CV of Satyajit Banerjee

1. **Name in Full :** Satyajit Banerjee
(Underline Surname)
(name as it appears in scientific publications: S. S. Banerjee)

2. Address

Present
Department of Physics,
Indian Institute of Technology Kanpur (IIT K),
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(not updated and the webpage is being changed)

3. Date of Birth	**4. Nationality**	**5. Sex**
19/05/1972	India	Male

6. Present position(Designation, Organisation)
Professor, Dept. of Physics, IIT Kanpur

7. Area of Specialisation
Experimental Condensed Matter Physics

8. Current Areas of Research

1. Instabilities and nonlinear behavior in superconductors.
2. Properties of nano-patterned superconductors
3. Magnetism at nanoscales.
4. Effect of intense environments on magnetism and superconductivity.
5. Investigating the inhomogeneous magnetic state in oxides and a possible inhomogeneous superconducting state in pnictide compounds.
6. Statics and Dynamics in magnetic systems with topological excitations .
6. Developed high sensitivity magneto-optical imaging (MOI) technique to image magnetic field distribution inside superconductors as well as magnetic materials. This instrument is the first of its kind in India and with sensitivity comparable to best in the world. I am using MOI to image transport currents to study how locally currents distribute within, superconductors, magnetic systems, superconductor – magnetic system heterostructures and semiconductors. MOI is also being used to investigate current – domain interactions and distribution in magnetic materials. Dynamics of single vortices.

9. Academic Record (starting with Bachelor's Degree)

Degree (subjects)	Institution	Year	Marks & Division	Standing	Remarks
B.Sc. (Phy)	University of Mumbai, India	1992	79%	-	St. Xaviers Mumbai
M.Sc (Phy)	University of Mumbai, India	1994	73.5%	2nd	
Ph.D (Phys).	Tata Institute of	2000			I was a Ph.D. studen

	Fundamental Research/ University of Mumbai , India				at TIFR, in the dept. of condensed matter Physics and materials sciences (1994 – 2000). I received my Ph.d Degree in 2000 from Univ. of Mumbai. During my time TIFR was not a deemed University.

10. Previous Experience (in reverse chronological order)

A Current Research Activity and Interests (excluding research done for Ph.D. Degrees)

Duration	Organisation	Area(s)
2004 –	Dept. of Physics, Currently a Professor in the Dept.	Experimental condensed matter physics
2000 – 2003	Dept. of condensed matter physics, Weizmann Institute of Science, Israel. (Feinberg Postdoctoral Fellow).	Experimental condensed matter physics
Aug 2003 – April 2004	Visiting Scientist, Weizmann Institute of Science.	Experimental Condensed Matter Physics
All summers from 2005 to 2012.	Visiting Scientist, TIFR, Mumbai	Experimental Condensed Matter Physics

Facilities developed (and also being currently developed) in my laboratory at IIT Kanpur

- We have developed a state of the art Magneto-optical imaging technique to map with high local field sensitivity the distribution of local magnetic field across magnetic, superconducting and semiconducting samples at different temperatures and magnetic fields.
- We have developed techniques to make nanopores in anodized aluminium (AAO) templates. Using them we make nanowires.
- We a sputtering unit for making films.
- We use bulk transport and magnetization measurements. We have developed a technique for sensitive time series transport measurements.
- We are developing a tunneling current based setup for high sensitive measurement of low magnetization samples.
- We are developing a very high sensitivity mutual inductance measurement technique for measuring very sensitively diamagnetic response of materials.
- We are attempting to develop sensitive temperature imaging system.
- We are also developing a transport current imaging setup where we can image the flow of transport currents inside any material and map the local conductivity of materials.
- We are involved in developing a scanning hall probe setup.
- Developing superconducting fault current limiters.

Thesis (**Ph.D**.) Supervision

S.No.	Name	Year of completion	Title of Thesis	Co-guides(if any)
1.	Shyam Mohan. (Ph.D)	Degree awarded in Oct. (2009).	Instabilities in the vortex state of superconductors.	None

2.	Jaivardhan Sinha (Ph.D)	Degree awarded in Oct, 2010.	Properties of magnetic materials under extreme conditions.	None
3.	Gorky Shaw (Ph.D).	Degree awarded in April, 2013	Static and Driven phases of vortex matter in superconductors with intrinsic and nanopatterned pins	None
4.	Amit Banerjee (Ph.D)	Degree awarded in Oct 2013	Resonance Behavior of FIB grown nanomechanical systems and the role of microstructure	Late Prof. V. N. Kulkarni, Physics
5.	Pabitra Mondal (submited thesis for the award of Ph.D degree)	Degree Awarded in May, 2014	Anomalous magnetic response of $CaFe_{1.94}Co_{0.06}As_2$ superconductor and nonlinear response of the driven vortex state in 2H-NbS_2 superconductors	None
6.	Dibyajyoti Sivananda	Ongoing Phd student	Magnetic - superconducting heterostructures and novel small magnetization measuring techniques	None
7.	Kamalika Nath	Ongoing Phd Student	Instabilities in magnetic systems at low dimensions and extreme high magnetic fields.	None
8.	Biplab Bag	Submitted Thesis – Nov. 2016	Doping dependence and study of local magnetic response in Co doped Ba Iron Arsenide systems	None
9.	Amit Jash	Ongoing Phd student	Exploring surface states in topological superconductors and imaging effects of breaking time reversal symmetry in these systems	None
9.	Ankit Kumar	Ongoing Phd student	Symmetry broken states in Pnictides and imaging transport properties	None
10.	Md. Arif Ali	Ongoing PhD. Just joined	--Thesis title and problem not yet decided -	
11.	Nirmal Roy	Just Joined	-Thesis title not yet decided --	

Sponsored research Projects

Period	Sponsoring Organization	Title of Project	Amount of Grant	Co-Investigators (if any)
1.	Council of Scientific and Industrial Research (CSIR)	A high sensitivity magneto-optical setup for imaging the magnetic response in superconducting – magnetic heterostructures and for use in engineering sciences	Rs.9,50,000/-	None
2.	Department of Science and Technology (DST)	Developing a high sensitivity magneto-optical imaging technique	Rs.66,71,629/-	None
3.	Asian Office of Airforce Research and Development (AOARD), USA	Imaging Phase separation in CMR materials	US$ 25,000/- (Rs. 11,07,150/-)	None.
4.	International Center for Theoretical Sciences, belonging to TIFR, Mumbai, India	For organizing the international conference titled NESP (NON-EQUILIBRIUM STATISTICAL PHYSICS)), 2010.	Rs. 34,00,000/-	Co. PI's Prof. Debashish Chowdhury and Prof. Amit Dutta; from the Dept. of Physics. IIT Kanpur
4.	Department of Science and Technology (DST)	ENGINEERING SUPERCONDUCTING NANOSTRUCTURES IN DICHALCHOGENIDES AND INVESTIGATING THEIR PROPERTIES	Rs. 35,58,500/-	Prof. Hermann Suderow, Spain
5.	Ministry of human resource and Development (MHRD)	A proposal for virtual laboratory (waves and phenomenon)	Rs.40,00,000/-	None
6.	Department of Science and Technology (DST)	CREATION OF HETEROGENEOUS PINNING IN IRON PNICTIDES AND CUPRATE SUPERCONDUCTORS BY INTRODUCING NANOPATTERNED PINS	Rs.2,57,000	Prof. Tsuyoshi Tamegai, Univ. of Tokyo, Japan.
7.	Department of Science and Technology (DST)	PI for holding the 7th PAC - SERB meeting for DST on "condensed matter Physics and materials science" at IIT Kanpur between 17 - 19th Sept. 2014	Rs.16,50,000/-	Satyajit Banerjee
8.	DST – Technology development Program (DST – TSDP)	Developing a prototype of a smart Superconducting Fault Current Limiter	Rs.1,30,26,000/-	Satyajit Banerjee

		($SCFCL_{sm}$) with three dimensional field and current mapping technology for early fault and hot spot detection		

Ongoing National and International Collaborations:

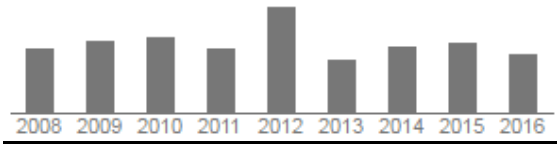
1. **Prof. Hermann Suderow,** Dr, Profesor Titular de Universidad, Fisica Materia Condensada, Universidad Aut6noma de Madrid, Madrid. (Collaboration formally funded through an Indo-Spanish Collaboration from the Ministry of India)
2. **Prof. Tsuyoshi Tamegai,** Department of Applied Physics, The University of Tokyo Japan (Collaboration formally funded through an Indo – Japanese Department of Science and Technology India and JSPS (Japan))
3. **Prof. Eli Zeldov**, Dept. of Physics, (Condensed Matter Physics), Weizmann Institute of Science, Israel.
4. **Prof. Arun Grover,** Department of Condensed Matter Physics and Material Science, Tata Institute of Fundamental Research Mumbai India and Presently Vice Chancellor, University of Punjab, India.
5. **Prof. Ajay Sood,** Dept. of Physics (Condensed Matter Physics), Indian Institute of Science, Banalore.
6. **Prof. Thamizhavel,** Department of Condensed Matter Physics and Material Science, Tata Institute of Fundamental Research Mumbai India
7. **Prof. Bharathi,** Formerly at IGCAR Kalpakam.

List of Publications and Patents:

Publications summary (as on 8th Nov. 2016)

Google Scholar

Citation indices	All	Since 2011
Citations	1077	314
h-index	19	11
i10-index	28	12



Patents:

1. Systems And Methods For Imaging Characteristics Of A Sample And For Identifying Regions Of Damage In The Sample: **Patent Filed (2010 - 11) by Intellectual Ventures for an Indian Patent and International patent.**

INVENTORS: Prof. Satyajit Banerjee, Dr. Shyam Mohan and Dr. Jaivardhan Sinha
Issued INTERNATIONAL patent nos: IN-800835-04-JP-NAT, IN-800835-05-KR-NAT
Issued national patent nos: INDEL20102433A

2. Switch useful at superconducting temperatures and comprising superconducting material (**completely** based on my publication S. S. Banerjee et al. Appl. Phys. Lett. 74, 126 (1999), I am the first author from the Indian side.). Patent Nos. : US6184765 B1.

