native-like RNA tertiary structures", *Proceedings of the National Academy of Sciences U.S.A.* **104**, 14644–14669. (Track II†)
18. Blum, B., Jordan, M.I., Kim, D., **Das, R.**, Bradley, P., and Baker, D. (2007) "Feature selection methods for improving protein structure prediction with Rosetta", in *Advances in Neural Information Processing Systems (NIPS)* **21**, eds. Platt, J., Koller, D., Singer, Y., and McCallum, A., MIT Press.
17. Lipfert, J., **Das, R.**, Chu, V.B., Kudaravalli, M., Boyd, N., Herschlag, D. and Doniach, S. (2007) "Structural transitions and thermodynamics of a glycine-dependent riboswitch from Vibrio cholerae", *Journal of Molecular Biology* **365**, 1393–1406.
16. Russell, R., **Das, R.**, Suh, H., Travers, K., Laederach, A., Engelhardt, M., and Herschlag D. (2006) "The paradoxical behavior of a highly structured misfolded intermediate in RNA folding", *Journal of Molecular Biology* **363**, 531-544.
15. **Das, R.** and Doniach, S. (2006) "Structural studies of proteins and nucleic acids in solution using small angle x-ray scattering (SAXS)," in *Soft Matter: Scattering, Imaging and Manipulation*, eds. Pecora, R. and Borsali, R., Kluwer Press.
14. **Das, R.**, Travers, K.J., Bai, Y., and Herschlag, D. (2005) "Determining the Mg^{2+} stoichiometry for folding an RNA's metal ion core", *Journal of the American Chemical Society* **127**, 8272-8273.
13. Bai, Y., **Das, R**., Millett, I.S., Herschlag, D., and Doniach, S. (2005) "Probing counterion modulated repulsion and attraction between nucleic acid duplexes in

solution." *Proceedings of the National Academy of Sciences U.S.A.* **102**, 959-960. (Track II†)

12. **Das, R.**,* Laederach, A.,* Pearlman, S.M., Herschlag, D., and Altman, R.B. (2005) "SAFA: Semi-Automated Footprinting Analysis software for high-throughput quantification of nucleic acid footprinting experiments." *RNA* **11**, 344-354.

11. Andresen, K., **Das, R.**, Park, H.Y., Smith, H., Kwok, L.W., Lamb, J.S., Kirkland, E.J., Herschlag, D., Finkelstein, K.D., and Pollack, L. (2004) "Spatial distribution of competing ions around DNA in solution." *Physical Review Letters* **93**, 248013.

10. Takamoto, K.,* **Das, R.**,* He, Q., Doniach, S., Brenowitz, M., Herschlag, D., and Chance, M. (2004) "Principles of RNA compaction: insights from the equilibrium folding pathway of the P4-P6 RNA domain in monovalent cations." *Journal of Molecular Biology* **343**, 1195-206.

9. **Das, R.**, Kwok, L.W., Millet, I.S., Bai, Y., Mills, T.T., Jacob, J., Maskel, G.S., Seifert, S., Simon, M.G.J., Thiyagarajan, P., Doniach, S., Pollack, L., and Herschlag, D. (2003) "The fastest global events in RNA folding: electrostatic relaxation and tertiary collapse of the Tetrahymena ribozyme." *Journal of Molecular Biology* **332**, 311-319.

8. **Das, R.**, Mills, T.T., Kwok, L.W., Maskel, G.S., Millett, I.S., Doniach, S., Finkelstein, K.D., Herschlag, D. and Pollack, L. (2003) "The counterion distribution around DNA probed by solution x-ray scattering." *Physical Review Letters* **90**, 188103.

7. Bartley, L., Zhuang, X., **Das, R.**, Chu, S., and Herschlag, D. (2003) "Exploration of the transition state for tertiary structure formation between an RNA helix and a large structured RNA." *Journal of Molecular Biology* **328**, 1011-1026.

6. Saunders, R., Kneissl, R., Grainge, K., Grainger, W.F., Jones, M.E., Maggi, A., **Das, R.**, Edge, A.C., Lasenby, A.N., Pooley, G.G., Shigeru, J.M., Tsuruta, T., Yamashita, K., Tawara, Y., Furuzawa, A., Harada, A., and Hatsukade I. (2003) "A measurement of H_0 from Ryle Telescope, ASCA and ROSAT observations of Abell 773." *Monthly Notices of the Royal Astronomical Society* **341**, 937-940.

5. Grainger, W.F., **Das, R.**, Grainge, K., Jones, M. E., Kneissl, R., Pooley, G.G., and Saunders, R.D.E. (2002) "A maximum-likelihood approach to removing radio sources from observations of the Sunyaev-Zel'dovich effect, with application to Abell 611." *Monthly Notices of the Royal Astronomical Society* **337**, 1207-1214.

4. Cotter, G., Buttery, H.J., **Das, R.**, Jones, M.E., Grainge, K., Pooley, G.G, and Saunders, R. (2002) "Observations of the Sunyaev-Zel'dovich effect in the z = 0.78 cluster MS 1137.5+6625." *Monthly Notices of the Royal Astronomical Society* **334**, 323-326.

3. Cotter G., Buttery, H.J., Rawlings, S., Croft, S., Hill, G.J., Gay, P., **Das, R.**, Drory, N., Grainge, K.; Grainger, W.F., Jones, M.E., Pooley, G.G., and Saunders, R. (2002) "Detection of a cosmic microwave background decrement towards a cluster of mJy radio sources." *Monthly Notices of the Royal Astronomical Society* **331**, 1-6.

2. Alba, M.M., **Das, R.**, Orengo, C.A., and Kellam, P. (2001) "Genomewide function conservation and phylogeny in the Herpesviridae." *Genome Research* **11**, 43-54.

1. Milton, K. and **Das, R.** (1996) "Finite element lattice Hamiltonian matrix

elements. Anharmonic oscillators." *Letters in Mathematical Physics* **36**, 177-187.

*Contributed equally.

† All PNAS papers have been submitted via "Track II", i.e., full peer review.

Manuscripts in preparation

Frederiksen, J.K., Li, N-S., **Das, R.**, Herschlag, D., and Piccirilli, J.A. "Biochemical detection of site-bound metal ions within RNA". To be submitted to *RNA*.