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Chennai Mathematical Institute

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Annual Report
2008 - 2009

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Contents

Preface

I take great pleasure in presenting the Annual Report of the Chennai Mathematical Institute for the period 2008-09.

CMI has always been and continues to be a centre of excellence for research in the Mathematical Sciences.In addition, it has a unique National Undergraduate Programme in Mathematics and Computer Science and in Physics.We admitted the 11th batch of students in our Undergraduate Programme in August 2008.

The number of applicants to our programmes has been steadily increasing over the years.The success of our undergraduate and graduate programmes is reflected by the very heartening response that our offers of admission have met with.As usual our alumni have all been very well placed in universities and research institutions in India and abroad.

CMI also runs successful Masters and Ph.D. Programmes in Mathematics and in Computer Science.The first doctoral degree after CMI became a Deemed University, was awarded in August 2008. Two more students have successfully defended their doctoral theses during 2008-09.

CMI has close academic cooperation with several institutions in India (special mention must be made of the Institute of Mathematical Sciences, Chennai) and abroad.Our collaboration with the Ecole Normale Suprerieure of France continues with vigour with three top students from B.Sc. Mathematics and Computer Science going to Paris every summer for two months and four students of ENS coming each year to teach in the undergraduate programme.This year, for the first time, CMI has sent its top three Physics graduates to the Ecole Polytechnique, France, for a summer internship, making the beginning of what we expect to be a long a fruitful collaboration.CMI has also signed an MoU with the Universite Pierre et Marie Curie (Paris VI) for research collaboration.It also has similar MoUs with the Universite de Paris-Sud at Orsay, France, and the ENS at Cachan, France.Recently, CMI has been

included as a full partner in the European Project ALGANT in Algebra, Geometry and Number Theory involving several European and one Canadian University.We are proud to say that all these agreements were initiated by the other parties after observing the quality of CMI students.

Our faculty members continue to win laurels for their scientific achievements.Prof. V. Balaji won the J.C. Bose fellowship and Dr. K. Narayan was awarded the Ramanujan fellowship by the Department of Science and Technology (DST).

We have had several academic programmes on campus.In keeping with its status as a University, CMI encourages activities not only in the sciences, but in humanities as well.Our adjunct Professor of Music, Prof. Ramanathan, arranged several seminars on Music Appreciation.Our adjunct Professor of English, Shri Sreekumar Varma, arranged seminars on "Translating through literature" and "Outsourcing in Literature". In Computer Science, a workshop on "Perspectives in Concurrency Theory" was organized in December 2008 in honour of Prof. P.S. Thiagarajan's 60th birthday.A number of eminent speakers, including Turing Award winners, spoke at the workshop.Later, in January 2009, Professors Madhavan Mukund and Narayan Kumar organized an international workshop on "Automata, Concurrency and Timed Systems" as part of the Indo-French Networking Project involving CMI, IMSc, IISc, ENS Cachan and University of Bordeaux.CMI hosted jointly with IMSc, Indo-French Conference in mathematics in December 2008.Prof. V.V. Sreedhar and visiting Professor, Prof. A. Thyagaraja ran a very successful weekly seminar on Fluid Dynamics between January and March 2009.The speakers included eminent mathematicians and physicists from all over the globe. Prof. V. Balaji organised a workshop on "Principal Bundles in Geometry" during February-March 2009.

In addition to the generous support from the Department of Atomic Energy (DAE), CMI also receives support from private sources. I take this opportunity to thank the Shriram Group Companies, Bajaj Allianz and Agilent Technologies for their support.

In April 2008, Chennai Mathematical Institute entered into a three year academic alliance with Tata Consultancy Services (TCS). Under this alliance, CMI faculty participate in training programmes at TCS and employees at TCS can enroll for the MSc Computer Science programme at CMI. TCS provides an annual grant to CMI that is used to fund computer equipment, academic visits to conferences and other institutions by CMI faculty and external visitors to CMI for academic collaboration. Academic visitors to CMI under this programme also deliver special lectures as part of the CMI-TCS Distinguished Lecture Series.

I thank the DST and the Board for Research in Nuclear Sciences (BRNS) whose BRNS-DST grant has allowed us to have a vibrant visitors' programme. The Ministry for Human Resources Development (MHRD) has used its good offices to organise a grant from the Universities Grants Commission (UGC) for an additional building to house an auditorium and additional academic space as well as guest rooms to accommodate visitors and students.

CMI enjoys the goodwill of individual donors too. Dr. Swaminathan made a generous endowment in the memory of his uncle Mr. K. Lakshmanan and Mrs. Usha Rubugunday made a similar endowment in memory of her husband. This has led to annual Lakshmanan and Rubugunday memorial lectures. The first in these series were given in January 2009 by Professors M.S. Narasimhan and R. Sridharan respectively.

As you can see by the instances cited above, CMI, enjoys the support of public, academic and private institutions as well as students and private individuals. Thanks to this support, we have been able to establish CMI as a much desired destination to work in the mathematical sciences. I am sure that CMI will continue to grow as a centre of excellence.

C S SESHADRI
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	K. Narayan
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	R. Srinivasan
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Faculty Profiles

C.S. Seshadri

C.S. Seshadri received his B.A. Hons. (Mathematics) degree from Madras University (1953) and his Ph.D. from Bombay University (1958).

He was at the School of Mathematics, Tata Institute of Fundamental Research, Bombay from 1953 to 1984 starting as a Research Scholar and rising to a Senior Professor. He was then a Senior Professor at the Institute of Mathematical Sciences, Madras (1984-89).

He has been a Visiting Professor at the University of Paris, France; Harvard University, Cambridge, U.S.A.; Institute for Advanced Study, Princeton, U.S.A.; University of California at Los Angeles, Los Angeles, U.S.A.; Brandeis University, U.S.A.; University of Bonn, Bonn, Germany; Kyoto University, Kyoto, Japan.

He has given invited talks at many international conferences including the International Congress of Mathematicians, Nice, France, 1970.

He has received the Shanti Swarup Bhatnagar Award (1972) and the Srinivasa Ramanujan Medal of Indian National Science Academy (INSA).He was awarded the D.Sc. Degree (Honoris Causa) of Banaras Hindu University, Varanasi (1985).He has been awarded the Shanti Swarup Bhatnagar Medal (1995) of INSA and Srinivasa Ramanujan Birth Centenary Award (1995-96) of Indian Science Congress Association (ISCA).He has received G.M. Modi Science Award (1995), The Trieste Science Prize of the Academy of Sciences for the Developing World in (2006) and H.K. Firodia Award for Excellence in Science and Technology, Pune (2008). He has also been awarded Padma Bhushan by the President of India (2009).

He is a Fellow of the Indian Academy of Sciences, Indian National Science Academy and a Fellow of the Royal Society. He has been appointed National Research Professor of the Ministry of Human Resource Development Government of India in 2006.

His research interests are: Algebraic Geometry and Algebraic Groups.

S. Kesavan

S. Kesavan received his B.Sc. (Mathematics) from University of Madras (1971), M.Sc. (Mathematics) from Indian Institute of Technology, Madras (1973) and Docteur-es-Sciences Mathematiques from Universite Pierre et Marie Curie (Paris VI), awarded for the thesis entitled Sur approximation de problemes lineaires et nonlineaires de valeurs propres, supervised by Professors J.L.Lions and P.G.Ciarlet (1979).

He is a Fellow of the National Academy of Sciences, Allahabad (1997) and the Indian Academy of Sciences, Bangalore (2008). He won the Tamil Nadu Scientist Award (TANSA), given by the Tamil Nadu State Council for Science and Technology, in Mathematical Sciences for 1998 and the C. L. Chandna Award for Outstanding Contributions to Mathematics Research and Teaching (1999).He is a Member of National Board for Higher Mathematics.

He is a Life Member of Indian Mathematical Society and Ramanujan Mathematical Society.He is a member of International Society for the Interaction of Mechanics and Mathematics (ISIMM), Indian Society of Industrial and Applicable Mathematics (ISIAM) and American Mathematical Society.He is a Fellow of Forum d'Analystes, Chennai.

V. Balaji

V. Balaji received his B.A. Hons. (Mathematics) from University of Delhi (1982), his M.A. (Mathematics) degree from University of Delhi (1984), his Ph.D. from University of Madras (1991).

He has been an NBHM Post-doctoral Fellow at the Chennai Mathematical Institute (1989-92).

His research interest is: Algebraic Geometry.

Madhavan Mukund

Madhavan Mukund received his B.Tech. (Computer Science) degree from the Indian Institute of Technology, Bombay (1986) and his Ph.D. from Aarhus University, Aarhus, Denmark (1992).

He is a member of the Executive Council and the Secretary of the Indian Association for Research in Computing Science (IARCS).

His research interests are: Partial order based models for concurrent systems and Logics for specifying and verifying concurrent systems.

K. Narayan Kumar

K. Narayan Kumar received his M.Sc. (Tech.) in Computer Science from Birla Institute of Technology and Science, Pilani (1990). He received his Ph.D. degree from the University of Bombay (1997). He has been a visiting scholar at the State University of New York at Stony Brook (1997-98).

His research interests include Logic, Automata theory and Concurrency.

S. Senthamarai Kannan

S. Senthamarai Kannan received his B.Sc. degree from HKRH College, Uthama Palayam (1985-88), M.Sc. degree from the Madurai Kamaraj University (1988-90) and P.D. from the Chennai Mathematical Institute, (1992-98).He has been a Post-doctoral Fellow at the International Centre for Theoretical Physics (1999-2000).

His research interests are: Representation Theory and Algebraic Geometry.

Shiva Shankar

Shiva Shankar received his B.Tech. (Electrical Engineering) from the Indian Institute of Technology, Delhi (1978) and his Ph.D. from SUNY, Stony Brook (1983).

He has been an Assistant Professor, at the Department of Applied Mathematics, SUNY, Stony Brook (1983-84), a Visiting Fellow at the School of Mathematics, Tata Institute of Fundamental Research, Bangalore (1984-88), an Associate Professor at the Department of Electrical Engineering, Indian Institute of Technology, Bombay (1988-2000).

Visiting Positions include Institute of Mathematical Sciences, Chennai, and at Mathematics Institute, University of Groningen.

His research interests are: Partial Differential Equations, Mechanics and Control Theory.

V.V. Sreedhar

V.V. Sreedhar received his B.Sc. degree from Andhra University, Visakhapatnam, M.Sc. degree in Physics from the Indian Institute of Technology, Madras and received his PhD degree in physics from Saha Institute of Nuclear Physics, Jadavpur University, Calcutta.

He has been an Assistant Professor in the Department of Physics at the Indian Institute of Technology, Kanpur, a Post-doc at the School of Theoretical Physics, Dublin

Institute of Advanced Studies, Dublin, Ireland and a Post-doc at the Institute for Theoretical Physics, Uppsala University, Uppsala, Sweden.