List of names in patent application (ordered as in the patent): Sabyasachi Bhattacharya, Mark J. Higgins, Satyajit S. Banerjee, Nitin G. Patil, Srinivasan Ramakrishnan, Arun K. Grover, Chandrasekhar V. R. Turumella, Vinod C. Sahni, Gurazada Ravikumar, Prashant K. Mishra,.

A Papers in Referred Journals (List those published and accepted separately)
*: **Corresponding Author**

Book Chapter: (On invitation)
Title : Nonlinear response of the static and dynamic phases of the vortex matter
Authors : S. S. Banerjee*, Shyam Mohan, Jaivardhan Sinha, Yuri Myasoedov, S. Ramakrishnan and A. K. Grover (* : corresponding author)
Book details: Superconductivity - Theory and Applications, ISBN 978-953-307-151-0
Publisher: Intech – open access publishers (http://www.intechweb.org/). Published July, 2011. Book chapter downloadable at http://www.intechopen.com/articles/show/title/nonlinear-response-of-the-static-and-dynamic-phases-of-the-vortex-matter

Download stats (Nov. 2016)

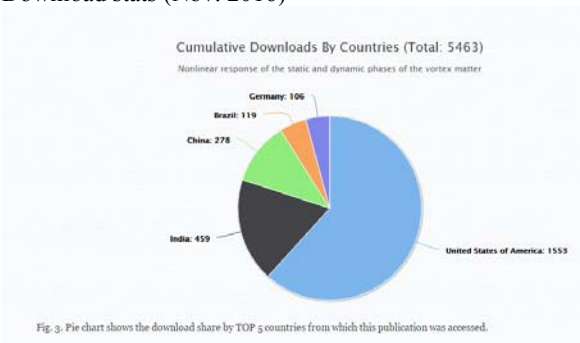


Fig. 3. Pie chart shows the download share by TOP 5 countries from which this publication was accessed.

Joined IIT Kanpur (Aug, 2004 - onwards) (*: corresponding author)
(3 more papers submitted in 2016 and are under consideration in International Journals).

S. No	Author(s)	Year	Title	Complete Reference of Journal
65.	Amit Banerjee, **S.S. Banerjee***	2016	Growing gold fractal nano-structures and studying changes in their morphology as a function of film growth rate	Materials Research Express 3 (10), 105016
64.	Biplab Bag, K Vinod, A Bharathi, **S.S. Banerjee***	2016	Observation of anomalous admixture of superconducting and magnetic fractions in BaFe2− x Co x As2 single crystals	New Journal of Physics 18 (6), 063025
63.	Gorky Shaw, **S.S. Banerjee***, T Tamegai, H Suderow	2016	Metastable inhomogeneous vortex configuration with non-uniform filling fraction inside a blind hole array patterned in a BSCCO single crystal and concentrating magnetic flux inside it	Superconductor Science and Technology 29 (6), 065021
62.	Gorky Shaw, **S S Banerjee***, T Tamegai, Hermann Suderow	2015	Commensurate - incommensurate vortex phase in a nanopatterned superconductor.	Journal of Physics: Conf. serise 638, 012009 (2015)

61	I. Guillamon, H. Suderow, P. Kulkarni, S. Vieira R. Cordoba, J. Sese, J.M. De Teresa, M.R. Ibarra G. Shaw, **S.S Banerjee**	2014	Nanostructuring superconducting vortex matter with focused ion beams	Physica C 503, 70 (2014)
60	Amit Banerjee **S. S. Banerjee***	2014	Spatially resolved energy dispersive x-ray spectroscopic method for in-situ evaluation of mechanical properties during the growth of a C - Pt composite nanowire	AIP ADVANCES **4**, 057119 (2014)
59	V. Crespo, A. Maldonado, J.A. Galvis, P. Kulkarni, I. Guillamon, J.G. Rodrigo, H. Suderow, S. Vieira, **S. Banerjee**, P. Rodiere,		Scanning microscopies of superconductors at very low temperatures,	Physica C, 479, 19 (2013).
58	Amit Banerjee, **S. S. Banerjee***	2013	Fabrication of single and coupled metallic nanocantilevers and their nanomechanical response at resonance	Nanotechnology 24 (2013) 105306
57	Amit Banerjee, Nitul S. Rajput, and **S. S. Banerjee***	2102	Unusual dimensional dependence of resonance frequencies of Au nanocantilevers fabricated with self-organized microstructure	AIP Advances 2, 032105 (2012).
56	Pabitra Mandal, Gorky Shaw, **S. S. Banerjee***, Neeraj Kumar, S. K. Dhar and A. Thamizhavel	2012	Anomalous local magnetic field distribution and strong pinning in CaFe1.94Co0.06As2 single crystals	Euro Phys. Lett. 100, 47002 (2012)
55	Gorky Shaw, Pabitra Mandal, **S. S. Banerjee** *, A. Niazi, A. K. Rastogi, A. K. Sood, S. Ramakrishnan, and A. K. Grover	2012	Critical behavior at depinning of driven disordered vortex matter in 2*H*-NbS2	Phys. Rev. B **85**, 174517 (2012)

54	Pabitra Mandal, Debanjan Chowdhury, **S. S. Banerjee*** and T. Tamegai.	2012	High sensitivity differential magneto-optical imaging with a compact Faraday-modulator	Review of Scientific Instruments **83,** 123906 (2012).
53	Gorky Shaw, Pabitra Mandal, **S S Banerjee*** and T Tamegai	2012	Visualizing a dilute vortex liquid to solid phase transition in a $Bi_2Sr_2CaCu_2O_8$ single crystal.	New Journal of Physics 14, 083042 (2012).
52	Gorky Shaw, Biplab Bag, **S S Banerjee*,** Hermann Suderow and T Tamegai.	2012	Generating strong magnetic flux shielding regions in a single crystal of Bi2Sr2CaCu2O8 using a blind hole array.	Supercond. Sci. Technol. 25, 095016 (2012)
51	Gorky Shaw, Pabitra Mandal, Biplab Bag, **S.S. Banerjee***, T. Tamegai, Hermann Suderow	2012	Properties of nanopatterned pins generated in a superconductor with FIB	Appl. Surf. Science 258, 4199 (2012)
50	P. D. Kulkarni1, **S. S Banerjee**, C. V. Tomy, G. Balakrishnan, D. McK. Paul, S. Ramakrishnan and A. K. Grover	2011	Crossover from paramagnetic compressed flux regime to diamagnetic pinned vortex lattice in a single crystal of cubic Ca3Rh4Sn13	Phys. Rev. B 84, 014501 (2011)
49	Gorky Shaw, Jaivardhan Sinha, Shyam Mohan and **S. S. Banerjee***	2010	Driven weak to strong pinning crossover in partially nanopatterned 2H-NbSe2 single crystal	Superconducting Science and Technology 23, 075002 (2010) Work highlighted on the front cover page of the Journal
48.	**S. S. Banerjee***, Jaivardhan Sinha ,Shyam Mohan, A.K. Sood, S. Ramakrishnan and A. K. Grover	2010	Evolution in the time series of vortex velocity fluctuations across different regimes of vortex flow	Physica C 470, S830 (2010)
47.	**S. S. Banerjee***, Gorky Shaw, Jaivardhan Sinha, Shyam Mohan, Pabitra Mandal	2010	Metastable magnetization response of the vortex state due to patterned blind hole pins	Physica C 470, S817 (2010)
46.	Shyam Mohan, Jaivardhan Sinha, and **S. S. Banerjee***, A.K. Sood, S. Ramakrishnan and A. K. Grover	2009	Giant slow velocity fluctuations in a driven vortex lattice	Phys. Rev. Lett. 103, 167001 (2009) Also, October 15, 2009 issue of Virtual Journal of Applications of Superconductivity, (http://www.vjsuper.org)

45.	Work reported in Phys. Rev. B 78, 214504 (2008) Was a focus new item in Nature India of Nature Magazine	2008	Cool Crystal	http://www.nature.com/nindia/2008/081228/full/nindia.2008.342.html doi:10.1038/nindia.2008.342; Published online 28th Dec. 2008
44.	Pradip Das, C. V. Tomy, **S. S. Banerjee***, H. Takeya, S. Ramakrishnan, A. K. Grover	2008	Surface Superconductivity, positive field cooled magnetization and peak effect phenomenon observed in a spherical single crystal of niobium	Phys. Rev. B 78, 214504 (2008)
43.	G. Ravindra Kumar, Subhendu.Kahaly, Jaivardhan Sinha, Shyam Mohan, and **S. S. Banerjee***	2008	High resolution magneto optical microscopy of megagauss axial magnetic fields generated in laser plasma interaction	Journal of Physics: Conference Series 112, 022083 (2008)
42.	Jaivardhan Sinha, Shyam Mohan, **S. S. Banerjee***, Subhendu Kahaly and G. Ravindra Kumar	2008	Mapping giant magnetic fields around dense solid plasmas by high resolution magneto-optical microscopy	Phys. Rev. E 77, 046118 (2008)
41.	S.R. Sarath Kumar, P. Malar, Thomas Osipowicz , **S.S.Banerjee**, S. Kasiviswanathan	2008	Ion beam studies on reactive DC sputtered manganese doped indium tin oxide thin films	J. Nucl. Inst. and Meth B. (2008, in press) doi:10.1016/j.nimb.2007.12.075.
40.	E. Rozenberg, A. I. Shames, M. Auslender, G. Jung, I. Felner, Jaivardhan Sinha, **S. S. Banerjee**, D. Mogilyansky, E. Sominski, A. Gedanken, Ya. M. Mukovskii, G. Gorodetsky.	2007	Disorder-induced phase coexistence in bulk doped manganites and its suppression in nanometer-sized crystals: The case of La0.9Ca 0.1MnO3.	Phys. Rev. B 76, 214429 (2007).
39.	Shyam; Mohan, Jaivardhan Sinha, **S. S. Banerjee***, Yuri Myasoedov	2007	Instabilities in the vortex matter and peak effect phenomenon	Phys. Rev. Lett. 98, 027003 (2007).
38.	Shyam Mohan, Jaivardhan Sinha, **S. S. Banerjee** *, Yuri Myasoedov.	2007	Instabilities in the vortex matter and peak effect phenomenon	Virtual Journal of Applications of Superconductivity, Jan. 15, 2007 issue

