Contribution ID: **209** Type: **Poster**

Critical Higgs Inflation and Second Order Gravitational Wave Signatures

The self coupling λ of the Higgs boson in the Standard Model may show critical behavior, i.e. the Higgs potential may have a point at an energy scale $\sim 10^{17-18}$ GeV where both the first and second derivatives (almost) vanish. Since λ is very small in this region, the Higgs boson can serve as inflaton even if its nonminimal coupling to the curvature scalar is only $calO(10)$, thereby alleviating concerns about the perturbative unitarity of the theory. We find that just before the Higgs as inflaton enters the flat region of the potential the usual slow–roll conditions are violated. This leads to "overshooting" behavior, which in turn strongly enhances scalar curvature perturbations because of the excitation of entropic (non–adiabatic) perturbations. For appropriate choice of the free parameters these large density perturbations occur at length scales relevant for the formation of primordial black holes. Even if these perturbations are not quite large enough to trigger copious black hole formation, they source second order tensor perturbations, i.e. primordial gravitational waves; the corresponding energy density can be detected by the proposed space-based gravitational wave detectors DECIGO and BBO.

Primary author: Mr XU, Yong (Bethe Center for Theoretical Physics, Universität Bonn)

Co-author: Prof. DREES, Manuel (Bethe Center for Theoretical Physics, Universität Bonn)

Session Classification: Parallel Sessions: Early Universe (C.A.R.L., H03)

Track Classification: Early Universe