His visiting positions include stints at the S.N. Bose National Centre for Basic Sciences, Kolkata, Raman Research Institute, Bangalore, Universities of Rochester, New York and Cincinnati, Ohio, U.S.A. and the High Energy Research Organization (KEK), Tsukuba, Japan.

His research interests are: Quantum Entanglement, Classical and Quantum Field Theory and Fluid Dynamics.

K.V. Subrahmanyam

K.V. Subrahmanyam received his B.Tech. (Computer Science) degree from the Indian Institute of Technology, Bombay (1986) and M.S. from Vanderbilt University, U.S.A. in 1987. He received his Ph.D. degree from the University of Bombay in December, 1995.

His research interests are: Circuit Complexity, Algebraic methods in Complexity theory.

Clare D' Cruz

Clare D' Cruz received her M.Sc. (Mathematics) from the Indian Institute of Technology, Bombay (1991) and her Ph.D. (Mathematics) from the Indian Institute of Technology, Bombay (1996).

She has been a Post-Doctoral Fellow at the Tata Institute of Fundamental Research, Mumbai (1996-98) and a Visiting Scholar at the Northeastern University, Boston, U.S.A. (1997-98).

Her research interest is: Commutative algebra.

Samir Datta

Samir Datta received his B.Tech. degree from the Indian Institute of Technology, Kanpur (1995), M.S. degree from Rutgers University (1997) and Ph.D. degree from Rutgers University (2004).

He has been a Network Architect at Tellium Inc. (2000-03) and a Post Doctoral Fellow at WINLAB, Rutgers University (2004-05).

His research interests are: Complexity Theory, Wireless and High Speed Networking.

Govind S. Krishnaswami

Govind S. Krishnaswami received his B.Sc (Physics), B.A. (Mathematics) from University of Rochester,U.S.A. (1999), M.A. (Physics), from University of Rochester, U.S.A. (2001) and Ph.D. (Physics) from University of Rochester, U.S.A. (2004).

He has been a Marie Curie Fellow, Spinoza Institute andInstitute for Theoretical Physics, Utrecht University, The Netherlands.

His research interests are: Quantum Field Theory, Hydrodynamics and Mathematical Physics

Upendra Kulkarni

Upendra Kulkarni received his B.Tech (Computer Science) from the Indian Institute of Technology Bombay, Mumbai (1992) and Ph.D. (Mathematics) from Brandeis University, U.S.A. (1998).

He has been a Visiting Assistant Professor at the University of Massachusetts Amherst (1998-2000), an Assistant Professor at the Truman State University (2000-05), An Associate Professor at the Truman State University (2005), a Visiting Scientist at the Indian Statistical Institute, Bangalore (2005-06) and a Visiting Fellow at the Tata Institute of Fundamental Research, Bangalore (2006-07).

His research interests are: Representations of algebraic groups over the integers and in characteristic **p**, Algebraic aspects of Lie representation theory including Lie algebras, quantum groups and related combinatorics and in solving elementary challenging problems.

K. Narayan

K. Narayan received his B.Tech. (Engineering Physics) from the Indian Institute of Technology Bombay, Mumbai (1997), M.S. (Physics) from the Cornell University, U.S.A. (1999) and Ph.D. (Physics) from the Cornell University, U.S.A. (2002).

He has been a Research Assistant at the Cornell University, U.S.A. (1998-2001), a Research Assistant at the Cornell University, U.S.A. (2001-02), a Postdoctoral Research Fellow at the Duke University, U.S.A. (2002-04) and a Postdoctoral Research (Visiting) Fellow at the Tata Institute of Fundamental Research, Mumbai (2004-07).

His research interests are: String theory and cosmology, Stringy geometry and D-brane gauge theories.

Suresh Nayak

Suresh Nayak received his B.Tech. (Computer Science) degree from the Indian Institute of Technology, Bombay (1991), and Ph.D. (Mathematics) degree from the Purdue University, (1997,98).

He has been a Visiting Fellow at the Harish-Chandra Research Institute, Allahabad (1999-2001).

His research interests are: Algebraic Geometry and Commutative Algebra.

R. Srinivasan

R. Srinivasan received his Ph.D. degree in Mathematics from the Indian Statistical Institute and the Institute of Mathematical Sciences (1998).

He has been a Visiting Fellow at the Harish-Chandra Research Institute, Allahabad (1998-2000), a Post Doctoral Fellow at the Indian Statistical Institute (2000-01), a Post Doctoral Fellow at Universite d'Orleans, France (2001-02), a Visiting Scientist at the Indian Statistical Institute (2002-03), a Visiting Fellow at ICTP, Trieste, Italy (2003) and a JSPS Post Doctoral Fellow at University of Tokyo, Japan (2003-05).

His research interests are: Operator Algebras and Operator Theory.

M. Sundari

M. Sundari received her M.Sc. (Mathematics) from the University of Hyderabad, Hyderabad (1988), M.Phil. (Mathematics) from the University of Hyderabad, Hyderabad (1990) and Ph.D. (Mathematics) from the Indian Statistical Institute, Bangalore (1996).

She has been a Visiting Mathematician at the International Center for Theoretical Physics, Trieste, Italy (1996), a Research Associate at the University of New South Wales, Sydney, Australia (1996-97), an Assistant Professor in the Effat College, Jeddah, Saudi Arabia (2000-01), a Faculty member at the ICFAI Institute of Science and Technology, Hyderabad (2003-04) and an Assistant Professor at the Indian Institute of Technology Roorkee, Roorkee (2004-06).

Her research interests are: Representation theory of Lie groups, Uncertainty Principles in Harmonic Analysis, Wiener-Tauberian theorems.

S.P.Suresh

S.P. Suresh received his M.C.A. degree from R.E.C. Trichy (1996), received his M.Sc. (by Research) from Anna University (1999) and received his Ph.D. degree from the Institute of Mathematical Sciences (2003).

His research interests are:Logic in Computer Science, Reasoning about Security protocols and Classical Indian Epistemology.

M.K. Vemuri

M.K. Vemuri received his M.S. (Mathematics) from Syracuse University, U.S.A. (1989) and Ph.D. from the University of Chicago, U.S.A. (1997).

He has been a Visiting Assistant Professor at Colgate University, U.S.A. (1997-99), an Instructor at Polytechnic University, U.S.A. (1999-2000) and a Teaching Research Associate at Syracuse University, U.S.A. (2000-2002).

His research interest is: Analysis

Purusottam Rath

Purusottam Rath received his Ph.D. (Mathematics) from Harish Chandra Research Institute, Allahabad (2006).

He has been a Visiting Fellow at the Institute of Mathematical Sciences, Chennai (2006-2007) and a Coleman Research Fellow at Queen's University, Canada (2007-2008).

His research interests are: Combinatorial Number Theory, Diophantine Approximation and Transcendental nature of special values of L-functions.

Shrihari Sridharan

Shrihari Sridharan received his B.Sc. (Mathematics) from Barathidasan University, Trichy (1998), M.Sc. (Mathematics) from Anna University, Chennai (2000) and Ph.D. (Mathematics) from the University of Manchester, Manchester (2004).

He has been a Post-doctoral Fellow at the Institute of Mathematical Sciences, Chennai (2004-2006), a Post-doctoral Fellow at the Indian Institute of Science, Bangalore (2006-2007) and a Senior Lecturer at the Department of Mathematics, Indian Institute of Technology, Guwahati (2007-2008).

His research interests are: Complex Dynamics and Ergodic Theory.

Awards

- **V. Balaji** was awarded JC Bose National Fellowship by the Department of Science and Technology in December 2008.

- **C.S. Seshadri** was awarded H.K. Firodia Award for Excellence in Science and Technology, Pune, in October 2008.

- **C.S. Seshadri** was awarded Padma Bhushan by the President of India, 2009 in January 2009.

- **K. Narayan** was awarded Ramanujan Fellowship by the Department of Science and Technology in March 2009.

Research Activities

Mathematics

The areas of active research in mathematics at CMI include, algebra, algebraic geometry, analysis, control theory, harmonic analysis, number theory, operator algebras, partial differential equations and representation theory.

Algebra

It has been shown that every essentially finite-type separated map of noetherian schemes admits an essential compactification.

A reduction formula for computing derived Hochschild cohomology in terms of iterated derived functors via relative dualizing complexes has been established.

Work on problems related to the bigraded modified Koszul complex yielded several interesting results for the fiber cone. This bigraded complex was also used to study contracted ideals in a regular local ring.

A counter-example to a conjecture of V. Vasconcelos concerning the first Hilbert coefficient has been constructed.

Minimal dimensional Schubert varieties admitting semistable points for the action of a maximal torus of G on G/P, where G is simple of classical type and P is a maximal parabolic subgroup of G, and Coxeter elements of W for which the corresponding Schubert variety admits a semistable point have been studied.

The non-degeneracy of quotient varieties under finite group actions has been investigated.

Algebraic Geometry

In the study of Tannaka categories associated to semistable bundles on projective varieties, an analogue of the classical Narasimhan-Seshadri theorem on higher

dimensional varieties over fields of arbitrary characteristics has been proved; this has interesting applications.

Analysis

Results like the almost sure invariance principles and law of iterated logarithms were established on natural extensions of Julia sets of hyperbolic rational maps for the Lyapunov exponential function. The distribution of ergodic sums of functions on periodic orbits of quadratic polynomial maps were also studied.

Control Theory

The degenerate algebraic Riccati equation, which arises naturally when solving optimal control problems for the linear quadratic regulator with infinite time horizon was studied. In certain special cases, which include finite dimensional systems and 'parabolic' systems, the existence of a unique solution which also has some stabilization properties has been proved.

Harmonic Analysis

An analogue of Hardy's theorem was proved for vector valued distributions and operators.The uniqueness of solutions to the Schrodinger equation on rank one semisimple Lie groups is currently being investigated.

Number Theory

The theme of an on-going project is to investigate the non-vanishing as well as algebraic nature of special values of a varying class of L-functions.For instance, special values of L-functions associated to classical Dirichlet characters and possible algebraic relations among them, as well as L-functions associated to Modular forms and Artin representations are being investigated.

On a different note, it is not known if the Petersson norm of the Ramanujan delta function is transcendental. In this context, the nature of the Petersson norm of other modular forms which appear to be more amenable to study has been taken up.

Another theme is the study of the nature of the values of the gamma function at rational arguments. One of our goals is to understand the relations, both rational as well as algebraic, existing between these gamma values. This is of independent interest in transcendental number theory. On the other hand, these are also of crucial importance in relation to the nature of the special values of L-functions.

Operator Algebras

Research has been primarily focused on the study of endomorphism semigroups (called as E_0-semigroups) on *B(H)*, the algebra of all bounded linear operators on a separable Hilbert space. Type III E_0-semigroups is a particular class of exotic E_0-semigroups, whose first example was discovered by Robert Powers in 1987. A new construction called 'generalized CCR flows' has been introduced and has proved to be very successful.