37.	E. Rozenberg, **S.S. Banerjee**, I. Felner, E. Sominski, A. Gedanken	2007	Nano-particles of La0.9Ca0.1MnO3 manganite: Size-induced change of magnetic ground state and interplay between surface and core contributions to its magnetism	Journal of Non-Crystalline Solids 353, 817 (2007).
36.	**S. S. Banerjee***, Shyam Mohan, Jaivardhan Sinha, Yuri Myasoedov	2007	Pinning regimes in the vortex solid and crossover between them in single crystals of 2H-NbSe2	Physica C 460-462, 710 (2007).
35.	**S. S. Banerjee*,** S. Goldberg, Y. Myasoedov, M. Rappaport, E. Zeldov, A. Soibel, F. de la Cruz, C. J. van der Beek, M. Konczykowski, T. Tamegai, V. Vinokur	2006	Melting of heterogeneous vortex matter: the vortex "nanoliquid	Pramana Journal of Physics, 60, 43 (2006).
34.	A. D. Thakur, **S. S. Banerjee***, M. J. Higgins, S. Ramakrishnan, A. K. Grover.	2006	Effect of pinning and driving force on the metastability effects in weakly pinned superconductors and the determination of spinodal line pertaining to order-disorder transition	Pramana Journal of Physics, 66, 159 (2006).
33	M. Menghini, Yanina Fasano, F. de la Cruz, **S. S. Banerjee**, Y. Myasoedov, E. Zeldov, C. J. van der Beek, M. Konczykowski and T. Tamegai	2005	Role of the Vortex Solid Topology in a First-Order Liquid-Solid Phase Transition	Perspectives on Superconductivity Research", edited by P.S. Lewis , Nova Publishers (2005). ISBN: 1-59454-523-5
32.	A. Jukna, I. Barboy, G. Jung, **S. S. Banerjee**, Y. Myasoedov, V. Plausinaitiene, A. Abrutis, X. Li, D. Wang, Roman Sobolewski	2005	Laser processed channels of easy vortex motion in YBa2Cu 3O7-δ films	Applied Physics Letters, 87, 192504 (2005).
31.	A. D. Thakur, **S. S. Banerjee**, M. J. Higgins, S. Ramakrishnan, A. K. Grover.	2005	Exploring metastability across the Peak effect via the third harmonic measurements in single crystals of 2H -NbSe2	Phys. Rev. B, 72, 1345241 (2005).
30	M. Menghini, Y.	2004	Amorphous vortex	JOURNAL OF LOW

	Fasano, F de la Cruz, **S. S. Banerjee**, Y. Myasoedov, E. Zeldov, C. J. van der Beek, M. Konczykowski, T. Tamegai		phase in $Bi_2Sr_2CaCu2O_8$ after the first order liquid-solid phase transition	TEMPERATURE PHYSICS, 135, 139 (2004)
29	**S. S. Banerjee**, E. Zeldov, A. Soibel, Y. Myasoedov, M. Rappaport, M. Menghini, Y. Fasano, F. de la Cruz, C J van der Beek, M. Konczykowski, T. Tamegai,	2004	Porous vortex matter	Physica C 408, 495 (2004)
28.	**S. S. Banerjee**, S. Goldberg, A. Soibel, Y. Myasoedov, M. Rappaport, E. Zeldov, F. de la Cruz, C. J van der beek, M. Konczykowski, T. Tamegai, V. Vinokur,	2004	Vortex nanoliquid in high temperature superconductors	Phys. Rev. Lett. 93, 097002 (2004).
27.	**S. S. Banerjee**, E. Zeldov, A. Soibel, Y. Myasoedov, M. Rappaport, M. Menghini, Y. Fasano, F. de la Cruz, C. J. van der Beek, M. Konczykowski and T. Tamagai	2004	'Porous' vortex matter'	PhysicaC: Superconductivity 408-410, 495 (2004).
26.	**S. S. Banerjee**, A. Soibel, Y. Myasoedov, M. Rappaport, E. Zeldov, M. Menghini, Y. Fasano, F. de la Cruz, C. J. van der Beek, M. Konczykowski and T. Tamagai	2003	Melting of 'Porous' vortex matter	Phys. Rev. Lett. 90, 087004 (2003).
25.	M. Menghini, Y. Fasano, F. de la Cruz, **S. S. Banerjee**, Y. Myasoedov, E. Zeldov, C. J. van der Beek, M. Konczykowski and T. Tamagai	2003	First order phase transition from the vortex liquid to an amorphous solid	Phys. Rev. Lett. 90, 147001 (2003).

24.	C. V.Tomy, D. Pal, S. S. Banerjee, S. Ramakrishnan, a. K. Grover, S. Bhattacharya, M. J. Higgins, G. Balakrishnan, D. MckPaul,	2002	Study of the peak effect phenomenon in single	Pramana J. of Phys 58, 925 (2002).
23.	A. Soibel, **S. S. Banerjee**, Y. Myasoedov, M. L. Rappaport, E. Zeldov, S. Ooi, T. Tamegai	2002	Investigating The Vortex Melting Phenomenon In BSCCO Crystals Using Magneto-Optical Imaging Technique	Pramana - Journal of Physics 58, 893 (2002).
22.	A. Soibel, Y. Myasoedov, M. L. Rappaport, T. Tamegai, **S. S. Banerjee** and E. Zeldov	2001	Temperature variations of the disorder-induced vortex lattice melting landscape	Phys. Rev. Lett. 87, 167001 (2001).
21.	**S. S. Banerjee**, A.K. Grover a, M.J. Higgins b, Gutam I. Menon, P.K. Mishra, D. Pal, S. Ramakrishnan, T.V. Chandrasekhar Rao, G. Ravikumar, V.C. Sahni, S. Sarkar and C.V. Tomy	2001	Disordered type-II superconductors: a universal phase diagram for low-Tc systems	Physica C 355, 39 (2001).
20.	**S. S. Banerjee**, S. Ramakrishnan, A. K. Grover, G. Ravikumar, P. K. Mishra, V. C. Sahni, C. V. Tomy, G. Balakrishnan, D. Mck. Paul, P. L. Gammel, D. J. Bishop, E. Bucher, M. J. Higgins, S. Bhattacharya	2000	Peak Effect, plateau effect and fishtail anomaly : The reentrant amorphization of vortex matter in 2H-NbSe2	Phys. Rev. B 62, 11838 (2000).
19	**S. S. Banerjee**, S. Ramakrishnan, D. Pal, S. Sarkar, A. K. Grover, G. Ravikumar, P. K. Mishra, T. V. C. Rao, V. C. Sahni, C. V. Tomy, M. J. Higgins, S.	2000	Magnetic phase diagram of weakly pinned type-II superconductors	Journal of Phys. Society of Japan. 69, 262 (2000)

	Bhattacharya			
18	S. Sarkar, **S. S. Banerjee**, A. K. Grover, S. Ramakrishnan, S. Bhattacharya, G. Ravikumar, P. K. Mishra, V. C. Sahni, C. V. Tomy, D. M. Paul, G. Balakrishnan,	2000	Peak effect in $Ca_3Rh_4Sn_{13}$: Vortex phase diagram and evidences for stepwise amorphization of flux line lattice	Physica C 341, 1085 (2000)
17.	**S.S. Banerjee**, S. Ramakrishnan, A.K. Grover, G. Ravikumar, P.K. Mishra, V.C. Sahni, C.V. Tomy, G. Balakrishnan, D. Mck. Paul, M.J. Higgins and S. Bhattacharya	2000	Stability and metastability of disordered vortex phases;	Physica C 332, 135 (2000).
16.	G. Ravikumar, P. K. Mishra, V. C. Sahni, **S. S. Banerjee**, A. K. Grover, S. Ramakrishnan, P. L. Gammel, D. J. Bishop, and E. Bucher, M. J. Higgins and S. Bhattacharya	2000	Supercooling of the disordered vortex phase via minor hysteresis loops in 2H-NbSe2	Phys. Rev. B 61, 12490 (2000).
15.	P.K. Mishra, G. Ravikumar, T.V. Chandrasekhar Rao, V.C. Sahni, **S.S.Banerjee**, S.Ramakrishnan, A.K. Grover and M.J. Higgins	2000	Surface barrier effect and the crossover in magnetization relaxation in 2H-NbSe2	Physica C 340, 65 (2000).
14.	S. Sarkar, **S.S. Banerjee**, A.K. Grover, S. Ramakrishnan, S. Bhattacharyaa, G. Ravikumar, P.K. Mishra, V.C. Sahni, C.V. Tomy, D.McK. Paul, G. Balakrishnan and M.J. Higgins	2000	Elucidation of amorphization of flux line lattice in Yb3Rh4Sn13	Physica C 341-348, 1055 (2000).
13.	S. Sarkar, D. Pal, **S. S. Banerjee**, S. Ramakrishnan, and A. K. Grover, C. V.	2000	Stepwise amorphization of the flux-line lattice in Ca3Rh4Sn13: A peak-effect study A peak-effect study	Phys. Rev. B 61, 12394 (2000).

