

Curriculum Vita of Anjan Kumar Gupta

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Education:

August 2001: Ph.D., Department of Physics and Astronomy, University of Kentucky, USA.
Title of dissertation: "Tunneling Studies of Pseudogap in high T_c Superconductor $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$."

May 1995: M.Sc (Integ.) in Physics, Indian Institute of Technology (IIT), Kanpur, India.

Professional:

- *May 2009 – Present:* Associate Professor, Physics Department, Indian Institute of Technology, Kanpur.
- *May 2003 – May 2009:* Assistant Professor, Physics Department, IIT Kanpur.
- *May 2009 – July 2009:* Visiting Professor, University Joseph Fourier, Grenoble, France.
- *Sept 2001 – April 2003:* Postdoctoral Researcher, Mesoscopic Physics group, CRTBT-CNRS, Grenoble, France.
- *Aug 1996 – July 1997 and Aug 1998 – Aug 2001:* Research Assistant, Department of Physics and Astronomy, University of Kentucky, USA.
- *Aug 1995 – July 1996:* Teaching assistant, Department of Physics and Astronomy, University of Kentucky, USA.

Honors and Awards:

Nov 2006: Best Presentation Award at "Building Futures: First Indo-UK Nanotechnology Workshop", Kolkata.

July 2004: Young Associate, Indian Academy of Sciences, Bangalore.

Aug 1997: Dissertation year fellowship, University of Kentucky, USA.

Feb 1996: Finalist, American Physical Society Summer Internship Program.

May 1995: Best M.Sc. (Physics) Experimental Project Award at IIT, Kanpur, India.

Publications:

- "Tunneling evidence of two types of electronic states in $\text{La}_{0.625}\text{Ca}_{0.375}\text{MnO}_3$ manganite thin films", Udai Raj Singh, Saumyadip Chaudhary, R. C. Budhani, and A. K. Gupta, *J. Phys.: Cond. Mat.* **21**, 355001 (2009).
- "Correlation between structural and superconducting properties of nano-granular disordered Nb thin films", Dibyendu Hazra, Mintu Mondal and Anjan K. Gupta, *Physica C* **469**, 268 (2009).
- "Pseudogap formation in the metallic state of $\text{La}_{0.67}\text{Sr}_{0.33}\text{MnO}_3$ thin films", Udai Raj Singh, A. K. Gupta, G. Sheeth, V. Chandrashekar, H. W. Jang, and C.-B. Eom, *Appl. Phys. Lett.* **93**, 212503 (2008).

- “Compact two-dimensional coarse-positioner for Scanning Probe Microscopes”, Anjan K. Gupta, Rajiv Shankar Sinha, and Reetesh Kumar Singh, *Rev. Sci. Instrum.* **79**, 063701 (2008).
- “STM Study of shear strain induced spatially varying superstructures on graphite”, S. K. Choudhury and Anjan. K.Gupta, *J. Phys.: Cond. Mat.* **20**, 225008 (2008).
- “Thickness Dependent Lattice Expansion in nano-granular Nb Thin Films”, D. Hazra, S. Datta, M. Mondal, A. K. Gupta, J. Ghatak and P.V. Satyam, *J. Appl. Phys.* **103**, 103535 (2008)
- “STM/S study of Charge-Ordering Energy Gap on the surface of $La_{0.35}Pr_{0.275}Ca_{0.375}MnO_3$ thin films”, Udai Raj Singh, Saumyadip Chaudhary, Shyam K. Choudhary, R. C. Budhani, and A. K. Gupta, *Phys. Rev. B.* **77**, 014404 (2008).
- “Study of Large Scale Linear Fringes on Graphite by Scanning Tunneling Microscopy”, Shyam K. Choudhury and Anjan. K.Gupta, *Jap. J. Appl. Phys.* **46**, 7450 (2007).
- “Scanning Tunneling Spectroscopy of the superconducting proximity effect in a diluted ferromagnetic alloy”, L. Crétonon, A. K. Gupta, H. Sellier, F. Lefloch, M. Fauré, A. Buzdin, and H. Courtois, *Phy. Rev. B* **72**, 024511 (2005).
- “Anolamous density of states in a metallic film in proximity with a superconductor”, A. K. Gupta, L.Crétonon, N. Moussy, B. Pannetier, and H. Courtois, *Phys. Rev. B* **69**, 104514 (2004).
- “Non-conservation of tunneling density of states in underdoped Bi-2212: Coexistence of pseudogap and superconducting gap”, A. K. Gupta, K.- W. Ng, *Europhys. Lett.* **58**, 878 (2002).
- “Microscopic electronic inhomogeneity in the high- T_c superconductor $Bi_2Sr_2CaCu_2O_{8+x}$ ”, S. H. Pan, J. P. O’Neal, R. L. Badzey, C. Chamon, H. Ding, J. R. Engelbrecht, Z. Wang, H. Eisaki, S. Uchida, A. K. Gupta, K.W. Ng, E. W. Hudson, K. M. Lang and J. C. Davis, *Nature* **413**, 282 (2001).
- “Compact coarse approach mechanism for scanning tunneling microscope” A. K. Gupta and K.-W. Ng, *Rev. Sci. Instrum.* **72**, 3552 (2001).
- “STM Studies of the Electronic Structure of Vortex Cores in $Bi_2Sr_2CaCu_2O_{8+\delta}$ ”, S.H. Pan, E.W. Hudson, A.K. Gupta, K.-W. Ng, H. Eisaki, S. Uchida, J.C. Davis, *Phys. Rev. Lett.* **85**, 1536 (2000).
- “Atomic Scale quasiparticle scattering resonances in $Bi_2Sr_2CaCu_2O_{8+\delta}$ ”, E.W. Hudson, S.H. Pan, A.K. Gupta, K.-W. Ng, and J.C. Davis, *Science* **285**, 88 (1999).
- “ab-plane tunneling spectroscopy of underdoped Bi2212”, A. K. Gupta and K.-W. Ng, *Phys. Rev. B* **58**(14), R8901 (1998).

