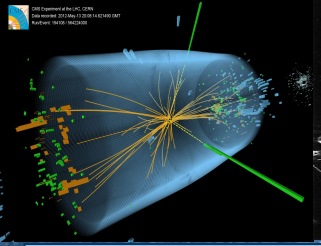
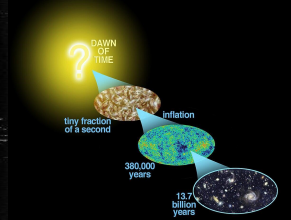


High Energy (Astro)Physics and Cosmology

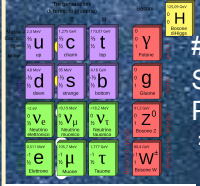
$$G_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

Prasanta Kumar Das



The High Energy (Astro)Physics and Cosmology Group study the universe's origin and the future, searches for the dark at high energy colliders, dark energy - the early and late-time cosmic acceleration, and the primordial gravitational waves.

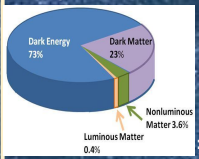
Dark matter(DM) search @ collider -



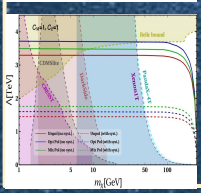
Standard Model - experimentally Successful - few limitations -> New Physics !

Dark Matter - 25% of the net matter Energy - play important role in structure formation

Signature of dark matter - relic density, galactic rotation curve,

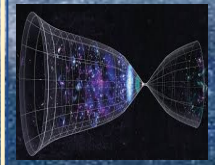


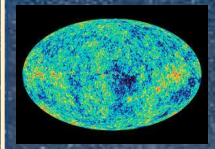
Linear collider: For a light DM , (~ 1 GeV): The effective scale ~ 3 TeV (Kundu et.al.)



UG project -Galactic rotation curve, halo - DM simulation using ML

Early universe cosmology and CMBR

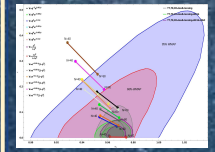




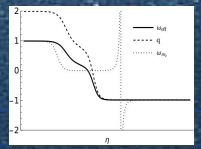
Big bang or Big bounce Not known - Quantum Gravity!

Quintom matter / Dark Energy

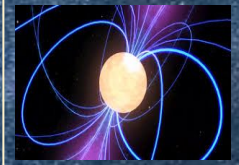
CMBR anisotropy - Quantum fluctuations (entanglement!) genesis of CMBR anisotropy !



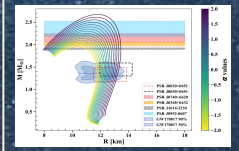
Inflation - f(R,T) gravity (Payel et al) + DM-DE intern. Cosmic evolution (Ashmita et al)



Neutron star - DM + Modified(f(R,T) gravity theory



Neutron star - 1.5 - 2.5 solar mass and 10-15 km radius



Anisotropic Neutron star- Dark matter - Tidal Deformation (Premachnad et al)

Tools required: QFT, GTR to study Early usinverse cosmology, particle scattering and compact object like NS. Softwares: Madgraph, ROOT, (ML based software)

HEPC site :

Current members: Ashmita, Manish, Premachand, Mayur, Charul(Pilani)

Past members: Selvaganapathy, Atanu, Payel & Saumyen, Dr. Ravi (postdoc)

Journal Publications: 47 (published), 4 (communicated)

External funding agency: ANRF, BRNS, DST-SERB, CSIR, DST-Fast Track

Collaborating Institutes: Washington state University, Kansas University, IUCAA Pune, HRI, PRL.