	Tomy, G. Ravikumar, P. K. Mishra, V. C. Sahni, G. Balakrishnan and D. McK. Paul, S. Bhattacharya			
12	**S. S. Banerjee**, N. G. Patil, S. Ramakrishnan, A. K. Grover, G. Ravikumar, P. K. Mishra, T. V. C. Rao, V. C. Sahni, C. V. Tomy, D. MckPaul, G. Balakrishnan, m. J. Higgins, S. Bhattacharya,	1999	Plasticity in moving and pinned vortex matter	JOURNAL DE PHYSIQUE IV 9, 105 (1999)
11.	**S. S. Banerjee***, N. G. Patil, S. Ramakrishnan, A. K. Grover, S. Bhattacharya, G. Ravikumar, P. K. Mishra, T. V. Chandrasekhar Rao, V. C. Sahni, M. J. Higgins,	1999	Metastability and switching in the vortex state of 2H-NbSe2	Appl. Phys. Lett. 74, 126 (1999).
10.	**S. S. Banerjee**, N. G. Patil, S. Ramakrishnan, A. K. Grover, S. Bhattacharya, G. Ravikumar, P. K. Mishra, T. V. Chandrasekhar Rao, V. C. Sahni, M. J. Higgins, C. V. Tomy, G. Balakrishnan, D. Mck Paul	1999	Disorder, metastability, and history dependence in transformations of a vortex lattice	Phys. Rev. B 59, 6043 (1999).
9.	G. Ravikumar, P.K. Mishra, V.C. Sahni, **S. S. Banerjee**, S. Ramakrishnan, A. K. Grover, P.L. Gammel, D.J. Bishop, E. Bucher, M. J. Higgins and S. Bhattacharya,	1999	Step change in equilibrium magnetization across the peak effect in 2H-NbSe2	Physica C 322, 145 (1999).
8.	**S.S. Banerjee**, N. G. Patil, S. Saha, S. Ramakrishnan, A. K. Grover, S.	1998	Anomalous peak effect in CeRu2 and 2H-NbSe2 : Fracturing of a flux line lattices	Phys. Rev. B 58, 995 (1998).

	Bhattacharya, G. Ravikumar, P. K. Mishra, T. V. Chandrasekhar Rao, V. C. Sahni, M. J. Higgins, E. Yamamoto, Y. Haga, M. Hedo, Y. Inada and Y. Onuki			
7.	**S. S. Banerjee**, N. G. Patil, S. Ramakrishnan, A. K. Grover, S. Bhattacharya, G. Ravikumar, P. K. Mishra, T. V. Chandrasekhar Rao, V. C. Sahni, M. J. Higgins, C. V. Tomy, G. Balakrishnan, D. Mck Paul,	1998	Re-entrant peak effect in an anisotropic superconductor 2H-NbSe2	Euro. Phys. Lett. 44, 91 (1998).
6.	**S. S. Banerjee**, S. Saha, N. G. Patil, S. Ramakrishnan, A. K. Grover, S. Bhattacharya, G. Ravikumar, P. K. Mishra, T. V. C. Rao, V. C. Sahni, C. V. Tomy, G. Balakrishnan, D. Mck. Paul, M. J.Higgins	1998	Generic Phase diagram for vortex matter via a study of peak effect phenomenon in crystals of 2H-NbSe2	Physica C 308, 25 (1998).
5.	G. Ravikumar, V. C. Sahni, P. K. Mishra, T. V. Chandrasekhar Rao, **S. S. Banerjee**, A. K. Grover, S. Ramakrishnan, S. Bhattacharya, E. Yamamoto, Y. Haga, M. Hedo, Y. Inada and Y. Onuki,	1998	Manifestation of history - dependent critical currents via dc and ac magnetization measurements in single crystals of CeRu2 and NbSe2	Phys. Rev. B 57, R11069 (1998).
4.	G. Ravikumar, T. V. C. Rao, P. K. Mishra, V. C. Sahni, **S. S. Banerjee**, A. K. Grover, S. Ramakrishnan, S. Bhattacharya, M. J. Higgins, E.	1998	A novel technique to measure magnetization hysterisis curves in the peak-effect regime of superconductors	Physica C 298, 122 (1998).

	Yamamoto, Y. Haga, M. Hedo, Y. Inada, Y. Onuki			
3.	T. V. C. Rao, V. C. Sahni, P. K. Mishra, G. Ravikumar, C. V. Tomy, G. Balakrishnan, D. Mck Paul, C. A. Scott, **S. S. Banerjee**, N. G. Patil, S. Saha, S. Ramakrishnan, A. K. Grover, S. Bhattacharya	1998	Muon Spin Rotation Evidence for Loss of Order in the Flux Line Lattice in the Peak Effect Region in 2H-NbSe2	Physica C 299, 267 (1998).
2.	N. G. Patil, **S. S. Banerjee**, S. Saha, K. Ghosh, S. Ramakrishnan, S. Bhattacharya, A. K. Grover, T. V. C. Rao, G. Ravikumar, P. K. Mishra, V. C. Sahni, E. Yamamoto, Y. Haga, M. Hedo, Y. Inada, /Y. Onuki,	1997	AC and DC magnetisation studies of peak effect in a clean crystal of CeRu2	Physica C 282, 2043 (1997)
1.	G. Ravikumar, T. V. C. Rao, P. K. Mishra, V. C. Sahni, Subir Saha, **S. S. Banerjee**, N. G. Patil, A. K. Grover, S. Ramakrishnan, S. Bhattacharya, E. Yamamoto, Y. Haga, M. Hedo, Y. Inada, Y. Onuki	1997	Effect of field inhomogeniety on the magnetization measurements in peak effect region of CeRu2 superconductor	Physica C 276, 9 (1997).

B Papers published in Conference Proceedings

S.No.	Author(s)	Year	Title	Publisher
23	Pabitra Mandal, Gorky Shaw, **S. S. Banerjee*,** Neeraj Kumar, S. K. Dhar, A. Thamizhavel	2009	Flux penetration asymmetry and inhomogeneous pinning in $CaFe_{1.94}Co_{0.06}As_2$	Proceedings of the DAE solid state physics symposium (2009) Vol. 54, 811 - 812.
22	Shyam Mohan, Jaivardhan Sinha, **S. S. Banerjee***, A. K. Sood, S. Ramakrishnan and A. K. Grover	2009	Novel large amplitude low frequency velocity fluctuations in the elastic phase of	Proceedings of the DAE solid state physics symposium (2009) Vol. 54, 73- 76.

			driven vortex matter	
21	Gorky Shaw, Pabitra Mandal, Jaivardhan Sinha and **S. S. Banerjee***.	2009	Visualization of flux penetration in a high-T_c superconductor	Proceedings of the DAE solid state physics symposium (2009), Vol. 54, 807-808
20	Jaivardhan Sinha, **S. S. Banerjee***, Subhendu Kahaly and G. Ravindra Kumar.	2009	Magneto optical imaging of laser irradiated hard magnetic material	Proceedings of the DAE solid state physics symposium (2009), Vol. 54, 1083-1084
19.	Gorky Shaw, Shyam Mohan, Jaivardhan Sinha, Pabitra Mandal, **S. S. Banerjee***	2008	Investigating the effect of blind hole pinning on the magnetization response of a superconductor	Proceedings of the DAE solid state physics symposium Vol. 53, 949 (2008).
18.	Shyam Mohan, Jaivardhan Sinha, **S. S. Banerjee***, A. K. Sood, S. Ramakrishnan, A. K. Grover.	2008	Nonlinearities in the moving elastic vortex state of 2H-NbSe2.	Proceedings of the DAE solid state physics symposium Vol. 53, 929 (2008).
17.	Jaivardhan Sinha, Shyam Mohan, **S. S. Banerjee***, Subhendu Kahaly and G. Ravindra Kumar	2008	Magnetic domain patterns produced in a magnetic tape with Femtosecond laser pulse irradiation.	Proceedings of the DAE solid state physics symposium Vol. 53, 1211 (2008).
16	Artūras Jukna, Ilan Barboy, Grzegorz Jung, Adulfas Abrutis, **Satyajit S. Banerjee,** Xia Li, Daozhi Wang, Roman Sobolewski	2007	Noise Evidence for Intermittent channeled Vortex Motion in Laser-Processed YBaCuO Thin Films**.**	Proceedings of SPIE -- Volume 6600 Noise and Fluctuations in Circuits, Devices, and Materials, Massimo Macucci, Lode K. Vandamme, Carmine Ciofi, Michael B. Weissman, Editors, 66001C (Jun. 11, 2007)
15.	**Satyajit S. Banerjee***	2007	Advances in magneto-optical imaging	Proceedings of the 52nd DAE Solid State Physics Symposium, pg. 1249 (2007).
14.	**Satyajit S. Banerjee***, Shyam Mohan, Jaivardhan Sinha, Subendhu Kahaly, G. Ravindra Kumar	2007	Instabilities in superconductors and in intense laser produced plasma's	Proceedings of the 52nd DAE Solid State Physics Symposium, pg. 17 (2007).
13.	**S. S. Banerjee*,** Shyam Mohan, Jaivardhan Sinha, A. D. Thakur, S. Ramakrishnan, A. K. Grover, A. K. Sood	2006	Distribution of noise across the peak effect regime	Proceedings of DAE Solid State Physics Symposium 51, 665 (2006).
12.	Jaivardhan Sinha, Shyam Mohan, **S. S. Banerjee*,** S. Kahaly and G. Ravindra Kumar	2006	Magneto-optical study of giant magnetic field distribution produced by an intense, femtosecond laser pulse	Proceedings of DAE Solid State Physics Symposium 51, 943 (2006).
11.	Shyam Mohan, Jaivardhan Sinha, **S. S. Banerjee***	2006	Elastic instabilities in the vortex state of 2H-$NbSe_2$	Proceedings of DAE Solid State Physics Symposium 51, 667 (2006).
10.	D. Jaiswal – Nagar, A. D. Thakur, **S. S. Banerjee**, T. Isshiki, H. Aoki, Y. Onuki, M. R. Eskildsen, P. C.	2005	Effect of Driving force on the state of phase coexistence in	Proceeding of the DAE Solid State Physics Symposium, 50, 673 (2005).

