

Manan VYAS

PERSONAL DATA

ADDRESS: Instituto de Ciencias Físicas,
Universidad Nacional Autónoma de México (UNAM),
Av Universidad s/n,
Col Chamilpa, MEX-62210 Cuernavaca, Mor., México

E-MAIL: manan@fis.unam.mx, mananvyas2@gmail.com

MY CITATIONS PAGE: <http://scholar.google.com.mx/citations?user=34Ez-VAAAAAJ>

CITIZENSHIP & DATE OF BIRTH: India | October 16, 1982

GENDER: Female

ACADEMIC POSITIONS

<i>Current</i> MAR 2014	Post-Doctoral Research Scientist (Supervisors: Prof. Luis Benet FERNÁNDEZ, Prof. François LEYVRAZ, Prof. Thomas H. SELIGMAN) INSTITUTO DE CIENCIAS FÍSICAS, UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO, Cuernavaca, México We aim to study decoherence and transport phenomenon in interacting many-body finite quantum systems using the concepts of random matrix theory. We have also started correlation analysis of nonlinear dynamical systems.
OCT 2013-FEB 2014	Post-Doctoral Research Scientist (Supervisor: Prof. Lea F. SANTOS) YESHIVA UNIVERSITY, New York, USA We have studied aspects of thermalization and relaxation in finite quantum many-body systems after a quench. We focus on 1D spin- $\frac{1}{2}$ systems in both the integrable and chaotic domains.
MAY 2012-SEP 2013 OCT 2011-APR 2012	Post-Doctoral Research Fellow (Supervisor: Prof. Steven L. TOMSOVIC) Research Stay WASHINGTON STATE UNIVERSITY, Pullman, USA We aim to find a generic way to control and manipulate quantum dynamics of systems whose classical counterparts are chaotic using tiny external perturbations. We have numerically constructed quantum dynamics of kicked rotor on a torus from its classical dynamics using semi-classical techniques, by extending the summation over periodic orbits to heteroclinic orbits, and testing its validity. We aim to use these numerical simulations, along with analytic methods, in our work on controlling quantum chaos.
MAY 2011-SEP 2011	Research Stay (Supervisor: Prof. V.K.B. KOTA) PHYSICAL RESEARCH LABORATORY, Ahmedabad, India We have studied the thermalization process in isolated fermionic systems, described by embedded Gaussian random matrix ensembles.
JUNE 2007-MAY 2011	Senior Research Fellow (Supervisor: Prof. V.K.B. KOTA) PHYSICAL RESEARCH LABORATORY, Ahmedabad, India As a part of my thesis work, embedded Gaussian random matrix ensembles [EGE] for complex systems are analyzed and introduced is the novel idea of group symmetries in EGE. Results presented in my thesis together with earlier investigations establish that embedded Gaussian ensembles can be used gainfully to study a variety of problems in many-body quantum physics and this includes quantum information science and the thermodynamics of isolated finite interacting quantum systems. We have used many diversified methods like numerical Monte-Carlo methods, binary correlation approximation, trace propagation, group theory and perturbation theory to derive generic properties of these ensembles. We have extensively used the multi-processor machines [IBM POWER5 and HPC facility at PRL] for my thesis work.

- JULY 2005-JUNE 2007 | **Junior Research Fellow** (Supervisor: Prof. P.K. PANIGRAHI)
 PHYSICAL RESEARCH LABORATORY, Ahmedabad, India
 Worked on topics related to quantum information, quantum optics and ultracold atoms. More specifically, we have analyzed entanglement induced sub-Planck structures in phase space and studied loss of superfluidity in the Bose Einstein condensate in an optical lattice with cubic and quintic nonlinearity.
- MAY 2004-JULY 2004 | **Summer Intern** (Supervisor: Prof. Hemant DAVE)
 PHYSICAL RESEARCH LABORATORY, Ahmedabad, India
 Worked on Submillimeter Wave Spectroscopy.

