



DEPARTMENT OF PHYSICS INDIAN INSTITUTE OF TECHNOLOGY KANPUR

PHYSICS SEMINAR ON “QUANTUM GAMES”

Abstract

We will discuss some examples of two-player games where quantum strategies can give better payoffs than purely classical strategies (even if the latter are probabilistic). The examples are as follows.

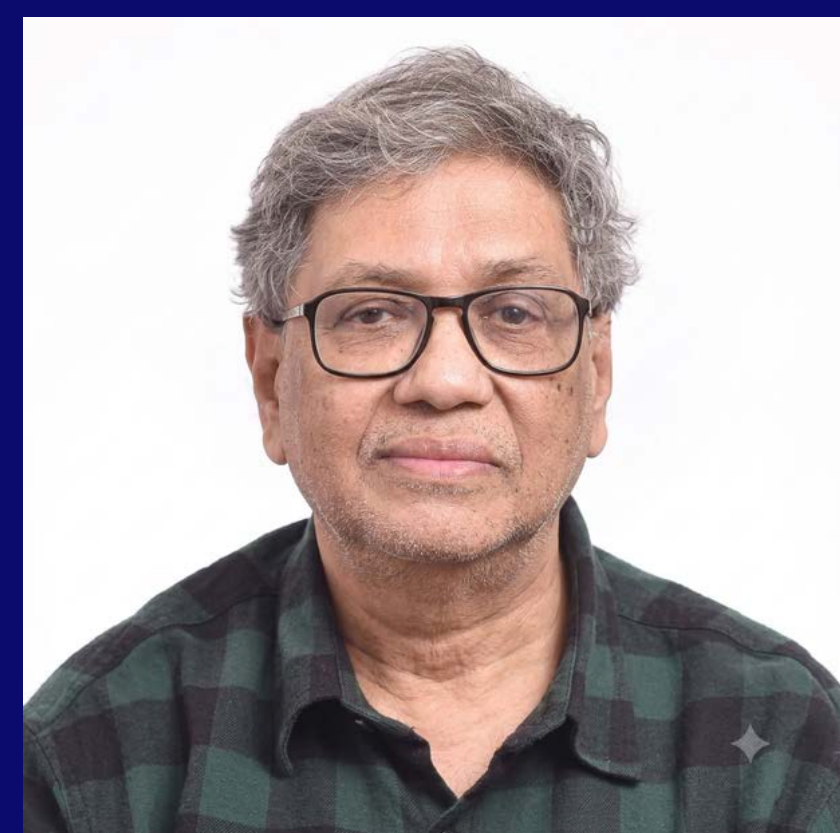
(i) a coin flipping game where two people, Q and C, play in the order Q, C, Q. It turns out that Q has a quantum strategy which always wins regardless of the classical strategy followed by C.

This game can be thought of as the simplest version of a quantum error correction code.

(ii) a game with two questions with yes/no answers and some payoffs for the four possible answers. The best classical strategy has a success rate of $3/4$ in the long run, but there is a quantum strategy which has a higher success rate of about 0.854. This game is related to the Clauser-Horne-Shimony-Holt (CHSH) and Bell's inequalities.

(iii) a number guessing game in which the second player has to guess a number chosen from 0 to $2^N - 1$ by the first player. The best classical strategy requires N questions, while there is a quantum strategy which requires only one operation. The talk will be at an elementary level. I will assume only a basic knowledge of two-state systems in quantum mechanics, and no knowledge of game theory.

Speaker



PROF. DIPTIMAN SEN

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About The Speaker

Prof. Diptiman Sen received his PhD in Physics from Princeton University in 1984. After postdoctoral work at Carnegie Mellon University and the University of Edinburgh, he joined the Indian Institute of Science in 1988 where he is a Professor. His research interests include condensed matter systems in low dimensions, mesoscopic systems, and various aspects of quantum field theory. Fellow of multiple science academies, and a prolific teacher and researcher, Prof. Diptiman Sen is one of most revered cond-mat theorist in India.



**THURSDAY
AUGUST 13**



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