	Canfield, S. Ramakrishnan, A. K. Grover		weakly pinned single crystals of $CeRu_2$ and $LuNi_2B_2C$	
9.	**S. S. Banerjee**, A. D. Thankur, S. Ramakrishnan, A. K. Grover	2005	Polycrystalline form of the flux line lattice and the anomalous variation in the critical current density.	Proceeding of the DAE Solid State Physics Symposium, 50, 667 (2005).
8.	**Satyajit S. Banerjee**	1998	Phases of Vortex Matter and Transformation amongst them	Proceedings of the Colloquium for Young Physicists, organized by Indian Physical Society and held at Saha Institute of Nuclear Physics, Calcutta on 20-21 August, 1998 (*In press*).
7.	**S. S. Banerjee**, N. G. Patil, S. Saha, S. Ramakrishnan, A. K. Grover, S. Bhattacharya, T. V. C. Rao, P. K. Mishra, G. Ravikumar, V. C. Sahni, C. V. Tomy, G. Balakrishnan, D. Mck Paul, M. J. Higgins,	1997	Thermodynamic Evidence for Reentrant Peak Effect in a Clean Single Crystal of 2H-$NbSe_2$ and the Effect of Disorder and Thermomagnetic History on it	Physica C 282-287, 2027 (1997).
6.	N. G. Patil, **S. S. Banerjee**, S. Saha, K.Ghosh, S.Ramakrishnan, S. Bhattacharya, A.K.Grover, T.V.C. Rao, G.Ravikumar, P.K.Mishra, V.C.Sahni, E. Yamamoto, Y. Haga, M. Hedo, Y. Inada, Y. Onuki	1997	AC and DC magnetization studies of Peak Effect in a clean single crystal of $CeRu_2$;	Physica C 282-287, 2043 (1997).
5.	**S. S. Banerjee**, N. G. Patil, K. Ghosh, S. Saha, G. I. Menon, S. Ramakrishnan, A. K. Grover, P. K. Mishra, T. V. C. Rao, G. Ravikumar, V. C. Sahni, C. V. Tomy, G. Balakrishnan, D. Mck. Paul, S. Bhattacharya	1997	Magnetic Phase Diagram of Anisotropic Superconductor 2H - $NbSe_2$	Physica B 237-238, 315 (1997)
4.	S. Ramakrishnan, N. G. Patil, **S.S. Banerjee**, S. Saha, G. I. Menon, A. K. Grover, P. K. Mishra, T. V. C. Rao,G. Ravikumar, V. C. Sahni, K. Ghosh, C. V. Tomy, G. Balakrishnan, D. Mck. Paul, S. Bhattacharya	1996	Reentrant Peak Effect via Magnetization Studies in $NbSe_2$	Proceedings of 21st International Conference on Low Temperature Physics, Prague, Czech. Journal of Physics 46(S6), 3105(1996).
3.	G. Ravikumar, T. V. C. Rao, P. K. Mishra, V. C. Sahni, Subir Saha, **S. S. Banerjee**, N. G. Patil, A. K. Grover, S. Ramakrishnan, S. Bhattacharya, E. Yamamoto, Y. Haga, M. Hedo, Y. Inada, Y. Onuki	1996	Effects of Field Inhomogeniety on the magnetization measurements in the Peak Effect region of $CeRu_2$ superconductor	Proceedings of Advances in Superconductivity, new materials, critical currents and devices, New Age International (P) Limited Publishers, 1996, Editors: R. Pinto, S. K. Malik, A. K. Grover, P. Ayyub, pp. 341.

2.	N. G. Patil, S. Saha, **S. S. Banerjee**, K. Ghosh, S. Ramakrishnan, A. K. Grover, T. V. C. Rao, G. Ravikumar, P. K. Mishra, V. C. Sahni, E. Yamamoto, Y. Haga, M. Hedo, Y. Inada, Y. Onuki	1996	Multiple Peak Structure in the Peak Effect region of the Vortex Lattice in the Cubic Superconductor $CeRu_2$	Proceedings of Advances in Superconductivity, new materials, critical currents and devices, New Age International (P) Limited Publishers, 1996, Editors: R. Pinto, S. K. Malik, A. K. Grover, P. Ayyub, pp. 335.
1.	**S. S. Banerjee**, N.G. Patil, Subir Saha, S. Ramakrishnan, A.K.Grover, S.Bhattacharya, G.Ravikumar, P.K.Mishra, T.V.C. Rao, V.C.Sahni, C.V.Tomy, G.Balakrishnan, D. Mck. Paul, M. J. Higgins		Effect of Disorder on the Peak Effect and Structure of Flux Line Lattice in 2H-$NbSe_2$	Proceedings of Advances in Superconductivity, new materials, critical currents and devices, New Age International (P) Limited Publishers, 1996, Editors: R. Pinto, S. K. Malik, A. K. Grover, P. Ayyub, pp. 257.

14. Awards and Recognitions

1. Invited to serve on the Editorial board of Pramana - Journal of Physics from 2015 - 2017.

2. P. K. Kelkar Young Faculty Research Fellowship Award, June 1, 2012 - May 31st, 2015.

3. Received the NASI-Scopus Young Scientist award for Physics, 2012 (Feb. 2nd, 2012)

4. On advisory board for the Journal, Superconductor Science and Technology from January 2009 onwards (impact factor Journal ~ 2.5) - Dec. 2014.

5. Young Achiever's award, 2007 -08, awarded by the Department of Atomic energy (DAE) at the Solid State Physics Symposium, Mysore 27^{th} – 31^{st} Dec. 2007.

6. Awarded the INSA (Indian National Science Academy) medal for Young Scientists, India, 2002.

7. Best poster award at the NATO Advanced Research Workshop on Magneto-optical imaging held at Oystese, Norway between 28-30 August, 2003.

8. First prize and Cash Award at the Colloquium for Young Physicists, organized by Indian Physical Society, Calcutta on 20-21 August 1998, at Saha Institute of Nuclear Physics, Calcutta.

15. Any Other Relevant Information

Invited Talks, colloquiums, chairing sessions etc.:

1. Invited talk "Jamming phenomenon and fluctuation relations in the driven vortex state of superconductors" Contemporary issues in condensed matter systems, IISc Bangalore, 14^{th} June 2016.

2. Invited talk "Evidence of Interplay between magnetic and superconducting fluctuations above Tc in doped iron arsenide compound" IIT Kanpur, Dept. day talk, 6^{th} Feb.2016.

3. Invited talk "Evidence of magnetic and superconducting fluctuations present below and above Tc in doped Iron Arsenide superconductor", IMSc, Chennai, 2^{nd} March 2016.

4. Colloquium, IISER Bhopal "Multiple current carrying states in a nanopatterned superconductor", 30^{th} Sept. 2015.

5. Invited talk "Large Negative velocity events and validity of non equilibrium fluctuation relations at the unjamming threshold in the driven vortex state of 2H-NbS_2" Vortex Workshop, SL Escorial ,Spain, 10^{st} -15^{th} May, 2015 Talk : 15^{th} May, 2015.

6. Invited talk on "Multiple current carrying states in nanopatterned superconductors" Indo Japan workshop on Nanomagnetism, NISER-IOP Bhubaneshwar, Jan 9 - 12th, 2015.

7. Invited talk on "Jamming phenomenon and Fluctuation relations for the driven vortex state in superconductors" the 6th Indo Israel Meeting on frontiers in condensed matter physics, Israel academy of Science and Humanities, Jerusalem, Israel from 6th - 11th Dec. 2014.

8. Invited talk "Commensurate - incommensurate domains and driven domain walls in the vortex state of nanopatterned superconductors", StatPhys-Kolkata VIII, 2014, S. N. Bose center, Dec.1 to 5th, 2014.

9. Invited talk "Unusual Critical state in nanopatterned SC" International Workshop on Advances in nanostructured superconductors: materials, properties and theory "La Cristalera", Miraflores de la Sierra, Madrid, 4 - 7 May (2014).

10. Invited talk at the Indian Statistical Physics Community meeting (ISPCM) in IISc Bangalore, 1st - 3rd Feb. 2014 (Saturday). The title is "Dynamic phases of the driven vortex state in superconductors: Jamming phenomena"

11. Invited talk " Competition between magnetic and superconducting order in an Iron Pnictide superconductor", IUMRS conference, IISc. Bangalore, 16th to 20th Dec.2013.

12. Invited Talk "Competition between magnetism and superconductivity in an underdoped Iron Pnictide superconductor", 14th International Workshop on Vortex matter in superconductors, Nanjing China, May 21 - 28th, 2013.

13. Invited Talk "Detecting ultra small changes in magnetization associated with phase transition in superconductors and the development of sensitive metallic nanocantilevers" 6th India - Singapore Joint Physics Symposium (ISJPS - 2013) at IIT Kharagpur, between February 25 -27, 2013.

14. Invited Talk "Advances in magneto-optical imaging" at Punjab University 7^{th} Chandigarh Science congress (CHASCON), from March 1-3, 2013.

15. Invited Talk "Magneto-Optical imaging of competing order parameters in pnictide superconductor", at the 5^{th} Indo – Singapore Joint Symposium at IIT Delhi 20^{th} – 22^{nd} Feb. 2012.

16. Invited Talk "Competition between magnetism and superconductivity in an under-doped iron arsenide superconductor" at International Conference on Functional Oxides and New carbon materials, S. N. Bose Center for Basic Sciences, Kolkata, May 8th, 2012.

17. Colloquium, "Exploring the coexistence of order parameter and a search for broken symmetry in the vortex state of superconductors", Department of Physics, IIT Kanpur, Jan. 20, 2012.

