CURRICULUM VITAE

Rajagopalan PARTHASARATHY
DAE Raja Ramanna Fellow (till 2015)
Formerly Tata Institute of Fundamental Research
School of Mathematics
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repository EDUCATIONAL QUALIFICATIONS

M.Sc	1967	Indian Institute of Technology, Madras, India
Ph.d	1973	Bombay Univ. {Thesis : Representations of Semisimple Lie Groups : Dirac operator and Discrete Series, Thesis advisor: Professor M.S. Narasimhan }

CONFERENCE LINK **CONFERENCE IMAGES LINK**

POSITIONS

DAE Raja Ramanna Fellow, Bharathiar University, Coimbatore
Senior Professor(I), Tata Institute of Fundamental Research, Bombay

Moore Instructor, M.I.T, Boston (1971-72)

Visiting Member, I.A.S, Princeton (1972-73, 86-87)

Visiting Professor : University of California, Los Angeles(1976-77),
San Diego (77-78), University of Utah, Salt Lake City (1982-83)

JSPS Exchange Visitor, Mathematical Institute of
Tohoku University, Sendai (Summer 87)

Visiting Member, M.S.R.I, Berkeley (Fall 87)

Max Planck Institut fur Mathematik, Bonn,(September 1997)

Université de Louis Pasteur, Strasbourg, (Two weeks in October 1997)

Exchange Visitor, Indo-French Center for the Promotion of
Science, Université des Sciences et Technologie de
Lille, France, (September 1994)

CNRS Directeur de Recherche, Université des Sciences
et Technologie de Lille, France, (October,November,December 1994)

Visiting Professor, Université des Sciences et Technologie de
Lille,(April,May,June 1997 and March,April,May 98)

LAMATH, Université de Valenciennes
(March,April,May,June 1999 - Poste PAST)
(April,May,June,July 2000 - Poste PAST)
(March,April,May,June 2001 - Poste PAST)
(May 2003 - Visiting Professor)
(June 2004- Visiting Professor)
(April,May 2005- Visiting Professor)
(June, 2006 - Visiting Professor)
(June, 2009 - Visiting Professor)

Ramanujan Institute, University of Madras, Chennai,(January 2002)

Institute for Mathematical Sciences, National University of Singapore,(August,2002)

ICTP, Trieste, Italy, (1.Invited Speaker, Conference in honour of M.S. Narasimhan
December 1-4, 2002, 2.Invited Speaker, Workshop in Representation
Theory, June,1993)

Institute of Mathematical Sciences, Chennai,(September 2002,November '03, Aug-Nov '04)

Here is a link to lectures during the latter visit to IMSc. Most of this course was repeated in TIFR during August-October,2006.

Institue of Mathematical Sciences, National University of Singapore, Workshop in Representation Theory, August 2-14,2002

Visiting Professor, Université Henri Poincare Nancy 1,(June 2003)

Visiting Professor, Université de Paris,10,(June 2005,May,June2007)
Max Planck Institute, Bonn, Germany, April,May 2006
Visiting Professor, M.I.T,Boston,Ohio State University,University of Georgia, Emory University,Georgia, CUNY, New York (April 2007)

AWARDS AND HONOURS

SHANTI SWARUP BHATNAGAR Award of the Council of Scientific and Industrial Research (India),(1985).
DOCTEUR HONORIS CAUSA, Université de Valenciennes et du Hainaut-Cambrésis, 2009.

SELECTED INVITED ADDRESSES :

Harish-Chandra Centenary Celebrations - 2023

Harish-Chandra Research Institute (HRI), Prayagraj, October 2-14

https://www.hri.res.in/~hc100/

The above link has my 6 talks in video format. For better viewing of the contents somewhat clearer than the the live camera shooting of material projected on the auditorium screen please refer to the **SLIDES**

International Congress of Mathematicians, Warsaw (1983)

Harish-Chandra Memorium, Harish-Chandra Research Institute, Allahabad, (1993)

ICTP, Trieste, Italy, (1.Invited Speaker, Conference in honour of M.S. Narasimhan, December 1-4, 2002, 2.Invited Speaker, Workshop in Representation Theory, June,1993)

National University of Singapore, Representation Theory Workshop,(August,2002)

December 15-18,2008, 'Representations of Lie Groups and Applications' Institut Henri Poincaré, Paris

PROFESSIONAL SOCIETIES

Fellow, Indian Academy of Sciences, Indian National Science Academy, National Academy of Sciences (India)

EDITORSHIP

Served as the Editor, Proceedings of the Indian Academy of Sciences, (Mathematical Sciences),(1991-93).