Work in progress relates to finding the gauge cocycle group of this family, to generalize the above constructions to a more general frame work of Hilbert modules, finding which class of semigroups of completely positive maps dilates to generalized CCR flows, developing the stochastic calculus with respect to the generalized CCR flows.

Powers' construction mentioned above has been generalised and a new class of -semigroups called `Toeplitz CAR flows', which includes the first type III example constructed by R. T. Powers, has been obtained.It is shown that the Toeplitz CAR flows contain uncountably many mutually non cocycle conjugate -semigroups of type III.The type III criterion for Toeplitz CAR flows employed by Powers (and later refined by W. Arveson) has been generalized and it is shown that Toeplitz CAR flows are always either of type I or type III.

Partial Differential Equations

Work on some shape optimization problems for the *p*-Laplacian operator, in particular, the study of the optimal configuration which maximizes the principal eigenvalue of the *p*-Laplacian in a class of doubly connected domains, is in progress.

Representation Theory

Inductive Algebras, i.e. commutative algebras of bounded operators on Hilbert space which are normalized by a unitary representation of a group are being studied.

The combinatorial characterizations of left and right cells of Kazhdan-Lusztig cells of the symmetric group have been to construct bases for certain quotients by two-sided ideals of the group ring and the Hecke algebra.This has applications to the invariant theory of the general linear group and the representation theory of the symmetric group.

For a Weyl module *V* of *SL(mn)*, a representation *W* of *SL(m).SL(n)* quantum has been constructed. This module *W* is a *q*-deformation of the module *V*. It is first shown how to construct this module when the highest weight of *V* is a fundamental

weight. This is then used to construct the module for arbitrary Weyl modules *V* of *SL(mn)*.

Computer Science

The research activity in Computer Science at CMI has been primarily in computational complexity theory, game theory, formal methods for specification and verification of timed and distributed systems and analysis of security protocols.

In computational complexity theory, the complexity of the graph isomorphism problem has been completely characterised for the class of planar graphs by providing an upper bound of logspace that matches previously known lower bounds.

In game theory, the focus has been on developing techniques for computing optimal solutions and Nash equilibria in different classes of stochastic games. Algorithms have been obtained for certain classes such as perfect information stochastic games. The communication complexity of stochastic games has also been investigated.

In formal methods, a new model of distributed timed automata has been proposed in which time is local-that is, clocks at different locations evolve at independent rates. Three different semantics have been proposed and problems such as checking for emptiness have been investigated under these different settings.

Timed message sequence graphs (timed MSGs) are scenario based specifications for communicating systems enhanced with interval timing constraints between events. Untimed MSGs admit a precise structural characterisation for channel boundedness, a necessary condition for regularity. For timed MSGs, channel boundedness has been shown to be undecidable even with very restricted forms of timing constraints.

In local testing, each test run monitors the interactions at some subset of interfaces of a distributed system. Even if all local tests pass, the system may not conform to the global specification because local behaviours can combine to form implied scenarios. Checking for implied scenarios is known to be undecidable, even for regular specifications. The problem becomes decidable if messages can be tagged during testing. These tags are generated in a uniform manner, without referring to or influencing the internal details of the system under test.

In security, research has centred on electronic voting protocols. A technique for transforming protocols has been developed that automatically guarantees receipt-freeness for an interesting subclass. The basic Dolev-Yao theory has been extended to handle the use of zero-knowledge proofs, resulting in a more faithful formal model for the analysis of voting protocols.

Physics

The research activity in the physics department was concentrated in the following three broad areas of theoretical physics: phenomenological aspects of high energy physics, quantum field theory and mathematical physics, and string theory.

In the first area, work is being continued on finding a novel solution to the dark energy problem in cosmology; wherein, neutrinos form a condensate which provides the dark energy component of the Universe. Also being studied are basic QED processes such as Moller and Bhabha scattering within the framework of noncommutative quantum field theory. Involvement in a Megascience project called India-based Neutrino Observatory (INO) continues.

In the second area, the analysis of the classical and quantum mechanical properties of a non-relativistic point particle constrained to move on a knot has been completed. The quantal gas of anyons coupled to a bath of oscillators was studied, using the influence functional approach of Feynman and Vernon. It is found that, contrary to claims in the literature, the information encoded in anyons decoheres in spite of their topological properties. This has important implications for the subject of topological quantum computation. In a separate problem, evidence was found for the possible existence of a non-trivial UV fixed point in $O(N)$ scalar field theory in the large-N limit. Scalar masses could be naturally small due to scale invariance at the fixed point. In $d = 3$ the construction reduced to theory which is known to be scale invariant at large-N. In another problem, Schwinger-Dyson equations of multi-matrix models were formulated as quadratic equations in convolution for a function (generator of correlations) on a finitely generated analogue of the Loop group. This group is the spectrum of the commutative shuffle-deconcatenation Hopf algebra. Moreover, the Schwinger-Dyson operators were shown to be invariant vector fields on this group for each primitive of the Hopf algebra.

In the third area, the focus was on understanding cosmological singularities from a string theory point of view. In this context, response of the $N = 4$ gauge theory to a time dependent gauge coupling source in terms of a Schrodinger wave functional

was studied. This enables an understanding of the gauge theory dual description to a spacelike cosmological singularity.Embedding BKL cosmologies in this AdS/CFT framework was also briefly discussed.In another work, string spectra near some null cosmological singularities were studied and null Kasner-like cosmological singularities as purely gravitational backgrounds were constructed. The string mode functions can be solved for, exactly in this background, enabling a detailed study of the near singularity string spectra, (time-dependent) oscillator masses, and wavefunctions.

Publications

Journal Articles

Mathematics

J1 V. Balaji, A. Dey and R. Parthasarthi:
Geometry of parabolic bundles on surfaces-I, (The Donaldson-Uhlenbeck compactification), Proceedings of the Indian Academy of Sciences, 118, No 1, February 2008, pp 43-79 (archiv:math.AG/06001274).

J2 V. Balaji and J. Kollar:
Holonomy groups of stable vector bundles, RIMS Journal, Kyoto University, 44, No 2, May 2008, pp 183-211 (archiv:math.AG/06001120).

J3 V. Balaji, A. Dey and S. Bandhopadyay:
Irreducibility of parabolic sheaves on a surface (work in progress).

J4 Purusottam Rath, K. Srilakshmi and R. Thangadurai:
On Davenport's Constant, International Journal of Number Theory. 4 (2008), no. 1, 107-115.

J5 Purusottam Rath:
Two exceptional classes of real numbers, Functiones et Approximatio, XXXVIII.1 (2008), 81-92.

J6 Purusottam Rath, S.D. Adhikari, R. Balasubramanian, F. Pappalardi:
Some zero-sum constants with weights, Proc. Indian Acad. Sci. Math. Sci. 118 (2008), no. 2, 183-188.

J7 Purusottam Rath, S. Gun and M. Ram Murty:
Transcendence of log-gamma function and some discrete periods, Accepted for publication in Journal of Number Theory

J8   Purusottam Rath, S. Gun and M. Ram Murty:
Transcendental nature of special values of L-functions, Accepted for publication in the Canadian Journal of Mathematics

J9   Purusottam Rath, S. Gun and M. Ram Murty:
Summation methods and distribution of eigen values of Hecke operators, Accepted for publication in Functiones et Approximatio.

J10 Purusottam Rath, S.D. Adhikari and S. Gun:
Remarks on some zero-sum theorems, Accepted for publication in the Proc. Indian Acad. Sci Math. Sci.

J11 C. De Concini, S.S.Kannan and Andrea Maffei:
The Quotient of Complete Symmetric Variety, Vol.8, No.4, October 2008.

J12 S.S. Kannan and Pranab Sardar:
Torus quotients of homogeneous spaces of the general linear group and the standard representation of certain symmetric groups, Proc. Indian Acad. Sci. (Math. Sci.) Vol. 119, No.1, February 2009, pp. 81-100.

J13 S.S. Kannan, S.K.Pattanayak and Pranab Sardar:
Projective Normality of Finite Group Quotients, Proceedings of the American Mathematical Society, Vol. 137, No. 3, March 2009, pp. 863-867.

J14 Srihari Sridharan:
Statistical Properties for Hyperbolic Julia sets, Accepted for publication in Differential Geometry Dynamical Systems.

J15 Srihari Sridharan:
Rates of Recurrence for real extensions of Complex Dynamics, Accepted for publication in Journal of Interdisciplinary Mathematics.

J16 R. Srinivasan and Masaki Izumi:
Generalized CCR flows, Commun. Math. Phys,, Volume 281, Number 2 / July, 2008,529-571.

J17 M. Sundari:
Tangential convergence of bounded harmonic functions on generalized Siegel domain, J. Aust. Math.Soc. 85(2008), 419-430.

J18 M. Sundari, Michael Cowling and Bruno Demange:
Vector valued distributions and Hardy's uncertainty principle for operators, to appear in Revista Math.

J19 Suresh Nayak:
Compactification for essentially finite-type maps, accepted for publication in Advances in Mathematics.

J20 M.K. Vemuri and Amritanshu Prasad:
Inductive algebras for finite Heisenberg groups', accepted for publication in Communications in Algebra.

J21 M.K. Vemuri and Amritanshu Prasad:
Eigenfunctions of the Laplace-Beltrami operator on Hyperboloids, appeared in the Tamkang Journal of Mathematics.

J22 M.K. Vemuri and Amritanshu Prasad:
Inductive algebras and homogeneous shifts, accepted for publication in Complex Analysis and Operator Theory.

Computer Science

J23 Samir Datta, Raghav Kulkarni and Sambuddha Roy:
Deterministically Isolating a Matching in Bipartite Planar Graphs, to appear in special issue of ToCS dedicated to STACS 2008.

Physics

J24 Govind S Krishnaswami:
Schwinger-Dyson operator of Yang-Mills matrix models with ghosts and derivations of the graded shuffle algebra, J. Phys. A: Math. Theor. 41 145402 (2008).

J25 Govind S Krishnaswami:
Schwinger-Dyson operators as invariant vector fields on a matrix-model analogue of the group of loops, J. Math. Phys. 49:062303 (2008).

J26 Adel Awad, Sumit Das, Suresh Nampuri, K. Narayan and Sandip Trivedi: Gauge theories with time dependent couplings and their cosmological duals, Phys.Rev.D79,046004,2009, arXiv:0807.1517 [hep-th].

Conference Papers

Mathematics

C1   V. Balaji:

Lectures on Principal bundles (to appear in London Mathematical Society, Cambridge in a Volume of papers dedicated to Peter Newstead).

C2   Purusottam Rath and S.D. Adhikari:

Simplices with monochromatic vertices: reflections on some problems in Euclidean Ramsey Theory, To appear in the conference proceedings held at Chennai in honour of Prof. T. C. Vasudevan.

C3   M. Sundari:

A survey on Hardy's unceratinty principle, to appear in Journal of Analysis as part of Proceedings of the 16th Ramanujan symposium on Fourier Analysis and its applications.