EDUCATION

- MAY 2012 | **Doctor of Philosophy in Physics**
 PHYSICAL RESEARCH LABORATORY, Ahmedabad, India
 Thesis: "Some Studies on Two-body Random Matrix Ensembles"
 Advisor: Prof. V.K.B. KOTA
 Degree awarded by : THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, Vadodara, India
- JUNE 2005 | **Master of Science in Physics**
 DEVI AHILYA VISHWAVIDYALAYA, Indore, India
First Class First | GPA: 9.93/10.0
- JUNE 2003 | **Bachelor of Science**
 DEVI AHILYA VISHWAVIDYALAYA, Indore, India
First Class First | *Physics, Mathematics, Computer Science* | 86.61 %
- JUNE 2000 | **All India Senior School Certificate Examination**
 SOUTH INDIAN CULTURAL ASSOCIATION, Indore, India
CBSE Board | *Physics, Mathematics, Chemistry* | 81.0 %
- JUNE 1998 | **All India Secondary School Examination**
 SOUTH INDIAN CULTURAL ASSOCIATION, Indore, India
CBSE Board | 74.0 %

SCHOLARSHIPS/CERTIFICATES/AWARDS/HONORS

- 2014 | DGAPA Post-Doctoral Fellowship awarded by UNAM, Mexico
 2014 | Included in the 2015 *69th Edition* of **Who's Who in America**
 2007 | SRF awarded by **Physical Research Laboratory**, Ahmedabad, India
 2007 | Qualified TOEFL-ibt | 109/120
 2006 | Qualified JEST | AIR 60 | Percentile ~98.0
 2005 | JRF awarded by **Physical Research Laboratory**, Ahmedabad, India
 2005 | Stood first in University | Master of Science
 2003 | Secured highest marks in MATHEMATICS | Bachelor of Science
 2003 | Stood first in MATHEMATICS, COMPUTER AND SCIENCE streams | Bachelor of Science
 2000 | Stood first in School | All India Senior School Certificate Examination
 2000 | Secured 97 % marks in MATHEMATICS | All India Senior School Certificate Examination
 1998 | Secured highest marks in ENGLISH | All India Secondary School Examination

COMPUTATIONAL SKILLS

Operating Systems : MAC OS X, WINDOWS, LINUX & UNIX
Workstation Familiarity : Mac OS X, IBM & HPC facility (20 node)
Programming Languages : FORTRAN (77, 90 and 95) & C++
Parallel Programming : OpenMP & MPI
Scientific Packages : MATHEMATICA, MATLAB, XMGRACE, GIMP, \LaTeX , BEAMER, GNPLOT, EMACS, MICROSOFT WORD & POWERPOINT

RESEARCH INTERESTS

Complex Systems, Random Matrix Theory, Quantum Chaos, Disordered Systems, Economics, Quantum Information Science, Chemical Physics & Extreme Value Statistics

EDITORIAL ACTIVITY

(2013 -) Reviewer/Referee for MATHEMATICAL REVIEWS (American Mathematical Society)

CURRENT STUDENTS IN COLLABORATION WITH PROF. THOMAS H. SELIGMAN

- Carlos Andres Gonzalez Gutierrez, *Doctoral student*, Posgrado en Ciencias Físicas, UNAM.
- Jorge Antonio Morales Valdés, *Master student*, Posgrado en Ciencias Físicas, UNAM.

TEACHING EXPERIENCE

- Course on “*Introduction to RMT*”, CENTRO INTERNACIONAL DE CIENCIAS A. C., UNAM, Cuernavaca, México | July 21-25, 2014
- Lecture on “*General Features of the Relaxation Dynamics of Interacting Quantum Systems*”, Instituto de Ciencias Físicas, UNAM (Campus UAEM), Cuernavaca, México | June 20, 2014
- Lecture on “*Embedded Random Matrix Ensembles for Quantum Many-body Chaos*”, Instituto de Ciencias Físicas, UNAM (Campus UAEM), Cuernavaca, México | April 4, 2014