18. Invited talk on Vortex Physics, to celebrate 100 years of superconductivity, arranged by Physics Society, Dept. of Physics IIT Kanpur, Nov. 12, 2011.

19. Invited talk "Magneto-optical imaging of competing order parameters in Iron Arsenide superconductor" 5^{th} Indo – Israeli Conference, 15^{th} – 18^{th} Oct, Ramada Inn Resort, Cochin, Kerala, India.

20. Invited talk "Instabilities and random organization in driven vortex matter in 2H-NbS_2" Current Trends in Condensed Matter (CTCM, 2011), organized by ISER Kolkata, 7 – 9^{th} Oct, 2011.

21. Invited talk on "Varieties of organization in the flowing driven state of vortex matter", at international conference of Vortex Matter in Superconductors, Chicago, Organizers, Argonne National Laboratory, USA. July 31^{st} – 5^{th} Aug, 2011.

22. Physics Colloquium at TIFR, Mumbai, on "Driving through traffic jams in superconductors", on March, 2011.

23. Invited talk, titled "Strange magnetic properties of ferromagnetic nanowires" at Mahabaleshwar, in the ICTS (International center for theoretical studies of TataInstitute of Fundamental Research, Mumbai) organized condensed matter program, 2009 (ICMP09), between 5th – 23rd Dec. 2009. Talk was on 20th Dec. 2009.

24. Invited talk at the Dept. of Atomic Energy (DAE) – SSPS (solid state physics symposium), titled "Novel large amplitude low frequency velocity fluctuations in the elastic phase of the driven vortex matter", Baroda on 17th Dec. 2009, at the Maharaja Sayajirao University of Baroda, Vadodara, India.

25. Physics Colloquium titled "Low frequency, large amplitude vortex velocity fluctuations and novel dynamics of the driven vortex state" at Indian Institute of Science (IISc) Bangalore, dated 4th Dec. 2009.

26. Invited talk on Large amplitude low frequency velocity fluctuations and its evolution with different phases of the driven vortex state at the 12th International workshop on vortex matter in superconductors, Sept.12-16, 2009 at the Lake Yamanaka, Yamanashi, Japan.

27. Invited talk on "Magneto-optical imaging technique: from superconductors to plasma's" at the Condensed Matter Physics Workshop held at IIT Kanpur, India from Feb. 20 – 22nd, 2009.

28. Invited talk on "Controlling magnetic and superconducting properties at extreme scales" in the International symposium on clusters, cluster assemblies and nanomaterials (ISCANM 2009), held at HRI, Allahabad, India from Feb. 9 - 11, 2009.

29. Invited talk on "Controlling magnetic and superconducting properties at extreme scales" in the Workshop on Magnetic Nanomaterials and their Application (MNTA), at S.N. Bose Center, Kolkata, from Jan. 27-28, 2009.

30. Invited talk on "Instabilities and nonlinearities in bulk and nanopatterned superconductors" at the Indian Condensed Matter Physics Workshop, Mahabaleshwar, 9th – 22nd Dec. 2008.

31. Invited talk on "Instabilities and nonlinearities in bulk and nanopatterned superconductors" at 4th Indo-Israeli conference in Condensed Matter Physics, Nov. 3-5 2008, Zfat, Israel.

32. Talk in the Condensed Matter Seminar at Weizmann institute of Science, Israel, 6th Nov. 2008, on "Instabilities and nonlinearities in bulk and nanopatterned superconductors".

33. Lecture Series on Superconductivity, Invited talks (4 nos.) at a School Organized on Condensed Matter Physics, at Harish Chandra Research Institute Allahabad, 5th June 2007.

34. Advances in magneto-optical imaging and imaging instabilities in vortex matter; **(**Invited Talk); East Asia symposium on Superconducting Electronics, IIT Delhi 14th December, 2007.

35. Instabilities in superconductors and giant magnetic fields associated with plasma's; (Invited Talk)**;** Department of Atomic Energy, Solid State Physics Symposium, Mysore, 27th to 31st Dec. Mangalore, 2007.

36. Lecture Series on Superconductivity, Invited talks (4 nos.) at a School Organized on Condensed Matter Physics, at Harish Chandra Research Institute Allahabad, 5th June 2007.

37. Institute Colloquium titled: Advances in magneto-optical imaging, 18th July, Tata Institute of Fundamental Research, Mumbai.

38. Instabilities in superconductors and mapping megagauss magnetic fields associated with laser plasma interactions. S. N. Bose National Center for Basic Sciences, Kolkata, 30th March, 2007.

39. Oral and Poster Presentation: Crossover in pinning regimes of the vortex solid and the peak effect at the 11th International workshop on Vortex Matter at Wroclaw, Poland, July 3rd – 8th, 2006.

40. Chaired a session: At the 11th International workshop on Vortex Matter at Wroclaw, Poland, July 3rd – 8th, 2006.

41. Poster presentation: Pinning regimes in the vortex solid and the crossover between them in single crystals of 2H-$NbSe_2$ at the 8th International Conference on Materials and Mechanisms of Superconductivity and High Temperature Superconductors, Dresden, July 9rd – 14th, 2006.

42. Invited talk: Instabilities in Superconductors, National conference on Emerging trends in engineering materials, Thapar Institute of Engineering and Technology, Patiala, Punjab, Feb1-3, 2007.

43. Chaired a session: At the National conference on Emerging trends in engineering materials, Thapar Institute of Engineering and Technology, Patiala, Punjab, Feb1-3, 2007.

44. Presented an invited talk at the condensed matter physics seminar organized in the dept. of Physics, IIT Kanpur, from 4th – 6th Feb, 2005. Title of my talk was on "Effect of dilute density of correlated disorder on the vortex state in superconductors: The porous vortex matter".

45. Presented an invited talk titled "Melting of heterogenous vortex matter: the vortex nanoliquid" at the xth international vortex state studies workshop (IVW-X) at the Tata Institute of Fundamental Research, Mumbai, 9th – 14th Jan, 2005.

46. Presented a tutorial titled "Magneto-optical imaging of superconductors" at a satellite tutorial session arranged prior to the the xth international vortex state studies workshop (IVW-X) at the Tata Institute of Fundamental Research, Mumbai, 7th – 9th Jan, 2005

47. Presented the Condensed Matter Physics Seminar in the Dept. of Condensed matter Physics, at the Hebrew University, Jerusalem, on 6th May. 2004. Title of my presentation was "Porous Vortex Matter".

48. Presented the Condensed Matter Physics Seminar in the Dept. of Condensed matter Physics, at the Weizmann Institute of Science, on 28th Jan. 2004. The title of my presentation was "Porous Vortex Matter".

49. Presented a poster on "Magneto-optical investigations into the melting of porous vortex matter in the presence of columnar defects" at the NATO Advanced Research Workshop on Magneto-optical imaging held at Oystese, Norway between 28-30 August, 2003.

50. Oral presentation (23rd June, 2003) titled "Heterogeneous melting of 'porous' vortex matter" at the 9th international workshop on vortex dynamics and vortex matter (ESF), Oleron Island, France 22-27 June, 2003.

51. Oral presentation (27th May, 2003) titled "Porous vortex matter" at the M2S-HTSC-VII, materials and mechanism of superconductivity and high temperature superconductors, held in Rio de Janeiro, Brazil 25-30 May, 2003.

52. Chaired the Superconductivity and Ferromagnetism session on 30th May, 2003 at the recently concluded M2S – HTSC – VII conference on materials and mechanisms of superconductivity and high temperature superconductors held at Rio de Janeiro, Brazil, between May 25 -30, 2003.

53. Phases of vortex matter in the presence of columnar defects: a magneto-optical study of BSCCO superconductors. Presented in the Condensed Matter Physics seminar at the Ben-Gurion University, Beer Sheeva, Israel, 25th Nov, 2002.

54. Phases of vortex matter in the presence of columnar defects: a magneto-optical study. Presented in the condensed matter physics seminar at ETH Zurich (laboratorium fur Festkorperphysik), Switzerland, Oct. 11, 2002.

55. Phases of vortex matter in the presence of columnar defects: a magneto-optical study. Presented at Ecole Polytechnique (Laboratoire des Solides Irradies), Palaiseau, France, Oct.7, 2002.

56. Presented a seminar in the Dept. of Condensed matter Physics and material sciences, TIFR, pertaining to Investigations into the phases of vortex matter using the differential magneto-optical technique, October, 2001.

57. Presented a colloquim at the Tata Institute of Fundamental Research on Pristine issues in condensed matter Physics via Vortex State Studies, July, 2000.

58. Oral presentation on "Peak Effect and its relation to Phases of Vortex Matter" during a panel discussion session Chaired by Gianni Blatter at the "Experimental Workshop on High Temperature Superconductors and related materials (Advanced Activities)" held between Nov.19 - Dec.6, 1998, in San Carlo de Bariloche, Argentina.

59. Oral presentation on "Phases of Vortex Matter and Transformation Amongst them" at the Colloquium for Young Physicists organized by Indian Physical Society and held at Saha Institute of Nuclear Physics, Calcutta on August 20-21, 1998.

60. Oral presentation on "Metastable states of Vortex Matter" in a Discussion Meeting on Vortices, held in T. I. F. R. on July 8, 1998.

61. Invited presentation on "Peak Effect in Superconductors: A Key to Elucidate Different Phases of Vortex Matter" at the International Conference on Superconductivity held between Dec. 15-17, 1997 in University of Hyderabad.

62. Oral presentation on "Thermodynamic Evidence for Reentrant Peak Effect in a Clean Single Crystal of 2H-$NbSe_2$ and the Effect of Disorder and Thermomagnetic History on it'' at the V^{th} International Conference on Materials and Mechanisms of Superconductivity, High Temperature Superconductors, M^2S-HTSC-V, held in Beijing, China from Feb.28 to March 4, 1997 .

