
K G Ramanathan

Professor K G Ramanathan was a very distinguished mathematician of India. He was responsible, along with Professor K Chandrasekharan, for developing the School of Mathematics, Tata Institute of Fundamental Research (TIFR), Mumbai into one of the outstanding schools of research in pure mathematics in the world. This was done during 1950–1960 with the encouragement and strong support by the first director of TIFR – the great Indian physicist Homi Bhabha whose birth centenary was celebrated in 2009.

Professor K G Ramanathan returned to India in 1951 after obtaining his PhD in mathematics that year from Princeton University, USA. He and Professor K Chandrasekharan were given the task of building a first rate mathematics research center in India by Homi Bhabha. They managed to attract a few outstanding students to TIFR., taught many courses in pure mathematics, and worked closely with many of them. They also arranged to bring several eminent international mathematicians to visit TIFR and give courses in advanced pure mathematics.

Over the last fifty years the School of Mathematics, TIFR has become an outstanding research center with excellent faculty and also of international reputation. It has produced a number of great mathematicians some of whom have moved to other parts of India and the world. This in turn has resulted in the development of more excellent centers of research in mathematics in India such as the Institute of Mathematical Sciences, Chennai, the Harish-Chandra Research Institute, Allahabad, the stat-math divisions of the Indian Statistical Institute at Kolkata, Delhi and Bangalore, and the Chennai Mathematics Institute. Also the departments of mathematics at several institutions such as the Indian Institute of Science, The Ramanujan Institute (University of Madras), the Central University of Hyderabad, etc., now have excellent faculty. There was a similar initiative by P C Mahalanobis and C R Rao in developing statistics and probability theory at the Indian Statistical Institute, Kolkata and its branches in Delhi and Bangalore.

Three mathematicians from the school of mathematics, TIFR have been elected Fellows of the Royal Society, UK (FRS). They are M S Narasimhan, C S Seshadri and M S Raghunathan. Also in 2007, Srinivasa Varadhan, who got his PhD at the Indian Statistical Institute, Kolkata in 1963, was awarded the Abel Prize by the Norwegian Academy of Sciences. This prize is considered the equivalent of the Nobel Prize in mathematics. A number of other mathematicians from India have also achieved great international recognition for their profound contribution to many aspects of mathematics. One could not have reached this point without the great efforts of K G Ramanathan along with K Chandrasekharan and those of P C Mahalanobis and C R Rao.

Professor K G Ramanathan initiated in the early seventies a collaboration with the Indian



Institute of Science to develop a strong center for research in applications of mathematics. This resulted in the creation of the TIFR–IISc programme in applications of mathematics on the campus of the Indian Institute of Science, Bangalore. This has flourished well and now has its own Campus near Yelahanka, in Bangalore with very good mathematicians specializing in partial differential equations and numerical analysis. Thus K G Ramanathan has the unique distinction of being the prime mover of the development of two groups of outstanding mathematicians in India, one in pure mathematics and another in applied mathematics.

K G Ramanathan was born on 13 November 1920 in Hyderabad, Andhra Pradesh to Sri K Gopala Iyer and Smt. Anantalakshmi. He was one of three children. He had a brother and a sister. He got his school education from Wesleyan Mission High School, Secunderabad. Next he got his BA degree in mathematics in 1940 from the Nizam College, Hyderabad. Later in 1942 he obtained his Master's degree in mathematics from Loyola College in Chennai (Madras at that time). He worked as assistant lecturer in mathematics at Annamalai University, Chidambaram, Tamil Nadu during 1945–46 and as lecturer in mathematics at Osmania University, Hyderabad for the next two years. Then in 1948 he became a research scholar in mathematics at the University of Madras. There he came in contact with Professors R Vaidhyathanaswamy and T Vijayaraghavan, both well-established research mathematicians. In addition, Rev Fr. C Racine, a former student of the famous French mathematician E Cartan, had just come to Loyola college, Chennai as a Jesuit priest to teach mathematics. He was a very encouraging and gentle person genuinely interested in promoting scholarship in mathematics in students that he came in contact with. K G Ramanathan was one such student and got some very useful advice and help from Rev Fr. C Racine. Rev Fr C Racine went on to help many students who attended Loyola college. More than a decade after K G Ramanathan, the present author was taught modern algebra by Rev Fr C Racine at Loyola college, motivating him to have a research career in mathematics.

During the period 1942–48 while he was still a student, K G Ramanathan produced a number of good research papers mainly in number theory and some related to the great Srinivasa Ramanujan's work, especially, his functions $\tau(n)$, $\sigma(n)$, etc. In 1948 Ramanathan got an opportunity to go to the Institute for Advanced Study (IAS) at Princeton. This was set up in the late nineteen thirties. Albert Einstein and logician Kurt Gödel were some of the early members of that Institute. The great physicist Robert Oppenheimer was the director of this Institute for a long time. Here Ramanathan had the opportunity to work with the great mathematicians C L Siegel and E Artin. Under their supervision, K G Ramanathan worked for his PhD in mathematics at the Princeton University. (The IAS is also housed on Princeton University Campus). Soon after finishing his PhD at Princeton in 1951, Ramanathan returned to India and joined K Chandrasekharan at the School of Mathematics, TIFR that had just started. K Chandrasekharan had himself been at Princeton earlier and worked with the great mathematician S Bochner.