PUBLICATIONS IN PEER-REVIEWED JOURNALS ¹

13. **E. J. Torres-Herrera, Manan Vyas and Lea F. Santos**
General features of the relaxation dynamics of interacting quantum systems
New J. Phys. **16**, 063010/1-32 (2014) | Times Cited: 1
[doi:10.1088/1367-2630/16/6/063010](https://doi.org/10.1088/1367-2630/16/6/063010)
12. **H.N. Deota, N.D. Chavda, V.K.B. Kota, V. Potbhare and Manan Vyas**
Random matrix ensemble with random two-body interactions in presence of a mean-field for spin-one boson systems
Phys. Rev. E **88**, 022130/1-12 (2013) | Times Cited: 5
[doi:10.1103/PhysRevE.88.022130](https://doi.org/10.1103/PhysRevE.88.022130)
11. **Manan Vyas and V.K.B. Kota**
Embedded Gaussian unitary ensembles with $U(\Omega) \otimes SU(r)$ embedding generated by random two-body interactions with $SU(r)$ symmetry
J. Math. Phys. **53**, 123301/1-18 (2012) | MR3058200 | Times Cited: 3
[doi:10.1063/1.4768711](https://doi.org/10.1063/1.4768711)
10. **Manan Vyas, V.K.B. Kota, N.D. Chavda and V. Potbhare**
One- plus two-body random matrix ensembles for boson systems with F-spin: Analysis using spectral variances

¹Google Citations (November 28, 2014)

- J. Phys. A **45**, 265203/1-33 (2012) | MR2942589 | Times Cited: 12
[doi:10.1088/1751-8113/45/26/265203](https://doi.org/10.1088/1751-8113/45/26/265203)
9. **V.K.B. Kota, A. Relaño, J. Retamosa and Manan Vyas**
Thermalization in the two-body random ensemble
 J. Stat. Mech. P10028/1-22 (2011) | Times Cited: 8
[doi:10.1088/1742-5468/2011/10/P10028](https://doi.org/10.1088/1742-5468/2011/10/P10028)
 8. **Manan Vyas, V.K.B. Kota and P.C. Srivastava**
One plus two-body random matrix ensembles with parity: Results for density of states and parity ratios
 Phys. Rev. C **83**, 064301/1-18 (2011) | Times Cited: 2
[doi:10.1103/PhysRevC.83.064301](https://doi.org/10.1103/PhysRevC.83.064301)
 7. **Manan Vyas and V.K.B. Kota**
Spectral properties of embedded Gaussian unitary ensemble of random matrices with Wigner's $SU(4)$ symmetry
 Annals of Physics (N.Y.) **325**, 2451-2485 (2010) | MR2718555 | Times Cited: 8
[doi:10.1016/j.aop.2010.05.005](https://doi.org/10.1016/j.aop.2010.05.005)
 6. **Manan Vyas and V.K.B. Kota**
Random matrix structure of nuclear shell model Hamiltonian matrices and comparison with an atomic example
 Euro. Phys. J. A **45**, 111-120 (2010) | Times Cited: 3
[doi:10.1140/epja/i2010-10991-1](https://doi.org/10.1140/epja/i2010-10991-1)
 5. **Manan Vyas, V.K.B. Kota and N.D. Chavda**
Transitions in eigenvalue and wavefunction structure in (1+2)-body random matrix ensembles with spin
 Phys. Rev. E **81**, 036212/1-17 (2010) | MR2629616 | Times Cited: 15
[doi:10.1103/PhysRevE.81.036212](https://doi.org/10.1103/PhysRevE.81.036212)
 4. **Manan Vyas, V.K.B. Kota and N.D. Chavda**
One- plus two-body random matrix ensembles with spin: Results for pairing correlations
 Phys. Lett. A **373**, 1434-1443 (2009) | Times Cited: 13
[doi:10.1016/j.physleta.2009.02.045](https://doi.org/10.1016/j.physleta.2009.02.045)
 3. **Priyam Das, Manan Vyas and P.K. Panigrahi**
Loss of superfluidity in the Bose Einstein condensate in an optical lattice with cubic and quintic nonlinearity
 J. Phys. B: At. Mol. Opt. Phys. **42**, 245304/1-5 (2009) | Times Cited: 6
[doi:10.1088/0953-4075/42/24/245304](https://doi.org/10.1088/0953-4075/42/24/245304)
 2. **V.K.B. Kota, Manan Vyas and K.B.K. Mayya**
Spectral distribution analysis of random interactions with J -symmetry and its extensions
 Int. J. Mod. Phys. E **17**, 318-333 (2008) | Times Cited: 8
[doi:10.1142/S0218301308011951](https://doi.org/10.1142/S0218301308011951)
 1. **J.R. Bhatt, P.K. Panigrahi and Manan Vyas**
Entanglement-induced sub-Planck phase-space structures
 Phys. Rev. A **78**, 034101/1-4 (2008); highlighted in the Virtual Journal of Quantum Optics
 | Times Cited: 12
[doi:10.1103/PhysRevA.78.034101](https://doi.org/10.1103/PhysRevA.78.034101)

