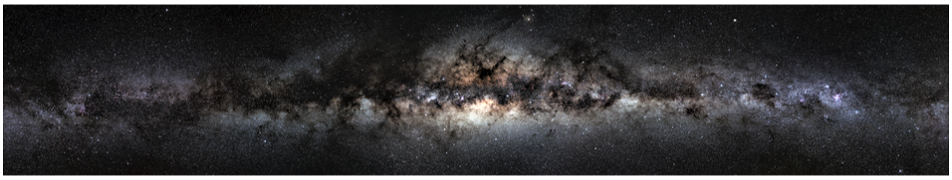

Contribution ID: **95**

Type: **Poster**

Inflationary Cosmology - A New Approach Using Non-linear Electrodynamics

Tuesday, 7 December 2021 08:20 (30 minutes)

We explore a new kind of NLED field as a source of gravity, which can accelerate the universe during the inflationary era. We propose a new type of NLED lagrangian which is characterized by two parameters: α (dimensionless parameter) and β (dimensionful parameter). We investigate the classical stability and the causality aspects of this model of inflationary expansion by demanding that the speed of the sound wave $c_s^2 > 0$ and $0 \le c_s^2 \le 1$. Corresponding to $0 \le c_s^2 \le 1$, we find $0.382(1.828) \le \beta B\ 2 \le 0.288(1.469)$ for $\alpha = 0.1(1.0)$. The equation of state parameter $\omega = -1/3$ requires $\beta_B^2 = 0.126(0.757)$ corresponding to $\alpha = 0.1(1.0)$. We find that the universe is accelerating i.e. $\ddot{a} > 0$ (which results in the deceleration parameter $q < 0$ (i.e. $\omega > -1/3$)), provided $\beta_B^2 \ge 0.126(0.757)$. During inflation, the energy density ρ_B is found to be maximum and $= 0.65/\beta$. The magnetic field necessary to trigger the inflation is found to be B ' is given by $B_{max} = 4 \times 10^{51}$ Gauss. Our model also predicts the e-fold number N = 71(64) that the magnetic field at the end of inflation is about $B = 10^{-10}$ (10^{-4}) Gauss corresponding to z = 0(1000) and this agrees quite well with the experimental prediction of the e-fold number. With $\alpha = 0.3(1.0)$ and $\beta_B^2 = 0.3974(0.8239)$, we find the scalar spectral index $n_s = 0.9649$, consistent with the PLANCK 2018 CMB data. Further, with $\alpha = 0.3(1.0)$, $\beta_B^2 = 0.3974(0.8239)$, we predicts the tensor-to-scalar ratio r = 0.1417(0.1449) and the tensorial spectral index $n_T = -0.0177(-0.0181)$. Journal Reference: Physica Scripta. 96, 065305 (2021).

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Session Classification: Break and Poster Session