

Curriculum Vitae

Srihari Keshavamurthy

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- **Date of birth** : 7th February, 1967
- **Place of birth**: Bangalore, India
- **Marital status** : Married, with two children
- **Education** :
 1. B. Sc. - Vivekananda college, University of Madras, India, 1987.
 2. M. S. - Villanova University, Pennsylvania, USA, 1989. Thesis titled *Hydrogen abstraction reaction of methylene from ethylene - a theoretical study*. Thesis advisor : **Prof. Jose R. Delavega**.
 3. Ph. D. - University of California at Berkeley, California, USA, 1994. Thesis titled *Semi-classical methods in chemical reaction dynamics*. Thesis advisor : **Prof. William H. Miller**.
- **Employment** :
 1. 1995 - 1996 : Postdoctoral research associate with **Prof. Gregory S. Ezra** at Cornell University, NY, USA.
 2. 1997 - 2003 : Assistant Professor in the Chemistry department of the Indian Institute of Technology, Kanpur, India.
 3. 2003 - present: Associate Professor in the Chemistry department of the Indian Institute of Technology, Kanpur, India. (On sabbatical June 2004 to June 2005).
 4. Dec 2000 - July 2001 : Visiting Assistant Professor in the Department of Physics at Washington State University, Pullman, USA. Collaborated with **Prof. Steven Tomsovic**. Taught an undergraduate course in Physics on electricity and magnetism.
 5. July 2004: Visiting Professor, Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore, India.
 6. Aug 2004 - Sep 2004 : Guest Scientist in the group of **Prof. Dr. Klaus Richter** at the Institut für Theoretische Physik, Universität Regensburg, Germany.
 7. Oct 2004 - March 2005 : Guest Scientist in the finite systems group headed by **Prof. Dr. J. M. Rost** at the Max-Planck-Institut für Physik Komplexer Systeme, Dresden, Germany.
 8. April 2005 - June 2005, June 2006 : Guest Scientist in the group of **Prof. Stephen Wiggins**, School of Mathematics, University of Bristol, UK.

• Awards and honors :

1. $\Sigma\Pi\Sigma$ Physics honor society, 1989 (Villanova). Given in recognition of high scholarship in Physics.
2. $\Sigma\Xi$ Scientific honor society, 1995 (Berkeley).
3. **Gopal Das Bhandari Memorial Distinguished Teacher Award**, IIT Kanpur, 2008.

• Publications :

1. A. Sethi and Srihari Keshavamurthy, *Local phase space control and interplay of classical and quantum effects in dissociation of a driven Morse oscillator*, Phys. Rev. A **79**, 033416 (2009).
2. P. Manikandan, A. Semparithi, and Srihari Keshavamurthy, *Decoding the dynamical information embedded in highly excited vibrational eigenstates: state space and phase space viewpoints*, J. Phys. Chem. A **113**, 1717 (2009).
3. A. Sethi and Srihari Keshavamurthy, *Bichromatically driven double well: parametric perspective of the strong-field control landscape reveals the influence of chaotic states*, J. Chem. Phys. **128**, 164117 (2008). Highlighted in the Virtual Journal of Ultrafast Science **7**, 2008.
4. Srihari Keshavamurthy, *Dynamical tunneling in molecules: quantum routes to energy flow*, Int. Rev. Phys. Chem. **26**, 521 (2007).
5. P. Manikandan and Srihari Keshavamurthy, *Intramolecular vibrational energy redistribution of a high frequency mode in the presence of an internal rotor: Classical thick-layer diffusion and quantum localization*, J. Chem. Phys. **127**, 064303 (2007).
6. A. Semparithi and Srihari Keshavamurthy, *Intramolecular vibrational energy redistribution as diffusion in state space: classical-quantum correspondence*, J. Chem. Phys. (communication) **125**, 141101 (2006). One of the top 20 research articles with the most full-text downloads during October 2006.
7. Srihari Keshavamurthy, *Resonance-assisted tunneling in three degrees of freedom without discrete symmetry*, Phys. Rev. E (rapid communication) **72**, 045203(R) (2005).
8. Srihari Keshavamurthy, *On dynamical tunneling and classical resonances*, J. Chem. Phys. **122**, 114109 (2005).
9. A. Semparithi and Srihari Keshavamurthy, *Parametric perspective on highly excited states: case study of CHBrCIF and C₂H₂*, Chem. Phys. Lett. **395**, 327 (2004).
10. A. Semparithi and Srihari Keshavamurthy, *Intramolecular vibrational energy redistribution in DCO (\tilde{X}^2A'): Classical-Quantum correspondence, dynamical assignments of highly excited states, and phase space transport*, Phys. Chem. Chem. Phys. **5**, 5051-5062 (2003).
11. N. R. Cerruti, Srihari Keshavamurthy, and S. Tomsovic, *Exploring classical phase space structures of nearly integrable quantum systems via parametric variations*, Phys. Rev. E **68**, 056205:1-13 (2003).
12. Srihari Keshavamurthy, *Dynamical tunneling in molecules: role of the classical resonances and chaos*, J. Chem. Phys. **119**,161 (2003). Highlighted in the Virtual Journal of Biological Physics Research **6**(1), 2003.