PAPERS ON ARXIV/UNDER PREPARATION/PHYSICS PEDAGOGY

5. **Harinder Pal, Manan Vyas and Steven Tomsovic**
Implementing generalized Gaussian wave packet dynamics in preparation

4. **V.K.B. Kota and Manan Vyas**
Random matrix theory for transition strength densities in finite quantum systems: Results from embedded unitary ensembles
in preparation
3. **H.N. Deota, N.D. Chavda, V.K.B. Kota, V. Potbhare and Manan Vyas**
Random matrix ensemble with random two-body interactions in presence of a mean-field for spin one boson systems
[arXiv:1207.7225](https://arxiv.org/abs/1207.7225)
2. **Manan Vyas and V.K.B. Kota**
Spectral distribution method for neutrinoless double-beta decay nuclear transition matrix elements: Binary correlation results
[arXiv:1106.0395](https://arxiv.org/abs/1106.0395)
1. **Manan Vyas and P.K. Panigrahi**
Generic solutions of commonly encountered equations
Phys. Edu. **23**, 299-302 (2007)
Available online at: <http://www.physedu.in>

REFEREED PUBLICATIONS IN CONFERENCE PROCEEDINGS

5. **V.K.B. Kota and Manan Vyas**
Embedded Random Matrix Ensembles with Lie Symmetries: Results from $U(\Omega)$ Wigner-Racah algebra
Proceedings of the symposium on Symmetries in Science XVI, eds: D. Schuch, M. Ramek Bregenz, Austria | July 21-26, 2013
Journal of Physics: Conference Series **538**, 012011 (2014)
[doi:10.1088/1742-6596/538/1/012011](https://doi.org/10.1088/1742-6596/538/1/012011)
4. **V.K.B. Kota and Manan Vyas**
Embedded random matrix ensemble results for neutrinoless double-beta decay
Proceedings of the DAE symposium on Nuclear Physics, **56**, 206-207 (2011)
Andhra University, Visakhapatnam, India | December 26-30, 2011
Available online at: <http://www.sympnp.org/proceedings>
3. **Manan Vyas, V.K.B. Kota and P.C. Srivastava**
Random matrix ensembles with parity preserving random interactions
Proceedings of the DAE Symposium on Nuclear Physics, **55**, 28-29 (2010)
BITS Pilani, India | December 20-24, 2010
Available online at: <http://www.sympnp.org/proceedings>
2. **Manan Vyas**
Random interaction matrix ensembles in mesoscopic physics
Proceedings of the National Seminar on “New Frontiers in Nuclear, Hadron and Mesoscopic Physics”, eds: V.K.B. Kota, A. Pratap (Allied Publishers, New Delhi, 2010), p. 23-37;
[arXiv:1004.2761](https://arxiv.org/abs/1004.2761) | Times Cited: 2
1. **Manan Vyas and V.K.B. Kota**
Random matrix ensembles with random interactions: Results for $EGUE(2)$ - $SU(4)$
Pramana-J. Phys. **73**, 521-531 (2009); [arXiv:0904.0551](https://arxiv.org/abs/0904.0551) | Times Cited: 2
[doi:10.1007/s12043-009-0104-x](https://doi.org/10.1007/s12043-009-0104-x)

POSTERS PRESENTED IN WORKSHOPS/CONFERENCES

3. *Embedded Random Matrix Ensembles for Quantum Many-body Chaos*
International Workshop on “Wave Chaos from the Micro- to the Macroscale”, MAX-PLANCK-INSTITUT FÜR PHYSIK KOMPLEXER SYSTEME, Dresden, Germany | October 22-26, 2012

2. *Dynamical Phase Transition in Bose-Einstein Condensate in an Optical Lattice*
 “Topical Conference on Atomic and Molecular Physics”, SARDAR PATEL UNIVERSITY, Vallabh Vidyanagar, Gujarat, India | January 3-5, 2008
1. *Phases of Bose Einstein Condensates in Optical Lattice*
 “National Conference on Nonlinear Systems and Dynamics”, PHYSICAL RESEARCH LABORATORY, Ahmedabad, India | January 3-5, 2008

