

Interplay between collider physics and the thermal history of the universe

M. Olalla Olea Romacho

“Matter and the Universe” Days 2021

24.11.2021



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Collider physics 🤝 Cosmology

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The electroweak phase transition

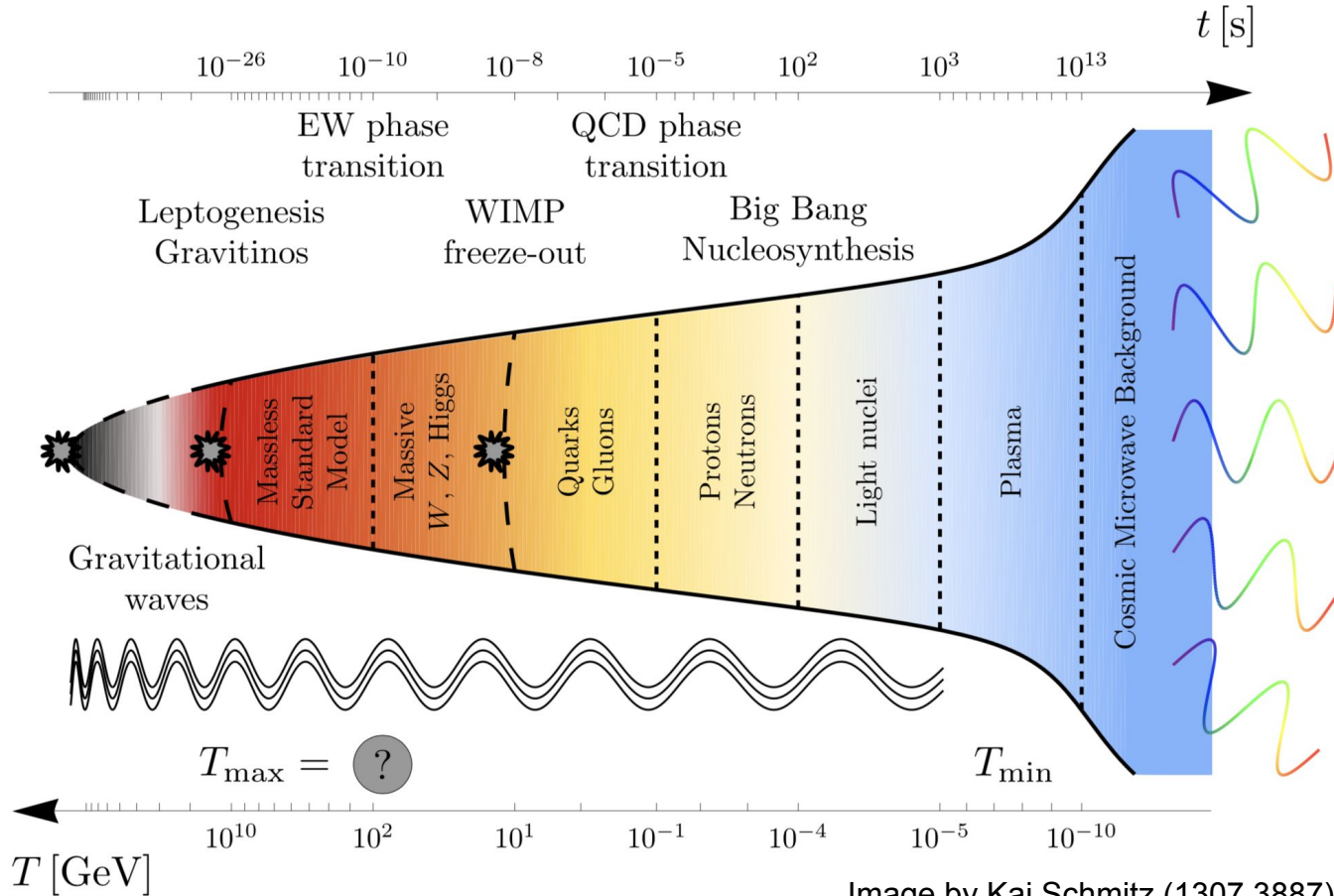


Image by Kai Schmitz (1307.3887)