13. A. Semparithi, V. Charulatha, and Srihari Keshavamurthy, *Understanding highly excited states via parametric variations*, J. Chem. Phys. **118**, 1146 (2003).
14. Srihari Keshavamurthy, N. R. Cerruti, and S. Tomsovic, *Analyzing intramolecular vibrational energy redistribution via the overlap intensity-level velocity correlator*, J. Chem. Phys. **117**, 4168 (2002).
15. Srihari Keshavamurthy, *Fingerprints of a classical resonance on the eigenlevel dynamics of the corresponding quantum Hamiltonian*, J. Phys. Chem. A **105**, 2668 (2001).
16. Raibatak Das and Srihari Keshavamurthy, *Real time semiclassical initial value method and threshold tunneling probabilities*, Chem. Phys. Lett. **326**, 544 (2000).
17. Srihari Keshavamurthy, *Classical resonances and their quantum manifestations*, Ind. J. Chem. **39 A** (Special issue on theoretical chemistry in India), 307-315 (2000).
18. Srihari Keshavamurthy, *Scaling of the average survival probability for low dimensional systems*, Chem. Phys. Lett. **300**, 281 (1999).
19. Srihari Keshavamurthy and Gregory S. Ezra, *Analysis of quantum eigenstates in a 3-mode system*, NATO-ASI Hamiltonian systems with three or more degrees of freedom, Ed., C. Simo, pp 435-439, Kluwer 1999.
20. Srihari Keshavamurthy and Gregory S. Ezra, *Eigenstate assignments and the quantum-classical correspondence for highly-excited vibrational states of the Baggot H_2O Hamiltonian*, J. Chem. Phys. **107**, 156-179 (1997).
21. Srihari Keshavamurthy and Gregory S. Ezra, *Assigning vibrational spectra of highly excited molecules: classical and quantum vibrational dynamics of the H_2O molecule*, Chem. Phys. Lett. **259**, 81-90 (1996).
22. Srihari Keshavamurthy and William H. Miller, *Semiclassical correction for quantum-mechanical scattering*, Chem. Phys. Lett. **218**, 189-194 (1994).
23. Srihari Keshavamurthy and William H. Miller, *A semiclassical model to incorporate multidimensional tunneling in classical trajectory simulations using locally conserved actions*, Chem. Phys. Lett. **205**, 96-101 (1993).

- **Preprints :**

- Srihari Keshavamurthy, *Exploiting the analogy between mean-field description of trapped Bose-Einstein condensates and molecular vibrational Hamiltonians: self-trapped states and dynamical tunneling*, (under preparation, 2009).
- P. Manikandan and Srihari Keshavamurthy, *Insights into the intermediate time power law scaling of the survival probability: connecting the state space and phase space perspectives on intramolecular vibrational energy redistribution*, (under preparation, 2009).

- **Special lectures :**

- Invited to give a set of five lectures on *Chemical reaction dynamics: from transition state to RRKM and beyond* at the Indian Association for Cultivation of Science, Kolkata, December 2008.
- Invited to give a set of ten lectures on *Classical-Quantum correspondences and semiclassical methods in Chemistry* at the Inorganic and Physical Chemistry division, Indian Institute of Science, January 2008.