THESES DIRECTED

S. KUMARESAN	:	On the canonical k -types in the irreducible unitary g -modules with nonzero relative cohomology
VIJAYANTHI CHARI	:	Some topics in infinite dimensional Lie algebras
Cédric Rousseau	:	(Codirecteur de la These, Université de Valenciennes, Laboratoire des Mathematiques (2006, juin) Déformations d'actions de groupes et de certains réseaux résolubles
Mémoire de DEA Directed	:	
Renaud CADART	:	La Représentation de Weil

Recent lectures given outside TIFR:-

"The BGG Theorem on Composition Series for Verma Modules", Chennai Mathematical Institute, September 20, 2007

"The K-Group of Substitutional Dynamical Systems" Hyderabad Central University, October 25, 2007

A course of lectures "A Brief Survey of Representations of Compact Lie Groups" was given at Amrita Vishwa Vidyapeetham, Ettimadai, Coimbatore. This was attended by about 35 M.Phil students and teachers, from various city colleges in and around Coimbatore. The students needed to get credit in the subject Lie Groups as part of their curriculum. The 8-hour course was conducted during January 29-31,2008.

"Colouring quasi-crystals with prescribed symmetries and frequencies", University of Victoria,B.C, Canada, May 13, 2009.
"K-group of substitutional systems", University of Washington, Seattle,WA, U.S.A, May 19,2009.

Professor M.S. Narasimhan Memorial meeting, June 4, 2021

Remembering Professor M.S. Narasimhan

by Professor M.S. Raghunathan, June 7, 2021

PUBLICATIONS

[1] Dirac Operator and Discrete Series, *Annals of Mathematics* vol 96 (1972) **PDF**

[2] A note on the vanishing of certain L^2 –cohomologies,*Journal of the Math. Soc. Japan* 23 (1971) **PDF**

[3] A geometric meaning of the multiplicity of integrable discrete classes in $L^2(G/\Gamma)$, (with R. Hotta) *Osaka J. Math.* 10 (1973) **PDF**

[4] Multiplicity formulas for discrete series, (with R. Hotta), *Inv. Math.* 26, (1974)**PDF**

[5] An algebraic construction of a class of representations of a semisimple Lie Algebra,*Math. Ann.* 226, (1977) **PDF**

[6] A generalization of the Enright-Varadarajan modules, *Compositio Math.* 36 (1978) **PDF**

[7] Criteria for the unitarizability of some highest weight modules, *Proc. Ind. Acad. Sci.* 89 (1980) **PDF**

[8] The transfer of invariant pairings to lattices, (with T. Enright) *Pac. Journal of Math.* 95 (1981) **PDF**

[9] Holomorphic forms in $\Gamma\backslash G/K$ and Chern classes, *Topology* 21 (1982)**PDF**

[10] A proof of a conjecture of Kashiwara and Vergne, (with T. Enright), *"Noncommutative Harmonic Analysis and Lie Groups", Lecture Notes in Mathematics* 880 Springer-Verlag, (1981)**PDF**

[11] Spin modules for the orthogonal affine Lie algebras (unpublished)

[12] On a reciprocity between the discrete part of some induced representations (unpublished)

[13] Unitary derived functor modules with small specrum (with T. Enright, N. Wallach and J. A. Wolf) *Acta. Math.* 154 (1985) **PDF**

[14] Unitary modules with non vanishing relative Lie algebra cohomology, *Proceedings of the International Congress of Mathematicians,* Warsaw (1983)

[15] t-structures in the derived category of representations of a quiver, *C. R. Acad. Sc. Paris, t. 304, Serie I,* (1987) also *Proc. Indian Acad. Sci.* 98 (1988) **PDF PDF**

[16] On the quantization of a coherent family of representations at roots of unity,*J. Math. Soc. of Jap.* 48 (1996) **PDF**

[17] Quantum Analogues of a Coherent Family of Modules at Roots of Unity : A_2, B_2, pp. 87-115 in: S.D. Adhikari (ed.), *Current Trends in Mathematics and Physics - A Tribute to Harish-Chandra*, Narosa, New Delhi, 1995 **PDF**

[18] Quantum Analogues of a Coherent Family of Modules at Roots of Unity: A_3, *Acta Applicandae Mathematicae* 44 (1996)**PDF**

[19] Colouring Quasi-Crystals with prescribed symmetries and frequencies, (with A. El Kacimi),*Discrete Comput. Geom.* 22 (1999),459-475.**PDF**

