Department of Theoretical Physics

Sandeep Kumar Acharya
TIFR

Rich structure of CMB spectral distortions as a probe of new physics at high redshifts

Friday, 5 October 2018, 14:30
Room A304

Energy injected before recombination epoch at redshifts $z \lesssim 2 \times 10^6$ can cause deviations from blackbody spectrum in the cosmic microwave background (CMB). All previous work has assumed that the injected energy is deposited as heat in the ionized background baryon-photon plasma giving the characteristic non-relativistic thermal spectral distortions which at redshifts $z \lesssim 10^4$ are known as the Sunyaev-Zeldovich effect. I revisit this assumption and show that it is incorrect. I evolve the full electromagnetic particle cascade of high energy particles in the expanding universe. I will show that the full spectral distortion spectrum has a non-thermal component which depends on the energy of the injected particles and whether they are electrons, electron-positron pairs or photons. The shape of the spectral distortion carries more information about the energy-injection mechanisms than has been assumed until now.

tifr

Subha Majumdar
CAP/DTP