C4   M.K. Vemuri:

Basic Fourier Analysis, submitted to the proceedings of the `Instructional Workshop on Wavelet Analysis', BHU, Varanasi.

Computer Science

C5   S. Akshay, B. Bollig, P. Gastin, Madhavan Mukund and K. Narayan Kumar:
"Distributed Timed Automata with Independently Evolving Clocks", Proceedings of the 19th International Conference on Concurrency (CONCUR 2008), Springer LNCS 5201 (2008) 82-97.

C6   P. Gastin, M. Mukund and K. Narayan Kumar:
Reachability and Boundedness in Time-Constrained MSG Graphs scenarios, in K. Lodaya, M. Mukund and R. Ramanujam (eds.): Perspectives in Concurrency, Universities Press (2008), 157-183.

C7   P. Bhateja and M. Mukund:
Tagging Make Local Testing of Message-Passing Systems Feasible, Proc 6th IEEE International Conference on Software Engineering and Formal Methods (SEFM) 2008, IEEE Press (2008), 171-180.

C8 Nagarajan Krishnamurthy, T Parthasarathy and G Ravindran:
Communication Complexity of Stochastic Games, International Conference on
Game Theory for Networks scheduled to be held at Bogazici University, Istanbul,
Turkey, May 2009, to appear in Proceedings of the 2009 International Conference
on Game Theory for Networks, IEEE Xplore.

C9 Nagarajan Krishnamurthy, T Parthasarathy and G Ravindran:
Vertical LCP Formulation of Perfect Information Stochastic Games, International
Conference on Operations Research for a Growing Nation in conjunction with
the annual convention of the Operations Research Society of India (ORSI) 2008.

C10 Samir Datta, Nutan Limaye and Prajakta Nimbhorkar:
3-connected Planar Graph Isomorphism is in Log-space FSTTCS 2008.

C11 Samir Datta, Nutan Limaye, Prajakta Nimbhorkar, Thomas Thierauf and Fabian
Wagner: A Log-space Algorithm for Canonization of Planar Graphs CoRR abs/
0809.2319: (2009)

Preprints and Reports

Mathematics

P1 V. Balaji, A.J. Parameswaran: An analogue of the Narasimhan-Seshadri theorem
and some applications.

P2 Clare D'Cruz: Homology, mixed multiplicities and fiber cones.

P3 Clare D'Cruz: On the depth of blow-up rings of contracted ideals and ideals of
minimal mixed multiplicity.

P4 Clare D'Cruz: Hilbert series of the fiber cone of ideals of almost minimal mixed
multiplicity.

P5 Clare D'Cruz: Homology and Hilbert series of the fiber cone of ideals of almost
minimal multiplicity.

P6 Clare D'Cruz: On the canonical module oftoric surfaces in .

P7 S. Kesavan and J.-P. Raymond: On the Degenerate algebraic Riccati equation.

P8 Purusottam Rath: Subspace theorem and converting algebraic numbers to
algebraic integers.

P9   Purusottam Rath S. Gun and M. Ram Murty: On a conjecture of Chowla and Milnor.

P10 Purusottam Rath S. Gun and M. Ram Murty: Linear independence of Digamma function and a conjecture of Rohrlich.

P11 Purusottam Rath: Some musings on rational approximation and transcendental numbers.

P12 K.N. Raghavan, Preena Samuel and K. V. Subrahmanyam: KRS basis for rings of invariants and endomorphisms of irreducible modules.

P13 Suresh Nayak, L. Avramov, S. Iyengar and J. Lipman: Reduction of derived Hochschild functors over commutative algebras and schemes.

Computer Science

P14 A Bharat, M Sohoni and K V Subrahmanyam: Quantum deformations of the restriction ofmodules to tensor .

P15 C. Prakash and Madhavan Mukund: Specifying Interacting Components with Coordinated Concurrent Scenarios.

P16 R. Ramanujam and S.P. Suresh: Challenges for epistemic logic from security protocols, to appear in special issue in honor of Prof. Rohit Parikh.

Physics

P17 Kallingalthodi Madhu and K. Narayan: String spectra near some null cosmological singularities, arXiv:0904.4532 [hep-th].

Book

Mathematics

B1   S. Kesavan: Functional Analysis, Texts and Readings in Mathematics (TRIM), Volume 52, Hindustan Book Agency.

Edited Volumes

Computer Science

E1   R. Hariharan, M. Mukund and V. Vinay (eds.): Proc 28th International Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2008), IBFI, Schloss Dagstuhl, Germany (2008).

E2   K. Lodaya, M. Mukund and R. Ramanujam (eds.): Perspectives in Concurrency, Universities Press (2008),

Ph.D. Theses

PhD1   Shyamashree Upadhyay defended the thesis entitled "Schubert Varieties in the Orthogonal Grassmannian" in July 2008 and has been awarded the Ph.D. degree in Mathematics in August 2008.

PhD2   S. Jijo defended the thesis entitled "Planar algebra associated to the Asymptotic inclusion of a Kac algebra subfactor" in October 2008 (University of Madras).

PhD3   Ms. K.C. Revathy defended the thesis entitled "Understanding Abstract Definitions" in November 2008.

PhD4   Puneet Bhateja defended the thesis entitled "A Formal Approach to Testing Asynchronous Distributed Systems" in March 2009.

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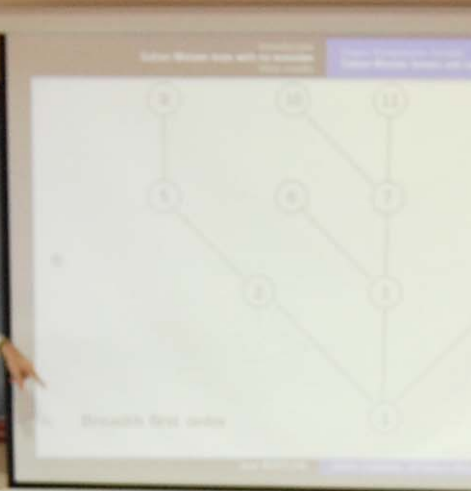
The National Undergraduate Programme

In 1998, CMI initiated an National Undergraduate Programme in the Mathematical Sciences in collaboration with Madhya Pradesh Bhoj Open University with a 3 year course in Mathematics and Computer Science, leading to a Honours degree.In 2001, this programme was extended to the postgraduate level with separate 2 year courses leading to degrees in Mathematics and Computer Science. The scope of the undergraduate programme was expanded in 2003 to incorporate a 3 year course leading to a Honours degree in Physics.

The undergraduate and postgraduate teaching programmes at CMI are both run in cooperation with the Institute of Mathematical Sciences (IMSc), Chennai.These programmes tap the teaching talent available at the elite research institutes of the country, which are normally outside the university system.Students are thus exposed to lectures by active researchers who bring a very different perspective to the teaching.

B.Sc. (Hons.) Mathematics

In 2008, the eleventh batch of students was admitted to the undergraduate programme.11 students have joined the programme. Of these, one is from the INMO stream.The second year class has 13 students, while the third year class has 6 students.

Out of the 8 students of the 2005 batch who took their degrees at the convocation in August, 2008, several have been placed in very prestigious institutions.

Name	Placement
Agnid Banerjee	Ph.D., University of Kentucky, USA
Walvekar Anup Hanamant	M.Sc., IIT-Bombay, Mumbai, India
Arnold Joseph Noronha	Ph.D., University of Pennsylvania, USA
Hrushikesh Girish Tilak	M.Math, University of Waterloo, Canada
Patel Jigar Shantilal	New York University, USA

Preyas D Popat	Ph.D, New York University, USA
Swarnava Mukhopadhyay	Ph.D., University of North Carolina at Chapel Hill, USA
Ved V Datar	Ph.D., Rutgers University, USA

Saikat Chakraborty, student of the 2004 batch who took his degree at the convocation in August, 2008, has joined Amber Valley School, Karnataka, India as Teacher.

B.Sc. (Hons.) Physics

This programme was started in 2003 with the assistance of the Physics Faculty of the IMSc., Chennai, and the active participation of physicists across the country.

In 2008, 7 students have joined the programme.

During the course of the academic year, Physics students perform some basic experiments in class at CMI.In addition, students have an intensive laboratory programme at the Homi Bhabha Centre for Science Education (HBCSE), Mumbai, during the summer vacation after the first year.A similar arrangement has been worked out with the Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam for students at the end of the second year.Regular laboratory classes are conducted with the help of IIT Madras for students in the third year.

Out of the 5 students of the 2005 batch who took their degrees at the convocation in August, 2008, several have been placed in very prestigious institutions.

Name	Placement
Achal Agrawal	Ecole Polytechnique, Palaiseau, France
Shiladitya Banerjee	Ph.D, Syracuse University, USA
Anirbit Mukherjee	Ph.D, Tata Institute of Fundamental Research, India
Ravitej U.	Ph.D, Tata Institute of Fundamental Research, India
Vineeth S Varma	M.S., Friedrich Schiller University of Jena, Germany

M.Sc.Mathematics

One student who joined the programme in 2006 has completed the programme successfully.

Name
Ashish Kumar

In 2008, two students have joined the programme.

M.Sc. Computer Science

Out of three students who joined the programme in 2006 two students have completed the programme successfully.

Name	Placement
Ramprasad K	Associate-Software, Geodesic Information Systems Ltd. Bangalore
Kumar Madhukar	Ph.D., Chennai Mathematical Institute, Chennai

Convocation

The 6th Annual Convocation of CMI was held on 1 August 2008. Degrees were awarded to 18 successful candidates at various levels.Of these, 14 were at the Undergraduate level, 3 were at the Postgraduate level and 1 was at Ph.D. level. Dr. T. Ramasami, Secretary, Department of Science and Technology gave away the degree certificates.Prof. Roddam Narasimha, F.R.S., Chairman, Engineering Mechanics Unit, Jawaharlal Nehru Centre for Advanced Scientific Research delivered the convocation address.

The CMI Medal of Excellence (instituted by Prof. K.R. Nagarajan) was awarded to Preyas Popat Dalsukhbhai in Mathematics and Computer Science and Shiladitya Banerjee in Physics for their outstanding performance at the undergraduate level.

Activities of the Undergraduate Students

Achievements of CMI students

National Science Day-Quiz, February 2009
(Institute of Mathematical Sciences, chennai)

Participants	Place
Harikrishnan	Ramani and Renjan Rajan John 3rd

Summer camps/courses/visits to other centres

- Debangshu Mukherjee attended the Summer Student Program in Physics at the Institute of Mathematical Sciences, Chennai under Prof. Gautam Menon.

- Shreyas Patankar attended Summer Program in mathematical physics at Inter University Center for Astronomy and Astrophysics (IUCAA), Pune during June-July 2008, Winter Program at Radio Astronomy Center, Ooty and observational astronomy program at the Ooty Radio Telescope facility in December 2008.