The electroweak phase transition

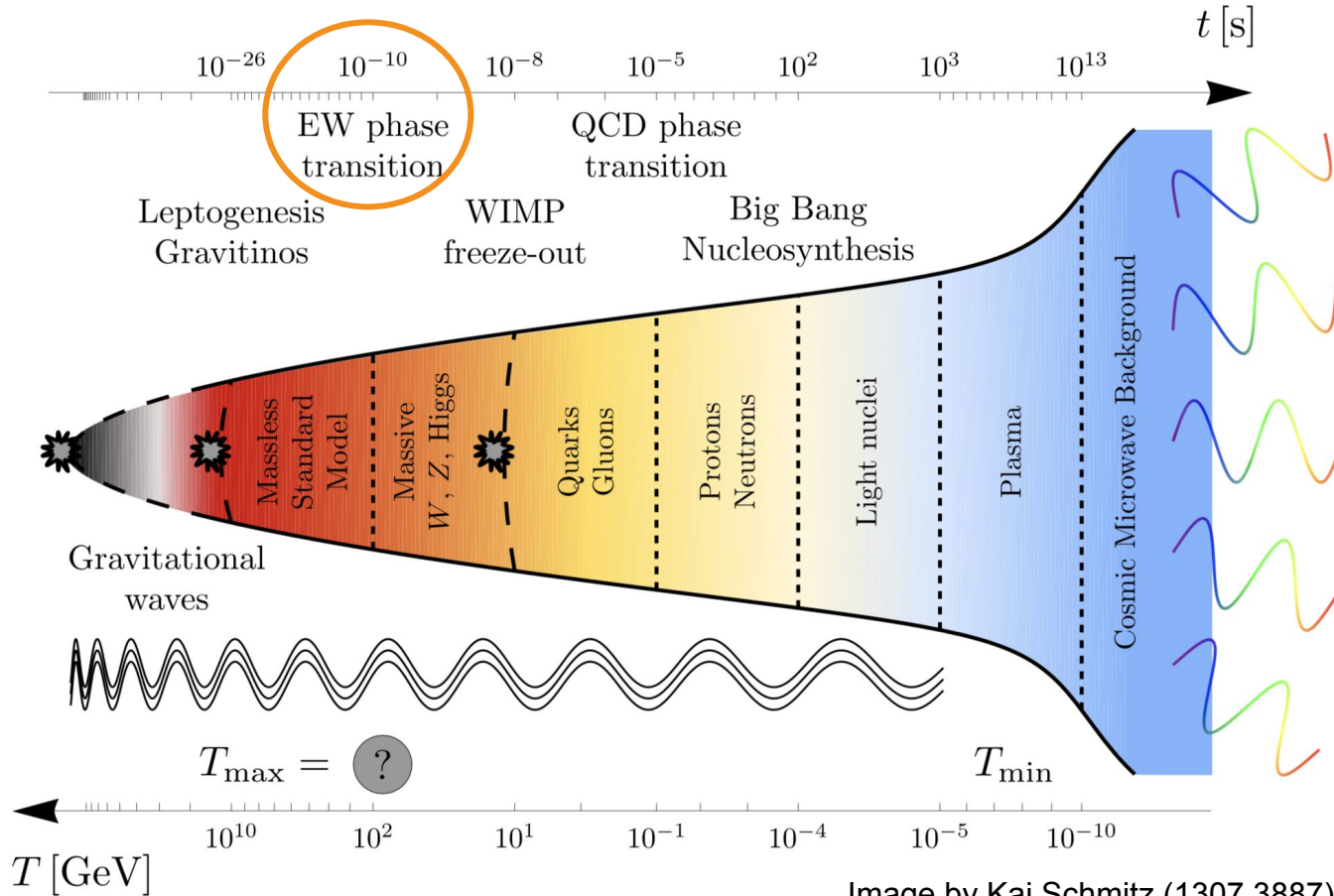
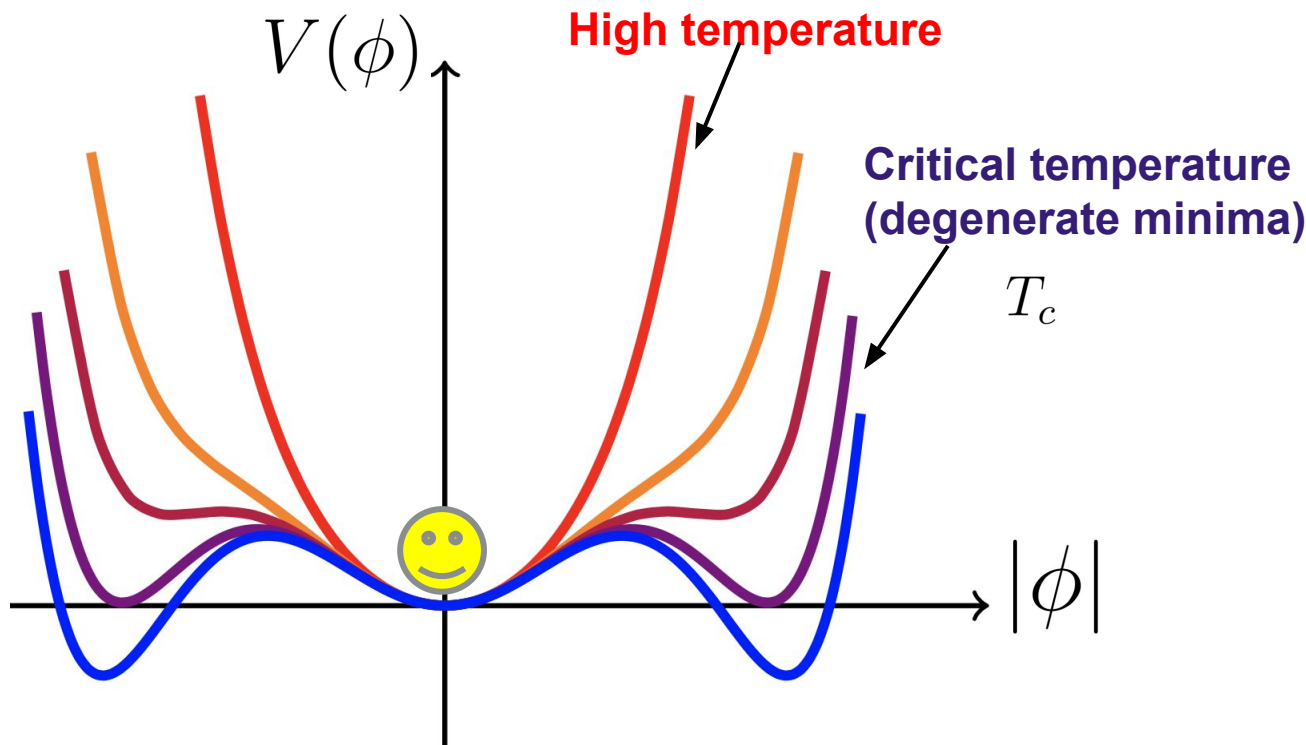