Conference Proceedings:

- “Temperature Dependent Tunneling study of $La_{0.625}Ca_{0.375}MnO_3$ Thin Films”, Udai Raj Singh, S. Chaudhuri, R. C. Budhani, and Anjan K. Gupta, *J. Phys.: Conf. Ser.* **150**, 042183 (2009).
- “A compact low temperature scanning tunneling microscope”, Anjan Kumar Gupta, Jaivardhan Sinha, Shyam Kumar Choudhary, *J. Phys.: Conf. Ser.* **150**, 012007 (2009).
- “Formation of the charge ordered state on the surface of $La_{0.35}Pr_{0.275}Ca_{0.375}MnO_3$ thin films”, Udai Raj Singh, Saumyadip Chaudhary, R. C. Budhani, and A. K. Gupta, *Proc. DAE 52nd SSP Symp*, p1073 (2007).

- “*Layer-by-Layer etching of NbSe₃ surface using STM*”, Shyam K. Coudhary and Anjan K. Gupta, Proc. DAE 52nd SSP Symp, p677 (2007).
- “*Some Unusual Electronic Patterns on Graphite Surface*”, Pramana-J. Phys. **70**, 339 (2008). (MESODIS-2006, IIT-Kanpur).
- “*Anomalous Density of States in hybrid Normal metal-Superconductor bilayers*”, A. K. Gupta, L. Cretinon, B. Pannetier and H. Courtois, Pramana **66**, 251 (2006).
- “*A Compact Tabletop Scanning Tunneling Microscope*”, Shyam K. Choudhary, Rupali Nagar, and Anjan K. Gupta, Proc. DAE 49th SSP Symp, p344 (2004).
- “*Local spectroscopy of a ferromagnetic metal in contact with a superconductor at very low temperature*”, Laurent Crétinon, Anjan K. Gupta, Bernard Pannetier, Hervé Courtois, Hermann Sellier and François Lefloch, Physica C **404**, 110 (2004). (Cit: 02)
- “*STM spectroscopy of the local density of states in hybrid normal metal-superconductor bilayers*”, Laurent Crétinon, Anjan Gupta, Bernard Pannetier, and Hervé Courtois, Physica C **404**, 103 (2004). (Cit:02)
- “*Coexistence of superconducting gap and pseudogap in underdoped Bi2212*”, K.-W. Ng, A. K. Gupta, Physica C **388**, 221 (2003). (Cit: 01)
- “*STM of quasiparticle scattering resonances in Bi₂Sr₂CaCu₂O_{8+δ}*”, E. W. Hudson, S. H. Pan, K. M. Lang, A. K. Gupta, K. -W. Ng and J. C. Davis, Physica B **284**, 969 (2000). (Cit:02)
- “*Temperature and magnetic field-dependent tunneling study of Bi₂Sr₂CaCu₂O_y in the pseudogap state*”, K.-W. Ng and A. K. Gupta, Physica B, **284-288**, 659 (1999). (Cit: 02)
- “*STM studies of quasiparticle scattering resonances in Bi₂Sr₂CaCu₂O_{8+δ}*”, E.W. Hudson, S.H. Pan, K.M. Lang, A.K. Gupta, K.-W. Ng, and J.C. Davis, Physica B, **284-288**, 969 (1999).
- “*Observation of Pseudogap in Underdoped Bi₂Sr₂CaCu₂O_{8+d} by Tunneling Spectroscopy*”, Anjan K. Gupta and K.- W. Ng, Int. J. of Mod. Phys. B **12**, 3271 (1998).
- “*Observation of pseudogap in underdoped Bi2212 by tunneling spectroscopy*”, A. K. Gupta and K.-W. Ng, Int. J. Mod. Phys. **12**, 3271 (1998). (Cit: 02)
- “*Electrical Transport Study of Y(Fe,Al)₂ compounds*”, A. K. Gupta, S. Radha, A. K. Nigam and Girish Chandra; Proc. of DAE Solid State Symposium (Jaipur), **37C**, 298 (1994).