Interaction with graduate students from Ecole Normale Superieure

Chennai Mathematical Institute has an agreement with the Ecole Normale Superieure in Paris, France, one of the leading institutions in the world for teaching and research in Mathematics.This agreement provides for regular exchange visits by academic members of CMI and ENS, Paris.This includes, in particular, exchanges of visits by undergraduate students between the two institutions.

Every year, the top three students passing out from the Mathematics programme spend 8 weeks at the ENS, where they work on research projects with the ENS faculty.In May-June, 2008, Hrushikesh Tilak, Ved Datar and Preyas Popat visited the ENS.

The annual visitors from the ENS arrived in two groups: two for the period January-February and two for the period March-April. Amic Frouvelle and Pierre Simon visited CMI during January-February, 2009 while Alexandre Thiery and Thomas Haettel were here during March-April, 2009.They taught, examined and evaluated the course Calculus II (second semester of I).

Fiesta Mathematica

CMI students organised the annual intercollegiate festival Fiesta 2009 successfully for the third time running, on March 14, 2009. The event got enthusiastic support from several corporate sources, including Microsoft Research, Symantec, Tata Consultancy Services and the Princeton Review. More than 60 students from Chennai colleges like IIT Madras, SRM University and Loyola College participated in the fest. There were various academic and non academic events, like Physics, Math and Coding olympiads, Quiz, "Shipwreck" and informals.The participants took away more than Rs 20,000 in cash prizes.

Undergraduate / Graduate Courses

Course	Instructor
Algebra I	P Vanchinathan
Calculus IT	Parthsarathy
English	Shreekumar Varma
Introduction to Programming I	Madhavan Mukund
Algebra III	S Senthamarai Kannan
Analysis I	S Kesavan
Caculus III	R Srinivasan
Design and Analysis of Algorithms	Samir Datta
Algebra IV	R Sridharan
Theory of Computation	K V Subrahmanyam
Ordinary Differential Equations	Shiva Shankar
Classical Mechanics I	Subhashish Banerjee
Electromagnetism IV	V Sreedhar
Mathematical Physics	R Shankar
Physics Laboratory	M V Rao
Properties of Matter	V Sridhar
Quantum Mechanics I	G Rajasekaran
Theory of General Relativity	K Narayan
Quantum Mechanics III	R Parthsarathy
Statistcal Physics II	S Sivakumar
Algebra	Clare D'Cruz
Algebraic Topology	Murali K Vemuri
Measure and Integration	Sundari Maddala
Databases	Madhavan Mukund
Distributed Systems	S P Suresh
Operating System	S P Suresh

- Topics in Complexity .... T C Vijayraghavan
- Algebra II .... S Ramanan
- Calculus II .... Amic Frouvelle/Pierre Simon
- Discrete Mathematics .... Samir Datta
- Intro. to Programming II .... K Narayan Kumar
- Probability .... K V Subrahmanyam
- Music .... N Ramanathan
- Analysis II .... Srihari Sridharan
- Computer Organization .... S P Suresh
- Topology .... P Vanchinathan
- Programming Language Concepts .... Madhavan Mukund
- Electromagnetism II .... V V Sreedhar
- Mathematical Physics II .... A Thyagaraja and Sibasish Ghosh
- Quantum Mechanics I .... K Narayan
- Statistical Mechanics I .... Subhashish Banerjee
- Physics Laboratory .... M V Rao
- Atom and Molecular Physics .... R Jagannathan
- Quantum Mechanics II .... G Rajasekaran
- Condensed Matter Physics .... V Sankara Sastry
- Nuclear and Particle Physics .... R Parthasarathy
- Algebra .... S Senthamarai Kannan
- Complex Analysis .... M K Vemuri
- Functional Analysis .... R Srinivasan
- Game Theory .... T Parthasarathy
- Symplectic Geometry .... Shiva Shankar
- Algebraic Number Theory .... R Sujatha
- Hall Algebras and the Geometry of Quivers . V Lakshmi Bai
- Algorithms .... K V Subrahmanyam
- Compilers .... S P Suresh
- Theory of Computation .... K Narayan Kumar
- Verification .... K Narayan Kumar
- Algebraic Geometry II .... V Balaji
- Algebraic Groups .... P Vanchinathan

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Courses,
Special Lectures

- Shreekumar Varma gave a seminar on "Translating Through Literature" (April 2008).

- C.S. Seshadri gave a course of lectures on "Moduli of Curves and GIT" (April - May 2008)

- Shrihari Sridharan gave six lectures on "Symbolic Dynamics" (October 2008).

- Shreekumar Varma conducted a seminar on "Outsourcing Literature" with Panellists: Sashi Kumar, Chairman, Asian College of Journalism, and Film maker, Prasanna Ramaswamy, Writer-director, Film maker and Theatre resource person, and Leela Samson, Director, Kalakshetra, and Bharatanatyam exponent. (October 2008).

- V. Balaji gave a semester long graduate course in "Algebraic Geometry" (August - December 2008).

- M.S. Narasimhan, TIFR Bangalore Centre, delivered K. Lakshmanan Memorial Distinguished Lecture on "Integration and Topology" (January 2009).

- R. Sridharan delivered R.K. Rubugunday Distinguished Lecture on "On a Saraband theme of circles and some variations" (January 2009).

- R. Jagannathan gave a talk on "Quantum Theory of Electron Lenses" (February 2009).

Conferences, Workshops and Lecture Series

Workshop on Perspectives in Concurrency Theory, December 2008

- Gerard Boudol, INRIA, Sophia-Antipolis, France
  True concurrency at work: relaxed memory models

- Javier Esparza, TU Munchen, Germany
  Scheduling stochastic branching processes

- David Harel, Weizmann Institute of Science, Rehovot, Israel
  In silico biology, or On comprehensive and realistic modeling

- Mogens Nielsen, Aarhus University, Denmark
  Computational trust

- Amir Pnueli, New York University and Weizmann Institute of Science, Rehovot, Israel (Emeritus)
  Using abstraction to verify arbitrary temporal properties

- Wolfgang Thomas, RWTH Aachen, Germany
  Path logics with synchronization

- Igor Walukiewicz, LaBRI, Bordeaux, France
  Traces and distributed synthesis

Automata, Concurrency and Timed Systems, January 2009

- Dietmar Berwanger, LSV, ENS Cachan, France
  The order of moves in a game: When does it matter?

- Benedikt Bollig, LSV, ENS Cachan, France
  Realizability of Concurrent Recursive Programs

- Patricia Bouyer, LSV, ENS Cachan, France
  Quantitative timed games

- Philippe Darondeau, INRIA Rennes, France
  Opacity control

- Volker Diekert, FMI, Stuttgart, Germany
  Fragments of first-order logic over infinite words

- Deepak D'Souza, IISc Bangalore
  Automata and Logics over Signals

- Paul Gastin, LSV, ENS Cachan, France
  How to get decidability of distributed synthesis for asynchronous systems

- Hugo Gimbert, LaBRI,Bordeaux, France
  Qualitative Determinacy and Decidability of Stochastic Games with Partial Observation

- Stefan Haar, LSV, ENS Cachan, France
  Diagnosability and a covering relation in occurrence nets

- Hrishikesh Karmakar, IIT Bombay
  Improved state-count for determinization of non-deterministic Buchi automata: A Safra-tree based approach

- K. Narayan Kumar, CMI, Chennai
  Analyzing time-constrained message sequence graphs

- Dietrich Kuske, IfI, Leipzig, Germany
  Which local temporal logics for traces are tractable?

- Kamal Lodaya, IMSc, Chennai
  Around dot-depth two

- Anca Muscholl, LaBRI, Bordeaux, France
  A look at the control of asynchronous automata

- Paritosh Pandya, TIFR, Mumbai
  A Sampling Approach to the Analysis of Metric Temporal Logic

- Soumya Paul, IMSc, Chennai
  Thiagarajan's conjecture

- M. Praveen, IMSc, Chennai
  Petri nets with small path property

- R. Ramanujam, IMSc, Chennai
  Counting multiplicity over infinite alphabets

- Abhisekh Sankaran, IIT Bombay
  A FOL Fragment for Safety Checking in Infinite State Systems

- Anil Seth, IIT Kanpur
  Parity Games on Multi-Stack Pushdown Systems

- Vijay Suman, TIFR, Mumbai
  Determinization and Expressiveness of Integer Reset Timed Automata with Silent Transitions

- Pascal Weil, LaBRI, Bordeaux, France
  Independence monoids and recognizable trace languages

- Marc Zeitoun, LaBRI, Bordeaux, France
  Tree Pattern Rewriting Systems

- Wiesiek Zielonka, LIAFA, Paris
  Positional equilibria in infinite perfect information games

Weekly Seminar on Fluid Dynamics (January-March 2009)

- S.G. Rajeev, University of Rochester, U.S.A., gave a talk on "Geometrical Aspects of Fluid Dynamics".

- G. Baskaran, IMSC, Chennai, gave a talk on "Quantum Fluids: Superfluidity and Superconductivity".

- S.R.S Varadhan, Courant Institute, New York, gave a talk on "Derivation of Euler Equations" and "A class of examples of interacting particle systems and their scaling limits".

- K.R. Sreenivasan, ASICTP, Trieste, Italy, gave a talk on "Cryogenic Turbulence".

- Siddhartha Sen, University College, Dublin, gave a talk on "Quantum Weak Turbulence".

- A. Thyagaraja, Culham Labs, U.K. Atomic Energy Agency, gave a talk on "Introduction to Plasma Turbulence and its Transport Consequences in Fusion Plasmas".

- Shiraz Minwalla, TIFR, Mumbai, gave a talk on "Fluid Dynamics from Gravity".

- Rajaram Nityananda, NCRA, Pune, gave a talk on "Stellar Dynamics: the gravitational N-body problem in the fluid limit".

- S. Sridhar, RRI, Bangalore, gave a talk on "Dynamo action in astrophysical shear flows" and "Dynamo action in linear shear flows".

- K. Subramanian, IUCAA, Pune, gave a talk on "Magnetizing the universe" and "Magnetic helicity and dynamos".

- R. Narasimha, JNCASR, Bangalore, gave a talk on "The fluid dynamics of the cumulus cloud".

- Gautam Menon, IMSc, Chennai, gave a talk on "Random Organization and the Reversible-Irreversible Transition" and "Hydrodynamics of Biological Membranes".

- A.M. Srivastava, IOP, Bhubaneswar, gave a talk on "Quark-Gluon Plasma".

- R. Shankar, IMSc, Chennai, gave a talk on "Quantum Hall Fluids".

- Madan Rao, RRI, Bangalore, gave a talk on "Active Hydrodynamics in a Variety of Cellular Systems".

- R. Rajesh, IMSc, Chennai, gave a talk on "Constant Flux Relation for Turbulent Systems".

- M. Vanninathan, TIFR-Centre for Applied Mathematics, Bangalore, gave a talk on "Navier-Stokes Equations - A Millennium Problem".

