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TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Condensed Matter and Statistical Physics Seminar

Title : Fractionalized ("orthogonal") metals in anyon fluids

Speaker : Professor Senthil Todadri, (MIT)

Date : Friday , 14 August 2026

Time : 11:00 AM (IST)

Abstract : A fluid of mobile anyons may arise naturally when a Fractional Quantum Anomalous Hall (FQAH) state is doped. Motivated by recent experiments on twisted MoTe₂, we study metallic phases obtained by doping the $2/3$ FQAH state. We propose that the high-resistivity metal observed adjacent to this FQAH state is a Z_3 Orthogonal Metal: a non-Fermi liquid with sharp charge $1/3$ fermionic quasiparticles coupled to a (twisted) discrete Z_3 gauge field but with no sharp electronic quasiparticle. For a dilute gas of three species of charge- $1/3$ anyons with $\pi/3$ statistics, we construct two $U(3)$ symmetric Z_3 Orthogonal Metals, distinguished by whether the gapless fermions transform as $SU(3)$ triplets or singlets. We show that these states naturally yield large electrical resistivities even when the fractionalized quasiparticles are in a good metallic regime. Pairing of the charge- $1/3$ fermions produces an ordinary charge- $2e$ superconductor, smoothly connected to a BCS state but obtained through an intrinsically fractionalized normal state. We discuss experimental signatures of the idea that the normal metallic state in the lightly doped $2/3$ state may have fractionalized charge carriers.

Venue : Feynman Lecture Hall

ZoomMeeting: <https://icts-res-in.zoom.us/j/95754223224?pwd=sIfmaQ2dYXDc5dOfoUDuck7fv5nOKU.1>

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