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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

## ICTS Group Theory and Representation Theory Seminar

**Title** : Local tests of global properties

**Speaker** : Jaikumar Radhakrishnan (ICTS-TIFR, Bengaluru)

**Date** : Tuesday, 30 September 2025

**Time** : 11:30 AM (IST)

**Abstract** : We will present a proof of the following theorem using properties of the characters of the group  $Z_2^n$ .

*Theorem:* Fix  $\epsilon$  in  $[0,1]$ . Suppose  $f: Z_2^n \rightarrow Z_2$  is such that for  $x, y$  chosen uniformly at random from  $Z_2^n$ , we have

$\Pr[f(x+y) = f(x) + f(y)] \geq 1 - \epsilon$ .

Then, there is a linear function  $g: Z_2^n \rightarrow Z_2$  such that for  $x$  chosen uniformly at random from  $Z_2^n$ , we have

$\Pr[f(x) = g(x)] \geq 1 - \epsilon$ . (*End of theorem*)

(This is a somewhat precise version of a theorem originally proved using a combinatorial argument by Blum, Luby and Rubinfeld.) We will assume no background in computer science or in representation theory; we will begin by reviewing the characters of  $Z_2^n$  and their properties. If there is time left, we will present another algebraic result in the same spirit.

**Venue** : Feynman Lecture Hall