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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

A Tale of Two Symmetries

I will trace the development of ideas from a 1916 paper of Ramanujan, to the formulation of a conjecture of Jean-Pierre Serre in the 1970's, to its resolution in 2009 in my joint work with Jean-Pierre Wintenberger. Serre's modularity conjecture was a stimulus to much work that led to developments which were crucial to the methods Andrew Wiles used in his solution in 1994 of Fermat's Last Theorem. When Wiles announced his results he had said that his methods were *orthogonal* to Serre's conjecture. Our proof of Serre's conjecture uses a strategy that relies crucially on Wiles's methods. My mathematical memoir *Chasing A Conjecture: Inside the Mind of a Mathematician* talks about some of these ideas at an impressionistic level. This talk will give a more mathematical introduction to these ideas: it will flesh out the interplay of Galois and Ramanujan symmetries that are the main protagonists of my book.

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Prof. Chandrashekhar Khare was born in Mumbai, and studied at Cambridge, Oxford and Caltech, where he obtained his Ph.D. in 1995. He worked at the Tata Institute of Fundamental Research and the University of Utah and is now a professor at the University of California, Los Angeles. Prof. Khare's research is in number theory, especially on the relation between modular forms and Galois representations. In 2009, he and Jean-Pierre Winterberger made a remarkable breakthrough with their proof of a celebrated conjecture of J.-P. Serre. Prof. Khare's honors and awards include the Fermat Prize (2007), the Infosys Prize (2010) and the Cole Prize (2011); he was elected as a Fellow of the Royal Society in 2012.

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https://youtube.com/live/MM3exKW67IE

https://www.icts.res.in/lectures/Tale_of_Two_Symmetries