

ICTS Astrophysics & Relativity Seminar

- Title** : Magnetic reconnection - an alternative explanation of radio emission in galaxy clusters
- Speaker** : Subham Ghosh (ICTS-TIFR, Bengaluru)
- Date** : Friday, 19th July 2024
- Time** : 2:00 PM (IST)
- Abstract** : Observations of galaxy clusters show radio emission extended over almost the system scale, necessitating mechanisms for particle acceleration. Previous models for acceleration such as diffusive shock acceleration and that due to turbulence fall short in terms of efficiency. In this letter, we propose the possibility of acceleration via magnetic reconnection. In particular, we invoke the plasmoid instability which has been previously applied to understand particle energization in high energy systems. Turbulence in galaxy clusters lead to fluctuation dynamos that are known to generate magnetic field structures consisting of sharp reversals. These form natural sites of reconnection. We perform Particle-In-Cell (PIC) simulations of the plasmoid instability in collisionless and nonrelativistic plasmas. We show that the resulting particle energy spectra have power law indices that are consistent with that inferred from observations. Our estimates of the maximum achievable Lorentz factor is about 10^5 indicating that acceleration due magnetic reconnection is a promising avenue for understanding the origin of nonthermal emission in galaxy clusters.
- Venue** : Feynman Lecture Hall
- Zoom Link: <https://icts-res-in.zoom.us/j/97788249141?pwd=UfbTzvAyistwQssncgyPWU26CQHw5u.1>
- Meeting ID: 977 8824 9141
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