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The first order EW phase transition

What is a first order electroweak phase transition?

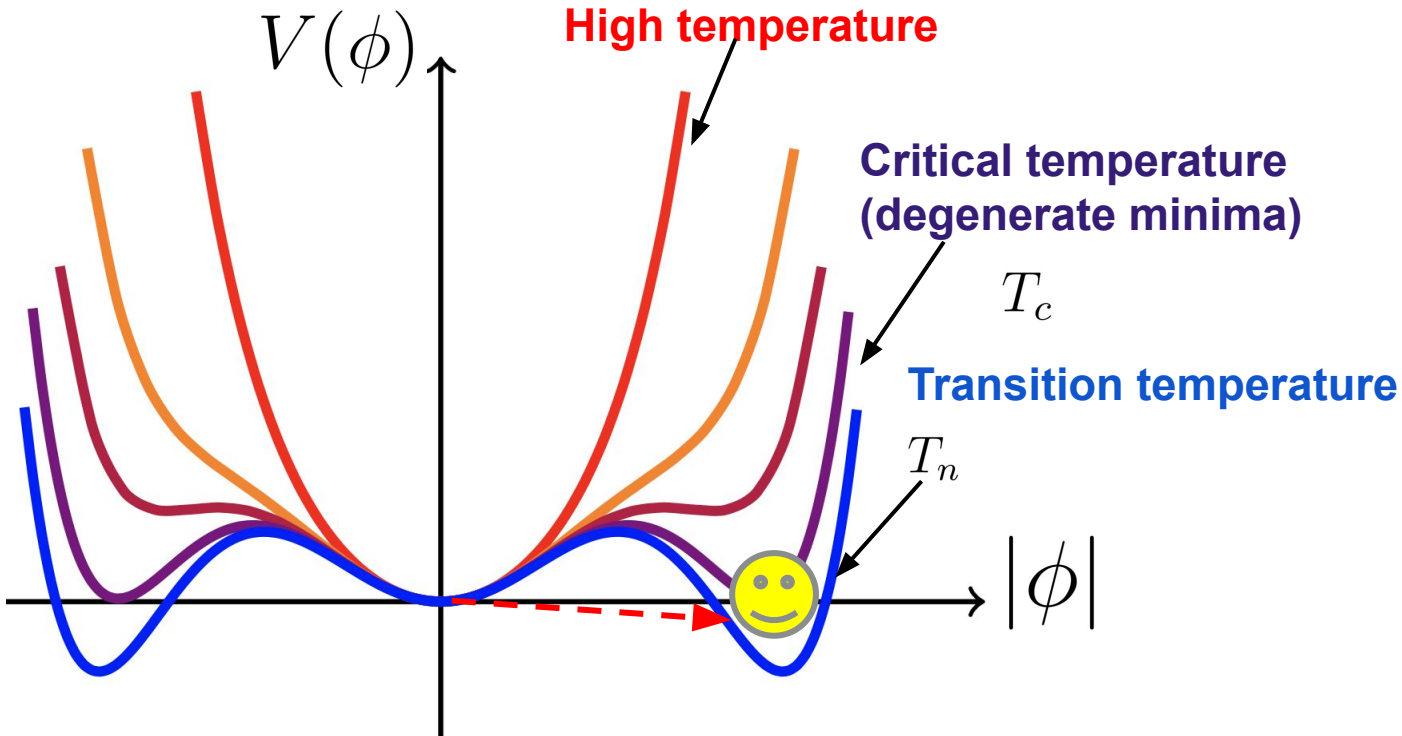
$$V(\phi, T) = V_0(\phi) + V^{loop}(\phi, T)$$