Patents:

- “Two dimensional nano positioner”, Pat. Appl. No. 323/DEL/2007 (15-02-2007), Dr. A. K. Gupta, Mr. Reetesh Kr. Singh & Mr. Rajiv Shankar Sinha.

Presentations:

- “Signatures of Coherent Polarons in STM/S study of CMR Manganites”, **Invited** talk in Symposium on Physical Sciences, JNU, New Delhi, March 2009.
- “STM studies of Electronically Inhomogeneous Surfaces”, Mar 2008, Seminar at Physics Department, Pondicherry University, Pondicherry, India.
- “STM Study of Strain-Induced Nano-Scale Electronic Patterns on Graphite Surface” **Seminar** at CRTBT, Grenoble, France in May 2007.
- “STM studies of Electronically Inhomogeneous Surfaces”, **Colloquium** at SINP, Kolkata in March 2007.
- “STM studies of Electronic Inhomogeneities in La_{0.35}Pr_{0.275}Ca_{0.375}MnO₃ thin films”, Anjan K. Gupta, Udai Raj Singh, Saumyadip Chaudhury and R. C. Budhani, **contributed talk** at APS March Meeting, Denver, Colorado (USA), March 2007.

- “STM study of some strain induced Electronic Patterns on Graphite Surface”, Anjan K. Gupta and Shyam K. Choudhary, **poster** presentation at APS March Meeting, Denver, Colorado (USA), March 2007.
- “STM studies of Electronically Inhomogeneous Surfaces”, Condensed Matter **Seminar** at Northwestern University, Evanston, IL (USA), March 2007.
- “STM study of Defect Induced Electronic Patterns on Graphite Surface”, *Invited* talk at “K.S. Krishnan Discussion Meeting on Frontiers in Quantum Science-2006, Novel Phenomena in Graphene”, The Indian Institute of Mathematical Sciences, Chennai Dec 2006.
- “STM study of strain induced Electronic Patterns on Graphite Surface”, *Invited talk* at “Building Futures: First Indo-UK Nanotechnology Workshop”, Kolkata, Nov 2006 (got the *best* presentation award).
- “Some Unusual Electronic Patterns on Graphite Surface”, *Invited talk* at Indian Academy of Sciences, summer meeting held at Indian Institute of Science, Bangalore in July 2006.
- “Anomalous Density of States in hybrid Normal metal – Superconductor Bilayers” A. K. Gupta, L. Cretinon, B. Pannetier and H. Courtois, **poster** presentation at International Vortices Workshop-10 (IVW10), TIFR, Mumbai, Jan 2005.
- “STM/S Imaging Studies in the Vortex State”, **tutorial** at IVW10 workshop, TIFR, Mumbai, Jan 2005.
- “Scanning Tunneling Microscopy”, **Seminar**, Summer 2004, NSC, Delhi
- “A Compact Tabletop Scanning Tunneling Microscope”, Shyam K. Choudhary, Rupali Nagar, and Anjan K. Gupta, **poster** presentation at DAE Solid State Symposium, Amritsar, summer 2004.
- “Scanning Tunneling Microscopy”, **talk** at Condensed Matter Physics meeting of IIT, Kanpur, Feb 2004.
- “Anomalous density of states in NS-proximity structures”, **Seminar**, TIFR, Mumbai, Dec 2003.
- “Scanning Tunneling Microscopy” Physics **Seminar** at TIFR, Dec 2003.
- “Scanning Tunneling Microscopy”, Physics **Seminar** at IIT Mumbai, Dec 2003.
- “STM study of the superconducting proximity effect in normal metal films and ferromagnetic nano-structures”, contributed talk at APS March Meeting 2003, Austin, Texas.
- “STM study of the superconducting proximity effect at 60 mK: influence of interface transparency”, H. Courtois, A. K. Gupta, L. Cretinon, N. Moussy, and B. Pannetier; APS March Meeting 2002, Indianapolis, USA.
- “Coexistence of pseudogap and superconducting gap from the ab-plane Tunneling studies of Bi2212”, Anjan K. Gupta and K.-W. Ng; APS March Meeting 2002, Indianapolis, USA.
- “A Compact Approach Mechanism for Scanning Tunneling Microscopes”, K.-W. Ng and A. K. Gupta, poster presentation at STM01 conference, Vancouver, Canada, 2001.
- “Non-conservation of tunneling density of states in the underdoped Bi-2212: Coexistence of pseudogap and superconducting gap”, Anjan K. Gupta and K.-W. Ng; APS March Meeting, 2001, Seattle, USA.
- “Resolving atomic structure in 1T-TaS₂ together with nearly commensurate $\sqrt{13}\times\sqrt{13}$ CDW using low temperature STM”, K.-W. Ng, A. K. Gupta J. W. Brill; APS March Meeting 2001, Seattle, USA.
- “A low temperature STM with a novel coarse approach mechanism”, *Condensed Matter Physics Seminar* at the University of Kentucky, October 2000.

