

# DPF-PHENO 2024

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## Hunting for Inflaton at Colliders

*Thursday 16 May 2024 15:00 (15 minutes)*

We consider the non-minimal quartic inflation driven by the  $U(1)_X$  Higgs field  $\phi$  in classically conformal  $U(1)_X$  extended Standard Model (SM). Since the conformal symmetry is broken radiatively, the  $U(1)_X$  gauge boson mass  $m_{Z'}$ , the  $U(1)_X$  gauge coupling  $g_X$ , and the inflationary predictions for tensor-to-scalar ratio  $r$  are determined by only two free parameters, the inflaton mass  $m_\phi$  and its mixing angle  $\theta$  with the SM Higgs field. We show that the new FASER experiment at the High-Luminosity LHC (HL-LHC) can detect the inflaton in both cases if the mass is in the range  $0.1 \lesssim m_\phi$  [GeV]  $\lesssim 4$ . We show that the searches for primordial gravitational waves, collider searches for  $Z'$  at the LHC, and long-lived particle searches at experiments like FASER are complementary in the hunt for inflation. By performing a comparative study of the metric and Palatini formulations of gravity, we demonstrate that the two formulations are distinguishable.

### Mini Symposia (Invited Talks Only)

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**Session Classification:** Physics Beyond the Standard Model

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