- V.V. Sreedhar, CMI, Chennai, gave a talk on "Symmetries and Conservation Laws in Fluid Dynamics".

- Workshop on Principal Bundles in Geometry (February-March 2009)

- Norbert Hoffmann, University of Gottingen, gave a talk on "Line bundles on stacks of principal G-bundles" and "On moduli of special instanton bundles".

- S. Subramaniam, TIFR Mumbai, gave a talk on "Principal Bundles on the projective line".

- Usha Bhosle, TIFR Mumbai, gave a talk on "Coherent systems on nodal curves".

- Jochen Heinloth, University of Amsterdam, gave a talk on "Semistable reduction for principal bundles" and "Picard groups of moduli spaces for twisted groups and degenerations of the affine Grasmanian".

- H. Lange, University of Erlangen, gave a talk on "Abelianization and polarization on Prym varieties".

- Yashonidhi Pandey gave a talk on "Prym Varieties and abelianization of -bundles" and "Some remarks on abelianisation".

- S.Ramanan gave a talk on "Kostant TDS and Vector bundles".

- Alexander Schmitt, Freie Universitat Berlin, gave a talk on "Geometric Invariant Theory and Principal Bundles" and "Principal Bundles on Nodal Curves".

- V. Balaji gave a talk on "Holonomy Group Schemes of Algebraic Varieties".

- Arijit Dey, TIFR Mumbai, gave a talk on "Restriction of tangent bundle and semistability".

- A.J. Parameswaran, TIFR Mumbai, gave a talk on "Picard Bundles and Brill-Noether Loci"

- Vivek, Institute of Mathematical Sciences, Chennai, gave a talk on "Zero cycles and Roitman's theorem".

- D.S. Nagaraj, Institute of Mathematical Sciences, Chennai, gave a talk on "Vector bundles generated by section on "

CMI-TCS Distinguished Lecture Series

- P.S. Thiagarajan, National University of Singapore Software on Wheels: "*Plug and Play*" *or* "*Plug and Pray*"? August 7, 2008

- Milind Sohoni, IIT Bombay, Mumbai
  Towards Linear Programming September 9, 2008

- R. Ramanujam, IMSc, Chennai
  The Cake Cutting Problem December 2, 2008

- David Harel, Weizmann Institute of Science, Rehovot, Israel
  Computers are Not Omnipotent December 16, 2008

- Amir Pnueli, New York University, USA and Weizmann Institute of Science, Rehovot, Israel (Emeritus)
  Taming the Infinite: Verification of Infinite-State Systems December 17, 2008

- Moshe Vardi, Rice University, Houston, USA
  And Logic Begat Computer Science: When Giants Roamed the Earth
  January 6, 2009

- I.V. Ramakrishnan, SUNY at Stony Brook, USA
  Bridging the Web Accessibility Divide March 6, 2009
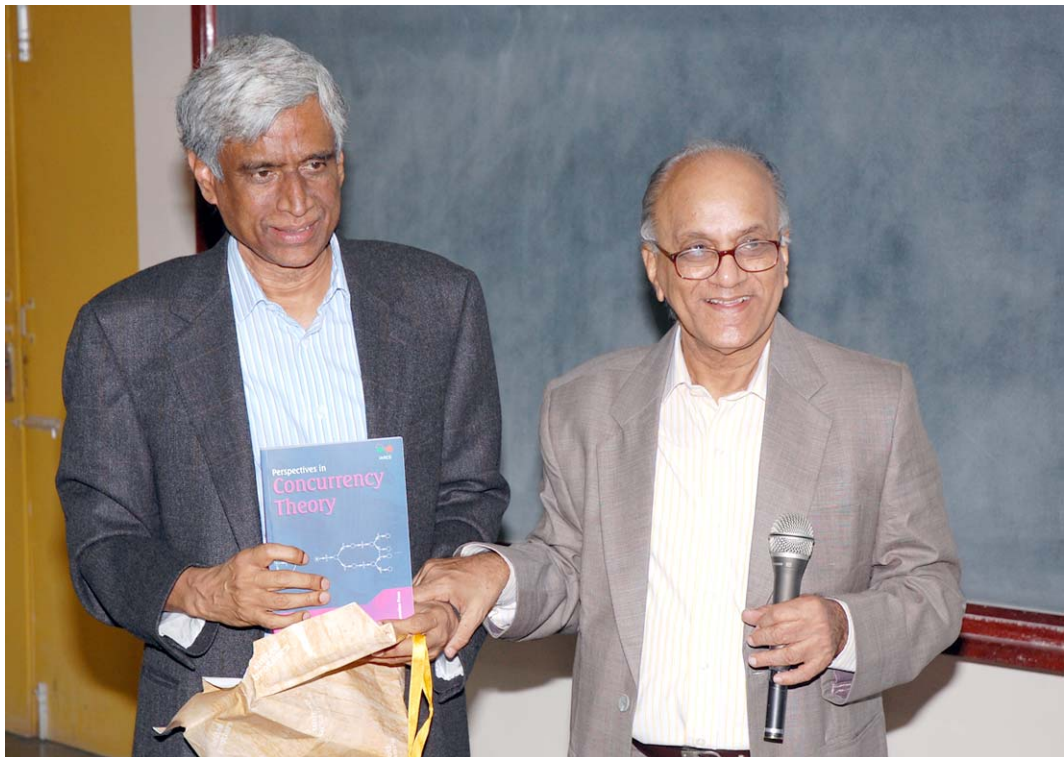
Conferences, Visits and External Lectures

C.S. Seshadri

- Participated in the Conference on "Vector Bundles" in honour of S. Ramanan (on the occasion of his 70th birthday) held at Madrid, Spain in June 2008 and gave a talk on "Remarks on Parabolic Structures".

- Visited Universitat Berlin, Berlin, Germany, during September 2008.

S. Kesavan

- Visited the Universite Paul Sabatier, Toulouse, France, as Visiting Professor and gave a colloquium talk during May 2008.

- Attended the International Conference on Control Theory at Institut Henri Poincare, Paris, during June 2008.

- Visited the Universite Henri Poincare, Nancy I, Nancy, France, during June 2008, under an IFCPAR project.

- Gave an invited talk at a workshop under the IFCPAR project held at Contrexeville, France, in June 2008.

- Attended the International Conference on partial Differential Equations and Applications in Honour of Prof. Philippe G. Ciarlet's Seventieth Birthday at City University of Hong Kong and gave an invited talk in December 2008.

V. Balaji

- Gave an invited talk in the International conference in Madrid in honour of Prof S.Ramanan held in June 2008.

- Visited International Centre for Theoretical Physics, Trieste, Italy, during June-July 2008.

- Gave an invited talk in the Indo-Brazil Symposium held in Rio de Janeiro in August 2008.

- Gave an invited talk in VBAC Conference on Principal bundles and geometric Langlands, held in Berlin, in September 2008.

- Organized a workshop on "Principal Bundles" at CMI in February 2009.

Madhavan Mukund

- Attended a workshop on "Beyond the Finite: New Challenges in Verification and Semistructured Data" at the International Conference and Research Center for Computer Science in Schloss Dagstuhl, Germany, in April 2008.

- Visited LSV, ENS de Cachan, France for one month in April-May 2008 on the Indo-French Networking Research Programme project "Timed and distributed models for control and verification (Timed-DISCOVERI)".Gave a talk entitled "Tagging Makes Local Testing of Message-Passing Systems Feasible" in May 2008.

- Visited IRISA, Rennes, France during May 2008.Gave a talk entitled entitled "Tagging Make Local Testing of Message-Passing Systems Feasible" in May 2008.

- Visited TRDDC, Pune in July 2008 and gave a talk entitled "Efficient processing of range queries".

- Attended the 7th Update Meeting on "Advanced Formal Methods", at the Tata Research Development and Design Centre, Pune, in July 2008 and presented a talk on "Software Transactional Memory"

- Taught a course on "Introduction to Algorithms", IGNITE Programme, Tata Consultancy Services, May-August, 2008

- Attended the Workshop on "Developments and New Tracks in Trace Theory" at Cremona, Italy, in October 2008 and presented a talk.

- Participated in the 6th IEEE International Conference on Software Engineering and Formal Methods (SEFM 2008) at Cape Town, South Africa, in November 2008 and presented a paper.

- Attended Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2008), at Indian Institute of Science, Bangalore, in December 2008.Co-chair of the Programme Committee, chaired a session.

- Attended Workshop on "Software Verification" at the Indian Institute of Science, Bangalore, in December 2008.

- Co-organizer of the workshop on "Perspectives in Concurrency Theory" to commemmorate Prof P S Thiagarajan's 60th birthday, CMI, in December 2008.

- Co-organizer of the workshop on "Automata, Concurreny and Timed Sysems (ACTS 2009)",CMI, in January 2009.

- Taught a course on "Foundations to Computing", IGNITE Programme, Tata Consultancy Services, October 2008-March, 2009

K. Narayan Kumar

- Visited the Department of Computer Science at the State University of New York at Stony Brook in April 2008.

- Visited LSV, ENS de Cachan during April - May, 2008 on the Indo-French Networking Research Programme project "Timed and distributed models for control and verification (Timed-DISCOVERI)".

- Attended 7th Update Meeting on "Advanced Formal Methods", TRDDC, Pune, in July 2008.

- Taught a course on "Introduction to Algorithms", IGNITE Programme, Tata Consultancy Services, May-August, 2008

- Attended Workshop on "Developments and New Tracks in Trace Theory", Cremona, Italy, in October, 2008 and gave a talk on "Reachability and Boundedness in Timed HMSCs".

- Attended Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2008), Indian Institute of Science, Bangalore, in December 2008.

- Attended Workshop on "Perspectives in Concurrency", at CMI, Chennai, in December 2008.

- Attended Workshop on "Automata, Concurrency and Timed Systems", CMI, Chennai, in January 2009 and gave a talk on "Analysing time-constrained MSCs".

- Attended the 3rd International Conference on "Logic and its Applications", at the Institute of Mathematical Sciences, in January 2009.

- Visited the Department of Computer Science, IISc, Bangalore, March 2009.

- Taught a course on "Foundations to Computing", IGNITE Programme, Tata Consultancy Services, October 2008-March, 2009

S. Senthamarai Kannan

- Attended Group Theory Work shop at Indian Statistical Institute, Bangalore and gave six lectures during May 2008.

- Gave two lectures of Finite Group Quotients in the Colloquim at the Institute of Mathematical Sciences, Chennai.

Shiva Shankar

- Visited the Indian Institute of Science twice during the period 2008-2009.

V.V. Sreedhar

- Attended Workshop on "Entanglement in Quantum Condensed Matter Systems", in November 2008, at the Institute of Mathematical Sciences, Chennai.

- Attended Workshop on "Noncommutative Geometry and Quantum Field Theory", in December 2008, at the Institute of Mathematical Sciences, Chennai.

