

# Whispers from the Dark Universe - Particles & Fields in the Gravitational Wave Era

CLUSTER OF EXCELLENCE  
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## WHISPERS FROM THE DARK UNIVERSE – PARTICLES & FIELDS IN THE GRAVITATIONAL WAVE ERA

HELMHOLTZ

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## Vacuum (in)stability in N2HDM vs 2HDMS

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(Meta)stability of the EW vacuum is a crucial requirement for models with extended scalar sectors, which puts strong constraints on the parameter space of such models. In this work, we compare the vacuum structure of two extended scalar models, namely N2HDM (2HDM+real singlet) and 2HDMS (2HDM+complex singlet) and the intrinsic difference between them. We further investigate whether such differences persist, once the experimental constraints are imposed on both models. Lastly, we motivate the measurement of tri-linear Higgs coupling in this context, which can help us probe the different vacuum structures in the two models.

**Primary author:** LAHIRI, Jayita (UNI/TH (Uni Hamburg, Institut fuer Theoretische Physik))

**Co-author:** Prof. MOORTGAT-PICK, Gudrid (University of Hamburg, DESY)

**Presenter:** LAHIRI, Jayita (UNI/TH (Uni Hamburg, Institut fuer Theoretische Physik))

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