CONFERENCE/WORKSHOP TALKS

7. *General Features of the Relaxation Dynamics of Isolated Interacting Quantum Systems*
Invited Lecture
A Celebration with Chaos: from RMT to quantum information, Symposium in honor of Thomas H. Seligman on the occasion of his 70th birthday
 INSTITUTO DE CIENCIAS FÍSICAS, UNAM, Cuernavaca, México | July 28-August 1, 2014
6. *Embedded Random Matrix Ensembles with Spin Degree of Freedom*
Workshop on “Random (Matrix Theory) Event”
 CENTRO INTERNACIONAL DE CIENCIAS A. C., UNAM, Cuernavaca, México | July 21-25, 2014
5. *Embedded Random Matrix Ensembles with Symmetries*
Colloquium
 PHYSICAL RESEARCH LABORATORY, Ahmedabad, India | September 27, 2011
4. *Monte-Carlo Results for Embedded Random Matrix Ensembles with Symmetries*
National Conference on Computational Techniques in Physics
 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, Vadodara, India | February 1-2, 2011
3. *Random Interaction Matrix Ensembles in Mesoscopic Physics*
National Seminar on “New Frontiers in Nuclear, Hadron and Mesoscopic Physics”
 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, Vadodara, India | December 3, 2009
2. *Two-body Random Matrix Ensembles with Spin and $SU(4)$ Symmetry*
Theoretical Physics Seminar
 PHYSICAL RESEARCH LABORATORY, Ahmedabad, India | April 16, 2009
1. *Random Matrix Ensembles*
Technical Seminar in Hindi
 PHYSICAL RESEARCH LABORATORY, Ahmedabad, India | March 19, 2009

CONFERENCES/WORKSHOPS/COURSES ATTENDED

12. A Celebration with Chaos: from RMT to quantum information, Symposium in honor of Thomas H. Seligman on the occasion of his 70th birthday
 CENTRO INTERNACIONAL DE CIENCIAS A. C., UNAM, Cuernavaca, México | July 28-August 1, 2014
11. Workshop on “Random (Matrix Theory) Event”
 CENTRO INTERNACIONAL DE CIENCIAS A. C., UNAM, Cuernavaca, México | July 21-25, 2014
10. International Workshop on “Wave Chaos from the Micro- to the Macroscale”
 MAX-PLANCK-INSTITUT FÜR PHYSIK KOMPLEXER SYSTEME, Dresden, Germany | October 22-26, 2012
9. National Conference on “Computational Techniques in Physics”
 THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, Vadodara, India | February 1-2, 2011
8. Workshop on “Connections for Women: An Introduction to Random Matrices”
 MATHEMATICAL SCIENCES RESEARCH INSTITUTE, Berkeley, USA | September 20-21, 2010
7. Workshop on “Random Matrix Theory and Applications. I.”
 MATHEMATICAL SCIENCES RESEARCH INSTITUTE, Berkeley, USA | September 13-17, 2010

6. Training programme on “Parallel Programming Concepts and MPI”
Conducted by Centre for Development of Advanced Computing (CDAC), Pune at PHYSICAL RESEARCH LABORATORY, Ahmedabad, India | January 20-23, 2010
5. National Seminar on “New Frontiers in Nuclear, Hadron and Mesoscopic Physics”
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, Vadodara, India | December 3, 2009
4. Refresher Workshop on “Parallel Programming”
Conducted by Centre for Development of Advanced Computing (CDAC), Pune at PHYSICAL RESEARCH LABORATORY, Ahmedabad, India | June 24-26, 2008
3. Workshop on “Basic Level Parallel Computing”
Conducted by Centre for Development of Advanced Computing (CDAC), Pune at PHYSICAL RESEARCH LABORATORY, Ahmedabad, India | February 19-22, 2008
2. “Topical Conference on Atomic and Molecular Physics”
SARDAR PATEL UNIVERSITY, Vallabh Vidyanagar, Gujarat, India | January 3-5, 2008
1. “National Conference on Nonlinear Systems and Dynamics”
PHYSICAL RESEARCH LABORATORY, Ahmedabad, India | January 3-5, 2008