- Conducted a weekly fluid dynamics seminar at CMI, during January-March 2009, along with Dr. A Thyagaraja of U.K. Atomic Energy Agency, and also lectured on "Symmetries and Conservation Laws in Fluid Dynamics".

K.V. Subrahmanyam

- Visited the Computer Science department, University of Chicago, during April 2008 and gave a talk at the Toyota Technical Institute, Chicago titled "An overview of GCT".

- Visited the Math department, North Eastern University, Boston, during April 2008 and gave two lectures on "The GCT approach to the P vs NP problem", one in the Math department and one in the Computer Science department.

- Visited Indian Institute of Technology, Mumbai, in June 2008.

- Attended Indian Algorithms Seminar,Khandala (2008)

Samir Datta

- Attended Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2008), Indian Institute of Science, Bangalore, in December 2008.

- Attended Indian Algorithms Seminar,Khandala (2008)

- Visited Ural State University for a joint Indo-Russian Workshop.

Govind S. Krishnaswami

- Gave a talk on " Dimensional Large-N QCD and Baryons" at the International Workshop on "Frontier Problems in Strong Interaction Physics", PPISR Bangalore in January 2009.

- Visited Tata Institute of Fundamental Research, Department of Theoretical Physics and gave a talk on "Possible non-trivial fixed point for 4d O(N) scalar fields", Free Meson seminar, in February 2009.

- Attended Spring School on "Algebraic and Combinatorial Structures in Quantum Field Theory" at Institut d'Etudes Scientifiques, Cargese (Corsica), France, in March 2009.

- EPSRC Fellow at the Department of Mathematical Sciences and Centre for Particle Theory, Durham University, U.K. (Summer and Autumn terms).Gave Course on Modular Forms by Jens Funke, Durham UK, Autumn 2008.

K. Narayan

- Attended Monsoon Workshop on String theory, TIFR, Mumbai, in June 2008.

- Visited CERN Theory Institute and gave a talk on "String Phenomenology" at CERN, Geneva, in August 2008.

- Attended Indian Strings Meeting, ISM08, International String Theory Conference (co-organizer), and gave a talk on "Gauge theories with time-dependent couplines and cosmological singularities" at Pondicherry, in December 2008.

- Attended Indo-US Frontiers of Science Symposium, at Agra, in March 2009.

Suresh Nayak

- Visited Purdue University during April 2008.

- Attended Luchezar Avramov's sixtieth birthday conference titled: "Commutative Algebra: Connections with Algebraic topology and Representation Theory" in May 2008.

- Invited Speaker at midwest conference called KUMUNU in August 2008 at Lincoln, Nebraska.

- Visited University of Nebraska at lincoln during May - December 2008.

R. Srinivasan

- Visited Prof. B.V. Rajarama Bhat at Indian Statistical Institute for two months during November-December 2008.

- Visited Prof. Masaki Izumi at University of Kyoto during January, 2009.

- Attended a workshop on "Operator Algebra" held at University of Tokyo, in January 2009 and gave a talk.

M. Sundari

- Gave an invited lecture in Symposium on "Harmonic analysis" held at the Indian Institute of Technology, Kanpur, in May 2008.

- Attended Colloque d'analyse Harmonique d'Orsay held at Universitat Paris – Sud 11 in the honour of Prof. Noel Lohoue, in July 2008.

- Attended a workshop on "Harmonic Analysis and PDE" held at the Indian Institute of Science, Bangalore, in December 2008.

- Attended Indo-French conference held at IMSc – CMI in December 2008.

- Gave an invited talk on `Hardy's uncertainty principle' in 16th Ramanujan symposium on Fourier analysis and its applications held at University of Madras, in February 2009.

S.P. Suresh

- Attended Dagstuhl Seminar on "Beyond the Finite: New Challenges in Verification and Semistructured Data", in April 2008 at Dagstuhl, Germany and gave a talk titled `Unbounded data in security protocols'.

- Visited ENS Cachan during April - May 2008.

- Attended Workshop on "Logic and Information Security" in September 2008 at Leiden, The Netherlands.

- Attended Calcutta Logic Cirlce Workshop on "Logic and Cognition" in October 2008 at Jadavpur University, Kolkata and gave an invited talk on "Gentzen's consistency proof for arithmetic".

- Attended Workshop on "Perspectives in Concurrency", in December 2008 at CMI, Chennai.

- Participated in the Third Indian Conference on "Logic and Applications", in January 2009 at the Institute of Mathematical Sciences, Chennai.

- Attended Workshop on "Automata, Concurrency, and Timed Systems" in January 2009 at CMI, Chennai.

M.K. Vemuri

- Attended workshop on "Fourier Analysis and Its Applications" at the Ramanujan Institute, Chennai, in February 2009 and gave a talk on `The homogeneous shifts via inductive algebras'.

- Gave a talk on "Inductive algebras and homogeneous shifts" at the Mathematics Colloquium, at the West Virginia University, Morgantown, WV, USA, in November 2008.

- Gave an instructional-lecture at the Instructional workshop on "Differential Geometry" at the University of Mysore, Mysore.

Purusottam Rath

- Gave a talk in the Indian Statistical Institute, New Delhi on "Transcendence of Gamma values".

- Gave a series of lectures on "Transcendence of periods of elliptic curves over number fields" in the workshop on "Modular Forms" at the Harish Chandra Research Institute.

- Gave a talk in the International Conference in Mathematics held at the Harish Chandra Research Institute.

Shrihari Sridharan

- Visited the Indian Institute of Science, Bangalore during June-July 2008.

- Attended DST-SERC School on "Nonlinear Dynamics" in Indian Institute of Science, Bangalore during June 2008.

- Attended International Conference on "Nonlinear Dynamical Systems and Turbulence" in the Indian Institute of Science, Bangalore during July 2008.

- Gave a short course entitled "Six lectures on Symbolic Dynamics" during October 2008.

A Baskar

- Attended 7th Update Meeting on "Advanced Formal Methods", at the Tata Research Development and Design Centre, Pune, in July 2008.

- Participated in International school on "Foundations of Security Analysis and Design", at Italy, during August 2008 and gave a talk on "Knowledge-based modeling of Voting Protocols".

- Visited Prof. Steve Kremer, ENS Cachan during September 2008.

- Attended Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2008), at Indian Institute of Science, Bangalore, in December 2008.

- Attended Workshop on "Perspectives in Concurrency", in December 2008 at CMI, Chennai.

- Participated in the Third Indian Conference on "Logic and Applications", in January 2009 at the Institute of Mathematical Sciences, Chennai.

- Attended Workshop on \Automata, Concurrency, and Timed Systems" in January 2009 at CMI, Chennai.

Prakash Chandrasekaran

- Visited the Indian Institute Science, Bangalore, during September - November 2008

- Visited Microsoft Research India, Bangalore, during January - March 2009

Nagarajan Krishnamurthy

- Visiting Scholar at the Indian Statistical Institute, Delhi during August - September 2008 and Collaborated with: Dr. S. K. Neogy, SQC and OR Unit.

- Attended ORSI Conference 2008, The International Conference on "Operations Research for a Growing Nation" at S.V. University, Tirupati, in December 2008.

- Attended Winter School on "Operations Research and its Applications", at the Indian Statistical Institute, Chennai, in February 2009 and gave talks on "Geometric Interpretation of Lemke-Howsons Algorithm to find Nash Equilibria in Bimatrix Games" and "Stochastic Games and Some Sub-classes".

- Attended Workshop on "Game Theory and its Applications" as a part of the annual technical festival, at the National Institute of Technology, Suratkal, in February 2009 and gave talks on "Algorithms to find Nash Equilibria in Bimatrix Games" and "Applications of Game Theory to Computer Science, Communication Networks and Economics".

Other Professional Activities

S. Kesavan

- Member, NBHM.

- Member, Executive Organizing Committee, ICM2010.

- Member, Board of Studies in Mathematics, Pondicherry University.

- Member, Board of Studies in Mathematics, Madras University.

- Member, Kanchi Mamunivar PG Centre, Pondicherry.

- Member, BoS in Mathematical Sciences, Homi Bhabha National Institute.

Madhavan Mukund

- Member, Editorial Board, Formal Methods Letters.

- Member, Editorial Board, Transactions on Petri Nets and Other Models of Concurrency (ToPNoC).

- Member, Program Committee, 35th International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM 2009), Spindleruv Mlyn, Czech Republic, 2009.

- Co-chair, Program Committee, 28th International Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2008), Bangalore, 2008.

- Member, Program Committee, 35th International Colloquium on Automata, Languages and Programming (ICALP), Reykjavik, Iceland, 2008.

- Member, Program Committee, 15th International Symposium on Formal Methods, Abo Akademi University, Turku, Finland, 2008.

- Member, Program Committee, 29th International Conference on Applications and Theory of Petri Nets (ICATPN), Xian, China, 2008.

- Member, Program Committee, Workshop on Concurrency metHods: Issues aNd Applications (CHINA 2008), Satellite Workshop at ICATPN 2008, Xian, China, 2008.

- Member ACM India Council, Association of Computing Machinery (ACM).

- Member of the Council, European Association for Theoretical Computer Science (EATCS).

- Secretary, Indian Association for Research in Computing Science (IARCS).

- National Coordinator, Indian Computing Olympiad.

- Team Leader of the Indian team, International Olympiad in Informatics, Cairo, Egypt, August 2008.

- Column editor, "News from India", Bulletin of the European Association for Theoretical Computer Science (EATCS).

- Member, Board of Studies in Mathematical Sciences, Homi Bhabha National Institute

- Member, Board of Studies in Computer Science, PSG College of Technology, Coimbatore

K. Narayan Kumar

- Member, Program Committee, Symposium on the Theoretical Aspects of Computer Science (STACS'09), Freiburg, Germany, February 2009.

- Member, Scienti c Committee, Workshop on Automata, Concurrency and Timed Systems, Chennai, January 2009.

- Coach, Indian Computing Olympiad.

- Deputy Leader of the Indian team, International Olympiad in Informatics, Cairo, Egypt, August 2008.

- Coach of the CMI team that participated in theWorld Finals of the ACM International Collegiate Programming Contest, Banff Canada, April 2008.

Shiva Shankar

- Associate Editor, Intl. Jour. on Multidimensional Systems and Signal Processing (Springer Verlag).

- Member of an IEEE Technical Committee in the area of Control Theory.

Govind S. Krishnaswami

- Co-organiser of theoretical particle physics seminar series, Durham University.

K. Narayan

- Co-organizer, Indian Strings Meeting, ISM08, international string theory conference, Pondicherry, Dec 2008.

S.P. Suresh

- Member of the Programme Committee, FSTTCS 2008, December 11-13, IISc, Bangalore.
- Chair of the Organizing Committee, ICLA 2009, January 7-11, IMSc, Chennai.

Visitors

- Kasturi Varadarajan, University of Iowa, gave a talk on "Algorithms for sensor cover" (April 2008).