With tremendous dedication, K G Ramanathan helped K Chandrasekharan in creating a fine school of mathematics. The two of them lectured to some very bright young students on a number of advanced topics in pure mathematics mainly in algebraic and analytic number theory, modern algebra and several complex variables. K G Ramanathan's excellent and meticulously delivered lectures along with informal discussions during long walks with them along the Arabian Sea near the old campus of TIFR were aimed at the budding as well as mature scholars. He gave them an exciting guided tour through the fascinating and glorious mathematical realm of Fermat, Euler, Lagrange, Gauss, Abel, Jacobi, Dirichlet, Kummer, Galois, Eisenstein, Kronecker, Riemann, Dedekind, Minkowski, Siegel, Hilbert, Hecke, Artin, Weil, Chevalley and many other world class mathematicians. Also since both K Chandrasekharan and K G Ramanathan had built a great reputation as outstanding mathematicians at Princeton they were able to persuade several top notch international mathematicians such as C L Siegel, Laurent Schwartz, Kiyosi Ito and others to visit TIFR and give lectures on a number of subjects to the young and eager students. They absorbed these subjects and learnt a good deal and very soon started to produce great research in a number of subjects such as algebraic geometry, several complex variables, dynamical systems.

What K Chandrasekharan and K G Ramanathan accomplished in that decade 1950–60 is very remarkable and is a great model to emulate for any one interested in building top class research groups. It was Prof. Bhabha's great vision to first get top class persons like Professor Chandrasekharan and Ramanathan to join him and then give them all the freedom and support to develop their ideas. KGR was an active research mathematician for over fifty years starting in 1942 till he passed away in 1992. For a nice account of the research accomplished by him, see the articles by S Raghavan who was a student of Ramanathan and a faculty member at the School of Mathematics, TIFR from the mid fifties till recently [1–3]. Ramanathan was also actively involved in the study of the *Notebooks* as well as the *Lost Notebook* of the great Indian mathematician Srinivasa Ramanujan.

K G Ramanathan received many honours during his life time. He was a Fellow of the Indian Academy of Sciences, and of the Indian National Science Academy. He served as President of the Indian Mathematical Society. He was the Editor of the Journal of the Indian Mathematical Society for over ten years and was on the editorial board of the well-known journal *Acta Arithmetica* for over thirty years. He received the Shanti Swarup Bhatnagar award in 1965. He was the UGC National Lecturer in 1965 and a Jawaharlal Nehru Fellow (1971–73) and was awarded Padma Bhushan in 1983 and the INSA Homi Bhabha Medal in 1985.

Ramanathan was keenly interested in Tamil, Telugu and English literature. He was also passionate about south Indian classical music and was a singer himself.



Prof. K G Ramanathan was a great scholar, visionary and an institution builder. He was also a very gentle and kind person, noted for his deep inner humility and simplicity. India is fortunate to have had Professor K G Ramanathan as one of its prized citizens.

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Suggested Reading

- [1] S Raghavan, A front rank mathematician, *Current Science*, Vol. 30, No.5, 10 September 1992.
- [2] S Raghavan and K G Ramanathan, *Acta Arithmetica* LXIV.1 1993, 1920–1992.
- [3] S Raghavan, Kollagunta Gopalaiyer Ramanathan (13 November 1920–10 May 1992), *Bio. Mem. Fell. INSA*, New Delhi, 31, pp.13–22, 2007.

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Reminiscences

Professor K G Ramanathan was known to many of his colleagues, friends and students as KGR. KGR was associated in Princeton with great mathematicians like Carl Ludwig Siegel and Emil Artin. When he joined TIFR he communicated enthusiastically his scholarship in mathematics to the research students. The young mathematicians at TIFR, thus acquired a taste for some deep areas of mathematics which were until then not cultivated in India; this had impact on the future course of research for many of them.

When C S Seshadri and I were research students at TIFR, during the first year of our stay KGR was staying in the hostel and we interacted with him closely. During the long walks in the evenings he used to talk to us extensively about mathematics and mathematicians. I still recall vividly his beautiful summary of Siegel's Princeton lectures "Analytic functions of several complex variables". This course of lectures treated among other topics Cousin's problems, Abelian functions, period relations, discrete subgroups of Lie groups, bounded symmetric domains, work of E and H Cartan, Siegel modular group and modular functions. Some of the other topics he talked about were: Class Field Theory, Kronecker's "liebster Jugendtraum", uniformisation of Riemann surfaces and the problem of resolutions of singularities in algebraic geometry.

We also came to know through him about the paper "Generalisation des fonctions abeliennes" by Andre Weil, which had been pointed out to him by Siegel. This paper played a crucial role in our later research. He also used to relate, with his keen sense of humour, many interesting anecdotes about mathematicians.

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