

# Vivek M. Vyas

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## RESEARCH INTEREST

My main area of interest is Quantum Field Theory. Currently, I am working on problems related to field theory applications to condensed matter systems, like graphene and ultracold atoms. I am also interested in Integrable Models and Solitons.

## EDUCATION

*Doctor of Philosophy*, Theoretical Physics  
Indian Institute of Science Education & Research - Kolkata, submitted thesis in March 2012

*Master of Science*, Physics  
M. S. University of Baroda, Vadodara, India, completed April 2006  
with First Class (63 %)  
Specialisation: Nuclear & Particle Physics

*Bachelor of Science*, Physics  
Gujarat University, Ahmedabad, India, completed in April 2004  
with First Class (68 %)

## EXPERIENCE

*Senior Research Fellow* September 2008 onwards  
Indian Institute of Science Education & Research - Kolkata,

*Junior Research Fellow* May 2008 to September 2008  
Indian Institute of Science Education & Research - Kolkata,

*Junior Research Fellow* July 2006 to April 2008  
Physical Research Laboratory, Ahmedabad

- Worked on Pulse propagation in nonlinear optical fibers for Course work project
- Successfully passed mandatory courses in Mathematical Methods, Advanced Quantum Mechanics, Statistical Methods, Atmospheric Science, Computational Methods and Communication Skills. Also attended courses on Quantum Field Theory, Finite Temperature Field theory, Group Theory and Gravity

*Summer Student* Summers 2005 & 2006  
Physical Research Laboratory, Ahmedabad

- Worked on Soliton solutions of nonlinear partial differential equations of Schrödinger type

## PUBLICATIONS *Published Papers:*

1. Vivek M Vyas, T Soloman Raju, C Nagaraja Kumar and Prasanta K Panigrahi, "Soliton solutions of driven nonlinear Schrödinger equation", *Journal of Physics A: Mathematical & General*, 39, 9151 (2006).
2. Vivek M. Vyas, Pankaj Patel, Prasanta K. Panigrahi, Choragudi Nagaraja Kumar, and W. Greiner, "Chirped chiral solitons in the nonlinear Schrödinger

equation with self-steepening and self-frequency shift”, Physical Review A (Rapid Communication), 78, R021803 (2008).

3. Vivek M. Vyas, T. Soloman Raju, and T. Shreecharan, “Classical solutions for Yang-Mills-Chern-Simons field coupled to an external source”, Mod. Phys. Lett. A 26, 2357 (2011).

*Communicated Papers:*

1. Vivek M. Vyas, Prasanta K. Panigrahi and T. Shreecharan, “A theory of non-BCS type superconductivity in gapped graphene” communicated to Modern Physics Letters A (an older version of the same is arXiv:0901.1034).
2. Vivek M. Vyas, Prasanta K. Panigrahi, “A constrained theory of non-BCS type superconductivity in gapped Graphene” communicated to Annals of Physics (arXiv:1107.5521).
3. Kumar Abhinav, B. Chandrasekhar, Vivek M. Vyas, Prasanta K. Panigrahi, “Unitary Fermi Gas: Scaling Symmetries and Exact Map”, communicated to Euro Physics Letters (arXiv:0905.1911).
4. Vivek M. Vyas, Sandeep Gautam, Prasanta K. Panigrahi, “On Berezinskii-Kosterlitz-Thouless Phase Transition in Quasi-One Dimensional Bose-Einstein Condensate”, communicated to Physical Review Letters (arXiv:1106.0402).
5. Anshul Saini, Vivek M. Vyas, S. N. Pandey, T. Solomon Raju, Prasanta K. Panigrahi, “Travelling wave solutions to nonlinear Schrodinger equation with self-steepening and self-frequency shift”, communicated to Chaos, Solitons and Fractals (arXiv:0911.2788).

**COMPUTER SKILLS**

*Languages & Software:* FORTRAN 90/95, C, MATLAB, Mathematica & L<sup>A</sup>T<sub>E</sub>X  
*Operating Systems:* MS Windows & GNU/Linux

**CONFERENCES ATTENDED**

1. International Symposium on Quantum Optics 2006, Physical Research Laboratory, Ahmedabad
2. Gave a talk at National Conference on Nonlinear Systems and Dynamics 2008, Physical Research Laboratory, Ahmedabad
3. Workshop on Integrable Systems 2008, Indian Institute of Science, Bangalore
4. DST-SERC School on Nonlinear Dynamics 2008, Indian Institute of Science, Bangalore
5. International Conference on Nonlinear Dynamical Systems and Turbulence, Indian Institute of Science, Bangalore
6. International Conference on Ultra Cold Atoms 2008, Indian Institute of Science Education & Research - Kolkata
7. Meeting on Entanglement in Quantum Condensed Matter Systems 2008, Institute of Mathematical Science, Chennai
8. Conference on Recent trends in Field theory 2009, Banaras Hindu University, Varansi
9. DST-SERC Preparatory School on Theoretical High Energy Physics 2009, Indian Institute of Technology Madras, Chennai
10. Gave a poster at National Conference on Nonlinear Systems and Dynamics 2009, Saha Institute of Nuclear Physics, Kolkata
11. International Conference of Mathematicians 2010, Hyderabad

12. One day meeting on Graphene and derivatives 2010, Indian Association for Cultivation of Science, Kolkata
13. Conference on Mathematical foundations of Quantum Mechanics 2010, Indian Institute of Science Education & Research - Kolkata
14. Presented a poster at conference on New trends in Field theory 2011, Banaras Hindu University, Varansi
15. Gave a talk at conference on Field Theory: Recent Trends & Applications 2011, Indian Institute of Science Education & Research - Kolkata
16. Gave a talk at Inter-IISER Physics Meet 2012, Indian Institute of Science Education & Research - Kolkata

## REFERENCES

1. Prasanta K. Panigrahi  
Department of Physical Sciences,  
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2. Ashok Das  
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