[20] Trace Splittings in C^*-algebras of Tiling Systems via Colourings (with A. El Kacimi), *Proceedings of the American Mathematical Society* 131 (2003),1191-1204.**Proc. AMS, vol.131 PDF PostScript**

[21] Quantum Analogues of a Coherent Family of Modules at Roots of one:G_2, in: V.B. Mehta (Ed.), *Algebraic Groups and Homogeneous Spaces*, Narosa Publ. House, 2007, pp.475-480 **PDF**

[22] Quantum Analogues of discrete series at roots of one, *Proceedings of an International Conference on "Harmonic Analysis and Quantum Groups", January 3-8,2005, Cochin University of Science and Technology, Kochi.***PDF**

[23] A Product for Harmonic Spinors on reductive homogeneous spaces, (with S. Mehdi),**Journal of Lie Theory Vol.18(2008) PDF**

[24] Skew-product for group valued edge labellings of Bratteli diagrams, (with A. El Kacimi),*Publ. Mat.* **Vol.53**, (2009), 329-354. **PDF**

[25] The K-group of substitutional systems, (with A. El Kacimi) *Publ. Mat.* **Vol.54**, (2010), 3-23. **PDF PDF**

[26] Representation theoretic harmonic spinors, (with Salah Mehdi), *Preprint, To appear in the Platinum Jubilee Special Issue of Indian Journal of Pure and Applied Mathematics.* **PDF**

[27] Cubic Dirac cohomology for generalized Enright-Varadarajan modules, (with Salah Mehdi), *Preprint* **PDF**

[28] Classification of Discrete Series by Minimal K type, *Electronic Journal of Representation Theory* **PDF**

In the following "Brief Abstract" the link for publications does not work; the correct links for publications are give above. Brief **Abstract** and Highlights of above Publications. For abstracts of earlier publications see below - **previous abstracts**

Here is a compilation of selected articles in the literature related to the above publications. (Note: The google search produced some extraneous results too.)

Seminaire-Bourbaki-vol.1970-71.pdf

Seminaire-Bourbaki-Duflo.pdf

Dirac Operators Rep Theory-Book.html

Dirac-Op-Chap-3.pdf

Dirac Partha String Th.pdf Hotta Parthasa dimension automor.pdf

Mathematics into the 21st Century: A Century of Lie Theory: Roger Howe ISBN:08218016780

Representation Theory and Automorphic Forms: Instructional Conference, By **T. N. Bailey, Anthony W. Knapp** ISBN:0821806092

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Google Search 1.htm

Google Search 2.html

Google Search 4.htm

Google Search 5.htm

Abstract of a talk by David Vogan on selected publications.
Speaker: Prof. D.A. Vogan
Title: Dirac operators and unitary representations: some of the work of Professor Parthasarathy

Abstract: The representation theory of a compact Lie group K is well understood by classical work of Cartan and Weyl. If T is a maximal torus in K, then a representation of K is may be regarded as a sum of characters of T. The homogeneous space K/T is a projective algebraic variety, and (thanks to Borel, Weil, and Bott) representations of K can be realized in sheaf cohomology of K/T with coefficients in algebraic line bundles.

Suppose G is a semisimple Lie group. Inside G there is a maximal compact subgroup K, and the homogeneous space G/K is a Riemannian symmetric space. Harish-Chandra showed in the 1950s and 1960s that infinite-dimensional representations of G can be thought of as sums of finite-dimensional representations of K, and used this point of view to establish many fundamental properties of harmonic analysis on G. But his work did not show exactly which sums of K representations could be extended to G representations, and it provided few direct clues about how to get detailed information about G representations from our knowledge of K.

The work of Parthasarathy changed that. He provided many of the tools that allow one to relate representations of G and of K almost as closely as one relates representations of K and of T in the classical theory. One of the first and most spectacular examples was his introduction of a Dirac operator on G/K. This operator plays the role of the del-bar operator (more precisely, of del-bar plus its adjoint) on K/T. First of all this allowed him to realize discrete series representations of G as solutions of the Dirac operator on G/K, in analogy with the Borel-Weil-Bott realization of finite-dimensional representations. Just as the Bott-Borel-Weil theorem is the beginning of a still-growing body of understanding of compact groups, so Parthasarathy's Dirac operator has led over the past thirty-five years to some of the deepest results on unitary representations of G. Typical examples are the work of Parthasarathy's student Kumaresan describing unitary representations that can contribute to the cohomology of locally symmetric spaces, and Parthasarathy's characterization of unitary holomorphic representations.