Conferences Organized

1. Non-equilibrium Statistical Physics (NESP), sponsored by the International Center for Theoretical Sciences, unit at TIFR (more details at the conference link: http://www.icts.res.in/program/nesp) . Venue : IIT Kanpur, Dates : 30st Jan. 2010 to 4th Feb. 2010. Followed by a satellite meeting (IITK:GJ)

2. Under the auspices of the Golden Jubilee celebrations of IIT K, we are also organizing an International Conference on the specialized topics Interaction, Instability, Transport and Kinetics: Glassiness and Jamming (IITK:GJ) during the five days, February 4-8, 2010. (more details at the conference: http://www.cse.iitk.ac.in/users/gj/new/conference/pages.php?confID=25)

Teaching:

Course No. & Title	Level (UG/PG)	Number of Times	Developed by you?
Phy102N (Mechanics & relativity)	UG	5 (For three times, received Letter of appreciation from Director, IIT Kanpur for Phy102N course for above average teaching performance in student reaction survey on the course)	No. However developing a virtual web based lab. for demonstrating various physics concepts http://iitk.vlab.co.in/?sub=27&brch=236 Also developing demonstration laboratory experiments.
Phy 102 Tutorial (mechanics & relativity)	UG	7	
Phy 102 S(mechanics & relativity)	UG	1 (Letter of appreciation received from Director, IIT	

		Kanpur for above average performance in student reaction survey on teaching)	
Phy103R (electrodynamics)	UG	1	
Phy 101 Labs (Undergraduate Physics Lab)	UG	5	I have introduced a new experiment in Phy101 lab, along with the write up in the manual, Measuring the velocity of light and also changes in instruments used for some experiments in Phy101
Phy 690T (Superconductivity and Applications, an advanced elective course)	PG	4 (for two times I delivered the received letter of appreciation received from Director, IIT Kanpur for above average performance in student reaction survey on teaching)	Yes. Phy690T, was graduate level elective on introduction to the phenomenon of superconductivity and its application. (Covers BCS theory, Ginzburg Landau theory, Mixed State of SC and vortices, Josephson effect, SQUIDs, Experiments related to SC
Phy543 (Introduction to Condensed Matter Physics)	UG/Masters/PhD students)	3 (Three times received letter of appreciation received from Director, IIT Kanpur for above average performance in student reaction survey on teaching)	
MSc Final year, one year experimental projects.	UG (MSc final year, 2 semester projects)	17	Two students have received best project award. One of the projects is being written up for being communicated to a Journal
Computational Physics	UG (MSc final year students)	1 (Jan – April, 2014 semester). Received letter of Appreciation from the Director for above average performance in student reaction survey in the course.	

Miscellaneous activities: Administrative responsibilities in my parent organization

Period	Organisation	Nature of Responsibility	Designation
2005 – 07 (sept)	IIT Kanpur	Member of DUGC*, Making Dept. Exam timetable, Student related matter associated with DUCG.	Member of DUGC.
2007 – 2009	IIT Kanpur	Departmental Budget Convener	Convener
2009 – 2011	IIT Kanpur	Member of DPGC** , Dept. IRDC committee	Member, DPGC
2011 - 2013	IIT Kanpur	Convener DPGC** (Departmental PostGradutate committee).	Convener

2012-2013	IIT Kanpur	Vice Chairman, GATE exam (a major all india exam through which students are selected into the M. Tech program in Engineering and PhD programs in Engineering and Sciences in Indian Institute of Technology across India)	Vice Chairman
2013 -	IIT Kanpur	Central Cryogenics Facility, Convenor.Inchange of Liquid Helium and Liquid Nitrogen facility of the facility	Convenor *Notable work done: 1. Installed a new Liquid Nitrogen Plant from Linde. 2. Helped enhance liquid He budget for Institute. 3. Set up a new helium recovery manifold of cylinders for the plant. 4. Setup a new website for the helium and liquid nitrogen plant.
2013 -	IIT Kanpur	Co - Convenor, Magnetic measurements facility, ACMS	Co - Convener.
2015 -	IIT Kanpur	Member of the Institutes ethics cell	
2016 -	IIT Kanpur	Convenor, Institute Ranking committee.	

*DUGC: Dept. under grad. Committee ; **DPGC: Dept. post. Grad. Committee

Some other miscellaneous administrative duties.

1. Warden Hall 1 & Warden Incharge (for last 4 months) 2007 - 2011
2. I have been a JAM question paper setter for Physics (2005), as well as freezing solution team and grading on other years (2006 and 2008). (JAM is an all India entrance exam for students into the Masters program in Sciences for entry into the Indian Institute of Technology Institutions across India).
3. I have been a Faculty Guardian thrice for new UG students.
4. I have been involved in IIT Joint Entrance Exam (IIT JEE) Center representative duty since 2005.
5. I have been the IIT JEE Physics Question paper setter for 2011
6. Served on Junior technical staff selection committee and was also the convener from the physics dept for the July 19th Selection (involved setting up the question paper, trade test, evaluation and interview).
7. As the overall incharge of Phy101 UG lab, I have been involved in planning and execution of shifting from the old core labs to the new core lab. building.
8. Introduced a new experiment, velocity of light in the Phy101 UG physics lab and also wrote the manual.
9. Setting up demonstration experiments for rigid body dynamics for Phy102 course.
10. Question paper setting for national exams like GATE and CSIR exams

Brief overview of some of my present research activity

Main results obtained since joining IIT Kanpur

1. In 2007, with my student we identified for the first time a crossover from a weak collective to a strong pinning regime deep in the quasi static elastic vortex state. The discovery was facilitated by choosing a field orientation parallel to the ab plane orientation of the single crystal, to minimize effects related to geometric barriers and extended defects (PRL **98,** 027003 (2007))

2. We developed time series measurement techniques which identified for the first time signatures of periodic velocity correlations in the driven vortex state, with a characteristic frequency in the sub hertz

regime. The work indentified the possibility of self organization into newer regime of vortex flow distinct from the elastic flow regime. (PRL **103**, 167001 (2009)).

3 . The high sensitivity magneto-optical imaging setup developed in my lab. at IITK (only one in the country) has been adapted for the non destructive imaging of materials predisposed to damage and cracks(work filed by Intellectual ventures for a simultaneous national and international patent (2011)).

4. We have used the high sensitivity magneto-optical imaging setup to map out magnetic fields around dense solid plasmas generated by intense *p*-polarized laser irradiation of tapes. The peculiar field distribution indicated the presence of hydrodynamic instabilities in the laser generated plasma. (PRE **77**, 046118 (2008)). The work has also set the stage for our current investigations on ultra fast spin dynamics in magnetic materials using the above (MS under preparation).

5. Magnetization studies on Cobalt nanowires (50 nanometers) embedded in nanoporous anodized alumina template grown in my lab at IIT Kanpur, reveal significant changes in the magnetic anisotropy as well as the onset of an unusual exchange bias like effect below 100 K. These unusual properties we argued are trigger by stress induced core-shell like magnetic configuration below 100 K. This work holds potential for applications (arXiv:1106.1965v1).

6. Using the focused ion beam (FIB) milling a hexagonal array of nanopatterned blind holes, in a single crystals of 2H-NbSe2 and BSCCO reveals a regime of enhanced impedance to vortex flow in the interstitial channels between the blind holes (Supercond. Sci. Technol. 23 (2010) 075002, and cover page article of this journal). Presently magneto optic imaging reveals the presence of a novel electromagnetic barrier around the patterned region of the sample (a portion of this work appears in Applied Surface Science (2011, in press); another detailed MS on barrier and novel ratchet like behavior we have observed in this system is under preparation).

7. Mapping local magnetic field using the high sensitivity magneto-optic imaging technique at IITK, we have identified the elusive low field reentrant melting line in a high Tc superconductor of BSCCO. We show that the reentrant low field melting line behavior is distinct from the high field melting and through a quantitative analysis we propose a form exhibiting the disorder dependence of the low field melting phase boundary (Submitted; not put on cond-mat, however preprint can be made available))

8. Using magneto - optical imaging to image the local magnetic field distribution in the new class of Pnictide superconductor (namely, $CaFe_{1.94}Co_{0.06}As_2$), we have identified direct evidence of magnetic correlations deep inside the superconducting state of this system. We have uncovered evidence for an anomalous Meissner response in this class of superconductors, which are associated with the developed of another order parameter along with superconductivity. We are also studying effects related to coexistence of magnetic fluctuations and superconductivity in doped Pnictides (Co doped $BaFe_2As_2$ system)

Overview of some results from my lab.

Development of the high sensitivity MOI setup: Over the past year in my lab. we have been successful in setting up the magneto-optical imaging (***MOI***) setup with a low temperature arm at IIT Kanpur. The MOI technique relies on optically imaging the spatial distribution of magnetic fields in a material. Briefly, the physical principle behind it is Faraday rotation viz., rotation in the plane of polarization of the light by an angle proportional to the magnetic field in the direction of light propation. Spatially resolving the faraday rotated light intensity is the technical principle of our setup. The setup we have built at IIT Kanpur (see picture below), involves a combination of filters, apertures, polarizers and beam splitters. A schematic diagram of the setup is shown in Fig.1 below. The CCD camera shown in the schematic captures the spatial distribution of the faraday rotated light intensity which inturn gives information about the local field in the sample. The sample T in the figure 1 can be placed in a chamber with a cold finger. For the low temperature arm, we have suitably modified a closed cycle refrigerator (CCR) (coupled with a dry low vibration turbo pumping station (supported by CSIR). We also developed a support to reduce the vibration in the CCR. Whereas before these modifications the level of vibrations was at the level of few 100's of microns with the conventional CCR, in our modified CCR we are able to get vibrations down to a micron-level. We are currently trying to reduce the vibration still further. The overall specifications we have achieved in our low temperature MOI setup is (i) Spatial resolution of > 1 micron (we have been able to see structures down to 1 micron. It should be emphasized here that we use 550 nm for our investigation therefore our spatial resolution is theoretically limitied to 0.5 micron. (ii) We have achieved a temporatal resolution of few milli seconds (though much higher is possible) (iii) Most importantly, we have achieved a magnetic field resolution of few milli Gauss.