- “New design for a compact STM”, February 2000, *Condensed Matter Physics Seminar* at TIFR, Mumbai, India.
- “New design for a compact STM”, *Colloquium* at IIT, Kanpur, India, February 2000.
- “A novel coarse-approach mechanism for Scanning Probe Microscopes”, Anjan K. Gupta and K.-W. Ng; APS March Meeting, 2000, Minneapolis, USA.
- “Magnetic Field Dependence of Tunnelling Spectra in the pseudogap state of underdoped Bi2212”, Anjan K. Gupta and K.-W. Ng; APS March Meeting, 1999, Atlanta, USA.
- “Temperature and magnetic field-dependent tunneling study of Bi₂Sr₂CaCu₂O_y in the pseudogap state”, K.-W. Ng and Anjan K. Gupta; Poster Presentation at LT22 Conference, Finland, 1999.
- “Evidence of pseudogap from Tunnelling Spectra of Underdoped Bi2212”, Anjan K. Gupta and K.-W. Ng; APS March Meeting, 1998, Los Angeles, USA.
- “ab-Plane tunneling spectroscopy of underdoped Bi2212”, *Condensed Matter Physics Seminar* at the University of Kentucky, January 1998.
- “Observation of pseudogap in underdoped Bi2212 by tunneling spectroscopy” -Anjan K. Gupta and K.-W. Ng; New3SC Conference, January 1998, Baton Rouge, Louisiana, USA.

Other Lectures:

1. Lecture in **SERC winter school** in “Strongly Correlated Systems” at HRI, November, 2005.
2. Four lectures in **summer school** in “Condensed Matter” at HRI on “Local Probes in Condensed Matter Experiments”
3. Two Lectures on vacuum, low temperatures, and STM in **QIP program** for college teachers at Central School, IITK, during summer 2005 and also during summer 2006.

Sponsored Projects:

1. “Nanometer Scale Lithography using Scanning Tunneling Microscope” MHRD, 2005-08, Rs.10Lacks.
2. “Scanning Tunneling Microscopy / Spectroscopy Studies of Strongly Correlated Transition Metal Oxides” DST, Govt. of India, started in Feb 2007, Rs.38 Lacks.
3. “Virtual Labs: Laboratory for Low Temperature Electrical Transport Measurements”, MHRD, 2009.

Technology Developed:

1. Low temperature (4.2K) STM with atomic resolution capability with high magnetic field (up to 5 Tesla) ability at IITK.
2. STM Electronics in collaboration with Nuclear Science Center, New Delhi.
3. Two dimensional nano-positioner in collaboration with R. S. Sinha and R. K. Singh. To be commercialized by Simplifix Automation and Solutions Pvt. Ltd. at SIIC, IIT Kanpur.

Ph.D. Thesis Supervision: Ongoing (04).

1. Shyam Kumar Choudhary, “STM Studies of Electronic Patterns on Graphite Surface”, expected to finish by winter 2010.
2. Udai Raj Singh, “Electronic inhomogeneities in Strongly Correlated Manganites”, submitted in July 2009.
3. Dibyendu Hazra, in progress.
4. Anirban Dutta, started in Aug 2008.