• Talks :

1. *Local phase space barriers and quantum control: interplay of classical and quantum mechanisms*, at the Theoretical Chemistry Conference, January 2009, Bangalore, India.
2. *Intramolecular vibrational energy flow, quantum eigenstates and the dynamical Arnol'd web*, at BIFUR08, December 2008, Madrid, Spain.
3. *Quantum control by creating local phase space barriers?*, at the National conference on quantum chemistry, soft computing and optimization Prof. S. P. Bhattacharya festschrift, IACS (Kolkata), April 2008.
4. *Dynamical assignment of quantum states: recent advances and challenges*, at the Fifth discussion meet on spectroscopy and dynamics of molecules and clusters, Mamallapuram, February 2008.
5. *Dynamical tunneling: Mechanism and Control*, at the CRSI-RSC joint symposium, Bangalore, January 2008.
6. *On the nature of vibrational energy flow in the molecular state space*, at the Trombay Symposium on Radiation and Photochemistry, Pune, January 2008.
7. *Bichromatically driven double well: parametric perspective of the control landscape*, at the Workshop on coherent control of optical phenomena, IITK, India, July 2007.
8. *Postmodern rate theories*, at CHEMFEST (Chemistry department annual in-house symposium), IITK, April 2007.
9. *Molecular Vibrations*, at the First REACH symposium, Parwanoo, Himachal Pradesh, March 2007.
10. *Does vibrational energy flow fill the molecular state space?*, at the Theoretical Chemistry Conference, December 2006, Tiruchirapalli, India.
11. *Molecular energy flow: importance of the resonance network*, Poster at Gordon Research Conference on vibrational dynamics, University of New England, Biddeford, Maine, USA, July 2006.
12. *Energy flow in molecules: lessons from classical mechanics*, at the meeting on Spectroscopy and Dynamics of Molecules and Clusters, April 2006, Goa, India.
13. *Dynamical tunneling: role of the classical resonances*, at the School of Mathematics, Bristol University, April 2005.
14. *Dynamical tunneling in molecules: spectral consequences of classical phase space structures* at the Max-Planck-Institut für Selbstorganisation und Strömungsforschung, Goettingen, December 2004.
15. *Resonance and Chaos assisted tunneling in molecules: 'nonclassical' routes to energy flow* at the Windberg Workshop, Germany, September 2004.
16. Poster at the CECAM workshop on Energy localization titled *Intramolecular vibrational dynamics in CDBrCIF and CF₃CHF₂: localized states and nonstatistical dynamics*, Lyon, France, September 2004.
17. *Energy flow in highly excited molecules: is statisticality only 'skin-deep'?* at the Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore, India, July 2004.
18. *Highly excited eigenstates and dynamics in CDBrCIF and CF₃CHF₂* at the Discussion meeting on High resolution molecular spectroscopy, Mumbai, India, April 2004.

19. *Dynamical tunneling: influence of classical phase space?* for the theory group in University of California at Berkeley, USA, Aug 2003.
20. *Classical-quantum correspondence and IVR: beyond two degrees of freedom via parametric techniques* at the Telluride Summer Research Workshop on *Condensed and gas phase vibrational dynamics*, Telluride, Colorado, USA, Aug. 2003.
21. *Dynamics of highly excited states - a parametric perspective*, Theoretical Chemistry Discussion meeting, Kolkata, India, Jan. 2003.
22. Invited talk for the 60th birthday celebrations of Prof. W. H. Miller titled *Scarring of highly excited states due to resonances - a level dynamics perspective*, Berkeley, California, USA, March 2001.
23. *Semiclassical transition state theory and beyond*, Theoretical Chemistry Discussion meeting, Hyderabad, India, Dec. 1998.

● **Additional information :**

- Instructor for a number of undergraduate and postgraduate physical chemistry/ chemical physics courses at IIT Kanpur including Quantum Mechanics (elementary and advanced), Statistical Mechanics, and Molecular spectroscopy.

Commendation letter from the Director, IIT Kanpur for exemplary teaching (2006, 2007).

- Seven Masters students guided for their thesis work and Ph.D. students:
 1. Dr. Aravindan Semparithi - PhD (2006); Postdoc (Montpellier). Thesis title, *Classical-Quantum correspondence Studies of Energy Flow in Polyatomic Molecules*. Currently at IIIT Hyderabad, India.
 2. Mr. Paranjyoti Manikandan - PhD in progress 2003 Dec -
 3. Ms. Astha Sethi - PhD in progress 2004 July -
- Research interests span a wide range with overlaps in physics and mathematical physics. Part of the proposed interdisciplinary group on Quantum computing at IIT Kanpur.
- Interested in Indian and Western classical music (trained for six years in South Indian classical flute).
- Avid interests in sports and play Badminton and Cricket.