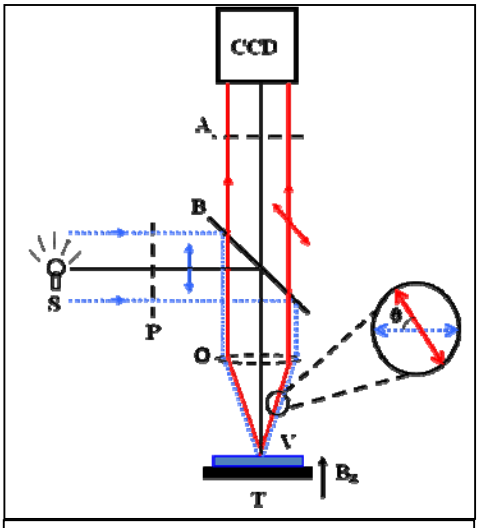
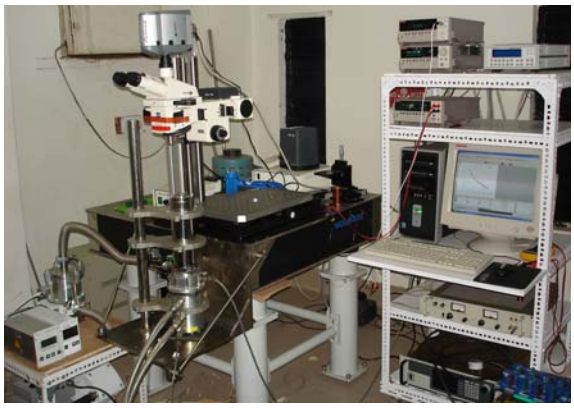


Fig.1. Schematic of MOI setup consisting of, light source (s), linear polarizer (P), beam splitter (B), objective (O), MOM indicator film (V), sample (T), analyzer (A). Also indicated is the local magnetic field direction (B_z). The blow up shows the state of linear polarization in the incident (blue, dotted line) and reflected beam (red, solid line)



Shown in Fig.2 is an image we have captured with our Magneto-optical imaging setup which shows the field distribution around a 25 micron copper wire carrying about 100 mAmps of curre. To obtain this MOI image (bottom left image in Fig.2) we employed a novel technique called the self field imaging technique. This involved a lockin type of a detection scheme. The signal to be detected is modulated (in our case the faraday rotated light) at a particular frequency and then we capture the rotated light intensity from the sample at the appropriate frequency. With this sort of a resolution we have succeeded in achieving for our MOI system, we are probing via our imaging system the magnetic and transport properties of a number of superconducting and magnetic sytems, their nanostructures as well as their heterstructures.

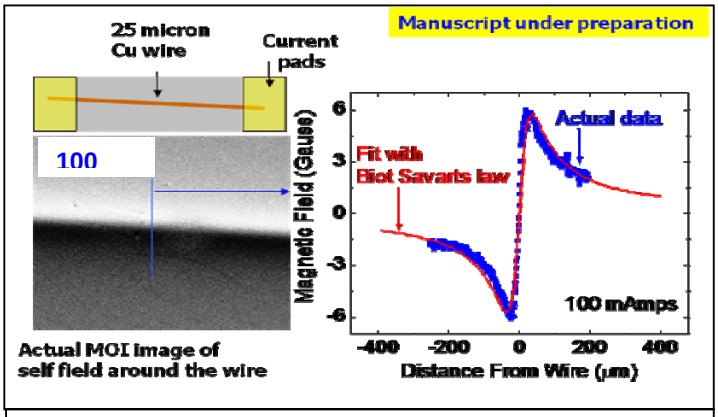


Fig.2. Shown above is a schematic of the copper wire (25 microns, which carries 25 mAmps of current. The left lower image is a MOI image of the wire carrying current obtained with our setup. The bright and dark correspond to the field either pointing out or into the plane of the paper. The graph on the right the data (blue) points are the field values along the blue line in the

<u>Topics of research I am pursuing in my laboratory are:</u>

(a) <u>Mapping giant magnetic fields around dense solid plasmas by high resolution magneto-optical microscopy or magneto-optical imaging (MOI)</u>: We have investigated the distribution of magnetic fields around dense solid plasmas generated by intense p-polarized laser (~10^{16} Wcm^{-2}, 100 fs) irradiation of magnetic tapes, using high sensitivity magneto optical microscopy. By investigating the effect of irradiation on the magnetic tape, we present evidence for axial magnetic fields and map out for the first time the spatial distribution of these fields around the laser generated plasma. By using the axial magnetic field distribution as a diagnostic tool we uncover evidence for angular momentum associated with

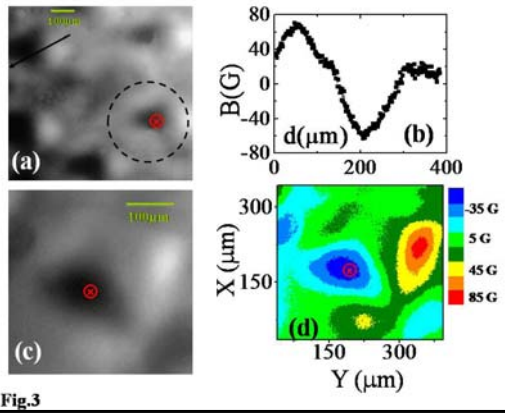


Fig.3

Fig.3. The above images (a) and (b) are MOI images obtained with our setup at IIT K. They are maps of the field distribution around a high intensity laser pulse irradiation. The figs. (b) and (d) are the magnetic field distribution inferred from the MOI images.

the plasma. In this work we have used MOI which provides clear evidence for the magnetic domain structure in a prerecorded magnetic tape. Having imaged these domains, we irradiated the tape with an intense laser beam. After investigating the laser irradiated spot with MOI we find that the magnetic domains at the irradiation site have got completely scrambled. We inferred that strong magnetic fields may have been produced around the laser irradiations spot. We then irradiated an unmagnetized tape possessing no prerecorded magnetic information or domains with the high intensity laser beam. To our surprise we found novel domain structure (cf. Fig.3 below). The patterns of field distribution obtained in Fig.3 when analysed, revealed interesting information above the nature of the plasma which was ignited in the first few picoseconds after the femtosecond laser pulse irradiation. This work of ours has been published and is available at *Phys. Rev. E, 77, 046118 (2008)*.

(b) Nanostructures of magnetic materials: Using annodization of aluminum and electrodeposition as a route to growing nanostructures, we have developed at IIT Kanpur a low cost setup to make ordered nanopore array in anodized aluminum. We have made nanopores in the range of 25 nm to 60 nm. We have used the electrodeposition technique using this nanoporous array to make nanowires. We have succeeded in making nanowires of Cu and Co. We have found interesting magnetic properties of these nanowires, which have potential for application in magnetic data storage devices. The paper relating to this work is currently under review in a journal. In Figure 4. show some of the nanopores of diameter of 60 nm we have grown in anodized alumina templates (AAO). The panel also show some Co nanowires we have grown in this template whose magnetic properties we have investigated.

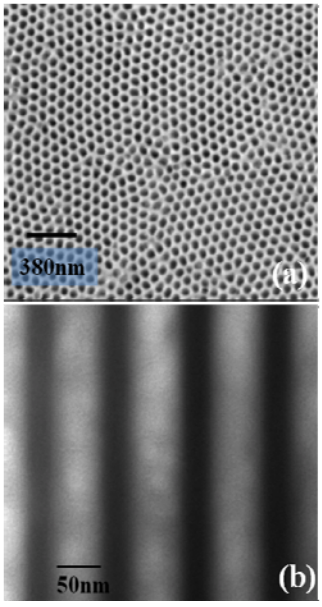


Fig.4. Image (a) SEM image of 50 nm diameter pores grown in Alumina (AAO) in our lab. Image (b) shows TEM image Of Cobalt nanowires inside the AAO.

(c) Properties of nano-patterned superconductor: We have succeeded in making novel patterned nanostructured surface of superconductors using the Focussed Ion Beam facility at IIT Kanpur. We have generated a regular hexagonal array of 100 nm sized blind holes in $NbSe_2$ and BSCCO. The holes are separated by 350 nm. Due to the possibility of matching of the vortex state in superconductors with the array of holes, we began investigating these structures. In such structures we find interesting metastable magnetization response. We understand these results on the basis of an interesting effect of collective action of correlated pinning centers. Our investigation with magneto-optical imaging not only confirms this collective effect behavior but also reveals other interesting modification of pinning properties of the vortices.

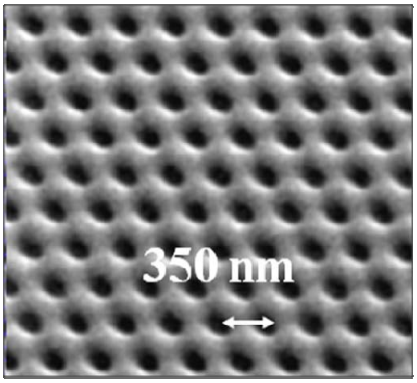


Fig.5. The image is blind holes made in $NbSe_2$ using focussed ion beam milling Facility at IIT Kanpur. Each hole has a diameter of 170 nm.

(d) Miscellaneous: (i) We have begun investigating magnetic domain structures in dilute magnetic semiconducting samples. We have also begun investigations into Colossal magnetoresistance materials (see our work in Phys. Rev. B 76, 214429 (2007)). In the coming years we hope to make substantial progress in understanding the physics in some of these systems especially in relation of metal insulator transitions concomitant with transformation in the magnetic state, spontaneous phase separation. (ii) We are also investigating inhomogeneous nature of superconductivity in the Pnictides (some of which have been outlined in point 9 of my CV).