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Faculty

KRISHNA RAJAGOPAL

Professor and Associate Head for Education, Physics MacVicar Faculty Fellow



Name: Krishna Rajagopal

Title(s): Professor of Physics
Associate Head for Education, Physics
MacVicar Faculty Fellow

Email: krishna@ctp.mit.edu

Phone: (617) 253-6202

Assistant: [Joyce Berggren](#) (617) 253-4827

Address:

Massachusetts Institute of Technology
77 Massachusetts Avenue, Bldg. [6-311](#)
Cambridge, MA 02139

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Research Interests

Professor Rajagopal enjoys thinking about [QCD](#) in extreme conditions because it requires linking usually disparate strands of theoretical physics, including particle and nuclear physics, cosmology, astrophysics, condensed matter physics and string theory. His research interests include the properties of the cold dense quark matter that may lie at the centers of neutron stars, where the densities are so high that the neutrons are crushed one upon another. Professor Rajagopal's work shows that a lump of cold dense quark matter is the QCD analogue of a superconductor but that if you were to look at it using ordinary light, it would look like a transparent insulator and not like an electric conductor as previously assumed. His work also shows that somewhat less dense quark matter may be, in a certain sense, crystalline. Professor Rajagopal also studies the properties of very hot quark matter, of the sort that filled the universe shortly after the big bang and that is created in current experiments at the Relativistic Heavy Ion Collider. He is using gauge/gravity duality --- originally developed by string theorists seeking to understand quantum gravity --- to understand properties of strongly coupled, liquid-like, quark-gluon plasma. For example, he analyzes how a high energy quark plowing through this liquid loses energy and under what conditions a pair of heavy quarks moving through this fluid can bind into a meson. Professor Rajagopal has also analyzed the critical point in the QCD phase diagram and has proposed signatures for its experimental detection, making it possible for experimentalists at RHIC to search for the critical point in a large region of the phase diagram.

Biographical Sketch

After growing up in Toronto, Professor Rajagopal did his undergraduate work at Queen's University in Kingston, Canada. He obtained his doctorate at Princeton University in 1993 and then spent three years at Harvard as a Junior Fellow. He then spent one year at Caltech before coming to MIT in 1997.

Selected Publications


Professor Rajagopal's publications can be found on [SPIRES](#).

Last updated on March 25, 2014 3:10 PM

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