- Rajaram Nityananda, Director, NCRA, Pune, gave a talk on "Gravity and Light" (April 2008).

- Amit Hogadi, TIFR, Mumbai, gave a talk on "Rationally Connected varieties and Tsen's theorem" (April 2008).

- B.P.Purnaprajna, University of Kansas at Lawrence, gave a talk on "Deformations of finite morphisms and smoothing of higher multiplicity structures on curves" (July 2008).

- Ajneet Dhillon, University ofWestern Ontario, Canada, gave a talk on "Tamagawa numbers and connected components of stacks of bundles" (July 2008).

- Sourav Chakraborty, University of Chicago, U.S.A., gave a talk on "Hardness and Algorithms for Rainbow Connectivity" (July 2008).

- J. Pasupathy gave a talk on "Transition from classical to quantum physics" (August 2008).

- Madhav Nori, University of Chicago, U.S.A., gave a talk on "K-theory and the splitting principle" (August 2008).

- S. Ramanan gave a talk on "Exponents of a Lie Group" (August 2008).

- Yoshitaka Terada, National Museum of Ethnology (Department of Cultural Research), in charge of its music gallery - Screening of the film "Drumming Out a Message: Eisa and the Okinawan Diaspora in Japan (2005)" followed by a discussion (August 2008).

- Alladi Sitaram, Professor Emiritus, Indian Statistical Institute, Bangalore, gave a talk on "From infinite series to Fourier transforms; a crash course on Fourier theory" and "Around Wiener's theorem on translates of functions and distributions" (August 2008).

- John H. Coates, Cambridge University, U.K., gave a talk on "Tate-Shafarevich groups of elliptic curves with complex multiplication" (August 2008).

- Sourav Chakraborty, Visiting Faculty CMI, Technion Univ, Israel, gave a talk on "An Online Multi-unit Auction for Perishable Goods with Unknown Supply" (September 2008).

- M. Subramanian gave a talk on "Synthesising Music on the Computer - special challenges for Karnatic music" (September 2008).

- Emmie te Nijenhuis gave a talk on "The Ancient Indian Tone System in Mathematics and Music Practice" (September 2008).

- C.S. Rajan, TIFR, Mumbai, gave a talk on "Cohomology of topological groups" (October 2008).

- Urmie Ray, IHP, Paris, France, gave a talk on "Two lectures on Automorphic Forms and Kac-Moody Algebras" (November 2008).

- David Beck gave a talk on "THE WEB OF MUSIC: An examination of the many facets through which music may be thought about" (November 2008).

- Sudarshan Ananth, IISER, Pune, gave a talk on "The forces of Nature" (November 2008).

- Aline Bonami, Professor Emeritus, University of Orleans, France, gave a talk on "Uncertainty Principles in the Euclidean space" (December 2008).

- Pasquale Angela, Universite Paul Verlaine - Metz, France, gave a talk on "L2-theory for certain hypergeometrical Fourier transforms" (December 2008).

- Erich Graedel, RWTH Aachen University, Germany, gave a talk on "Solution Concepts and Algorithms for Infinite Multiplayer Games" (December 2008).

- Ignasi Mundet i Riera, Universitat de Barcelona, Spain, gave a talk on "Jordan's theorem for the di"eomorphism group of some manifolds" (December 2008).

- Adel Awad, British University of Egypt, Cairo and Ain-Shams Univ, Cairo, gave a talk on "Kerr-AdS 5 Black Holes, the First Law and Counter-terms" (December 2008).

- Rajesh Gopakumar, HRI, Allahabad, gave a talk on "Open-Closed String Duality" (December 2008).

- M. Ram Murty, Queen's University, Canada, gave a talk on "Transcendence of Petersson Inner Product" (December 2008).

- V. Kumar Murty, University of Toronto, Canada, gave a talk on "Special Values of L- Functions of Half-Integral Weight Modular Forms" (December 2008).

- Suneeta Vardarajan, Dept. of Math. and Stat. Sciences, U. of Alberta, gave a talk on "Geometric ows and string theory" (December 2008).

- S.G. Rajeev, University of Rochester, U.S.A., gave a talk on "The Orbit of a Radiating Charged Particle" (January 2009).

- Adam Koranyi, CUNY, U.S.A, gave a talk on "Homogeneous operators on Hilbert spaces" (January 2009).

- Archana Pai, Albert Einstein Institute, Potsdam, Germany, gave a talk on \Fishing gravitational wave chirps with a multi-detector network" (January 2009).

- Daniel Stroock, Massachusetts Institute of Technology, U.S.A., gave a talk on "An Ergodic Theorem for Rotations in Infinite Dimensions" (January 2009).

- A. P. Balachandran, Syracuse University, U.S.A., gave a talk on "Quantum Gravity and Noncommutative Spacetimes" (January 2009).

  Krishna Chaitanya, University of Kansas, U.S.A., gave a talk on "Toroidalization" (January 2009).

- V. Lakshmibai, Northeastern University, U.S.A., gave a talk on "Hall algebras and the geometry of quivers" (January 2009).

- Nutan Limaye, Institute of Mathematical Sciences, gave a talk on \Hats o" to theoretical computer science" (January 2009).

- Simon Gindikin, Rutgers University, U.S.A., gave a talk on "Elementary talk: Complex background of real geometry" and "Advanced talk: 50 years of integral geometry" (January 2009).

- Loic Helout, INRIA Rennes, France, gave a talk on "Diagnosis from Scenarios" (January 2009).

- V. Lakshmibai, Northeastern University, U.S.A., gave a talk on "Hall algebras and the geometry of quivers" (January 2009).

- Shiraz Minwalla, Tata Institute of Fundamental Research Mumbai, gave a talk on "Black Holes in Yang-Mills Theory" (January 2009).

- M.S. Raghunathan, TIFR, Mumbai, gave a talk on "Cocompact Arithmetic Groups" (January 2009).

  Partha Mukhopadhyay, Institute of Mathematical Sciences, gave a talk on "Noncommutative Identity Testing, Isolation Lemma and Lower Bounds" (February 2009).

- M.S. Santhanam, IISER, Pune, gave a talk on "Level uctuations, quantum chaos and 1 fnoise" (March 2009).

- Tapas Kumar Das, Harish Chandra Research Institute, Allahabad, gave a talk on "Black Holes in your Bathtub" (March 2009).

- Piotr Pragacz, Polish Academy of Science, Poland, gave a talk on "Combinatorics of polynomials" (March 2009).

- Tapas Kumar Das, Harish Chandra Research Institute, Allahabad, gave a talk on "Astrophysical accretion as an analogue gravity phenomena" (March 2009).

- Raja Sridharan, Tata Institute of Fundamental Research, Mumbai, gave a talk on "On Segre classes" (March 2009).

N.K. Rajendiran & Co.,
Chartered Accountants

FORM NO. 10-B
(See Rule 17 – B)

AUDITOR'S REPORT

Audit report u/s 12A (b) of the Income Tax Act 1961, in case of charitable or religious Trust or institutions

We have examined the Balance sheet of **CHENNAI MATHEMATICAL INSTITUTE**, Plot No. H1, SIPCOT IT Park, Siruseri 603 103 as at 31st March 2009 and also the Income & Expenditure Account for the year ended on that date which are in agreement with the books of accounts maintained by the said Institution.

We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit. In our opinion, proper books of account, have been kept by the Head Office and the Branches of the above named institution visited by us so far as appears from our examination of the books, and proper returns adequate for the purposes of Audit have been received from Branches not visited by us.

In our opinion and to the best of our information and according to the information given to us the said accounts give a true and fair view.

    i)   in case of Balance Sheet, of State of affairs of the above named Institution as at 31st March 2009, and

    ii)   In case of Income & Expenditure Account, Excess of Expenditure over Income for the year end on that date.

Prescribed particulars are annexed hereto.

FOR N.K.RAJENDIRAN & CO.
Chartered Accountants.

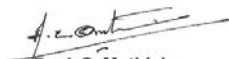Place: Chennai
Date: 06.08.2009

(N.K.RAJENDIRAN)
PROPRIETOR

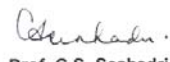No. 135 (Old No.147), Flat No. 3B, IIIrd Floor, Nelson Manickam Road, Aminjikarai, Chennai - 600 029
Tel : 2374 1212, Fax : 2374 0303   E-mail : auditornkr@yahoo.com

CHENNAI MATHEMATICAL INSTITUTE
PLOT NO. H1, SIPCOT IT PARK, SIRUSERI, 603 103.

BALANCE SHEET AS AT 31ST MARCH 2009

SOURCES OF FUNDS	SCH	31.03.2009 Rs.	31.03.2008 Rs.
General Fund	A	11514213	11555365
Capital Fund	B	54249597	13499597
Endowment Fund	C	57464754	42949070
Project Fund	D	2669356	17830897
TOTAL		**125897920**	**85834929**

APPLICATION OF FUNDS	SCH			
Fixed Assets	E		59572946	69778640
Investments	F			
Endowment Fund Deposits			55305866	
Other Deposits			16941831	17268105
Current Assets, Advances & Deposits				
Current Assets	G	270340		538819
Advances and Deposits	H	1409887		548201
Total		1680227		1087020
Less: Current Liabilities	I	7602953		2298837
Net Current Assets			(5922726)	(1211817)
TOTAL			**125897920**	**85834929**

Notes forming part of Accounts	J	
Significant Accounting Policies	K	

Dr. A.C. Muthiah
Founder Trustee

Shri K. Madhava Sarma
Trustee/Secretary

Prof. C.S. Seshadri
Trustee/Director

As per our report of even date annexed
For M/s. N.K. Rajendiran & Co.,
Chartered Accountants

N.K. Rajendiran
Proprietor

Place : Chennai
Date : 6/8/2009

CHENNAI MATHEMATICAL INSTITUTE
PLOT NO. H1, SIPCOT IT PARK, SIRUSERI, 603 103.

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2009

INCOME	SCH	31.03.2009 Rs.	31.03.2008 Rs.
Voluntary Contributions	L	40212672	34248531
Professional & Technical Fees		5000000	-
Fee Receipts	M	1070840	526182
Interest on Investments	N	2356601	1293685
Other Receipts	O	148224	68083
TOTAL		**48788337**	**36136481**
EXPENDITURE			
Research & Establishment	P	31855366	17844301
Operational Expenses	Q	7240171	5899970
Administrative & General Expenses	R	2408638	1965480
Depreciation		7325315	6597098
TOTAL		**48829489**	**32306848**
Excess of Expenditure Over Income transferred to Balance Sheet		41153	(3829632)

Dr. A.C. Muthiah
Founder Trustee

Shri K. Madhava Sarma
Trustee/Secretary

Prof. C.S. Seshadri
Trustee/Director

As per our report of even date annexed
For M/s. N.K. Rajendiran & Co.,
Chartered Accountants

N.K. Rajendiran
Proprietor

Place : Chennai
Date : 6/5/2009