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## Higgs dynamics in the early universe

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# *Stellingen*

*Behorend bij het proefschrift 'Higgs dynamics in the early universe'*

1. Computations of the stability of the electroweak vacuum during reheating are dependent on the renormalization scheme and should therefore be taken with a grain of salt.  
*Chapter 3 of this thesis.*
2. Whenever scalar fields are coupled non-minimally to gravity, a consistent treatment of reheating requires the inclusion of a non-trivial field space metric.  
*Chapter 4 of this thesis.*
3. A light particle that could be responsible for a first order electroweak phase transition could provide CP-violating interactions that are currently impossible to constrain by experiments.  
*Chapter 6 of this thesis.*
4. To explain the baryon asymmetry of the universe, we should focus on CP violation in the lepton sector instead of the quark sector.  
*Chapter 7 of this thesis.*
5. Contrary to the assertion of Clesse and García-Bellido, primordial black holes can not simultaneously explain the LIGO/VIRGO black hole mergers and constitute the entire dark matter fraction.  
*S. Clesse and J. García-Bellido, **Phys. Dark. Univ.** 22 (2018) 137-146.*
6. It is remarkable that the independent, local measurement of A. Domínguez et al. yields a value of the Hubble parameter that matches the CMB result.  
*A. Domínguez et al., **arXiv:190312097.***

7. The next large particle physics experiment should be a lepton collider, such as the proposed experiment CLIC.  
*CLICdp and CLIC Collaborations (T.K. Charles et al.), CERN Yellow Rep. Monogr. 1802 (2018) 1-98.*
8. It is interesting that the addition of an  $R^2$ -term solves the unitarity issues of Higgs inflation, while maintaining the connection between the CMB observables and Standard Model Higgs parameters.  
*D. Gorbunov and A. Tokareva, Phys. Lett. B788 (2019) 37-41.*
9. In order to decrease the number of flights, the physics community should experiment with conferences that take place completely online.

Jorinde van de Vis  
Leiden, 2 July 2019