The first order EW phase transition

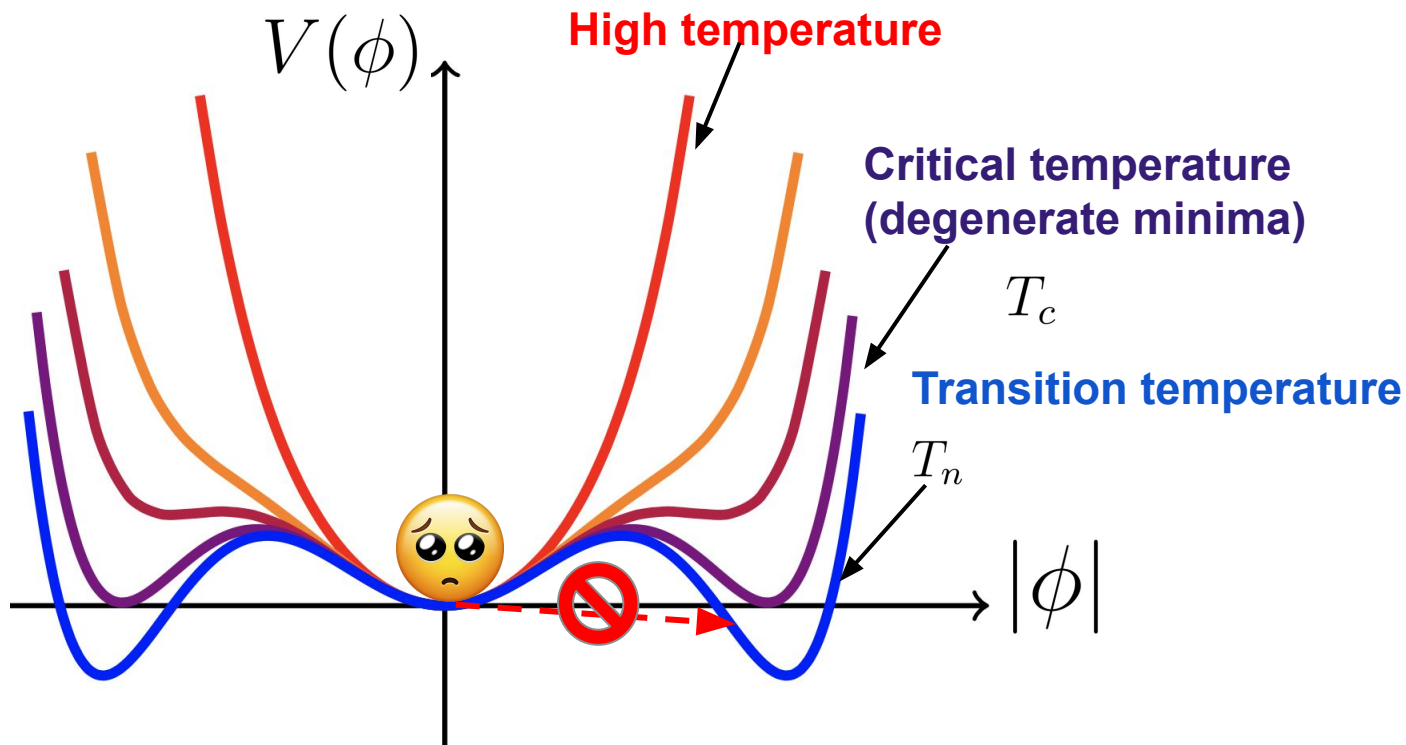
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What is a first order electroweak phase transition?



Vacuum trapping

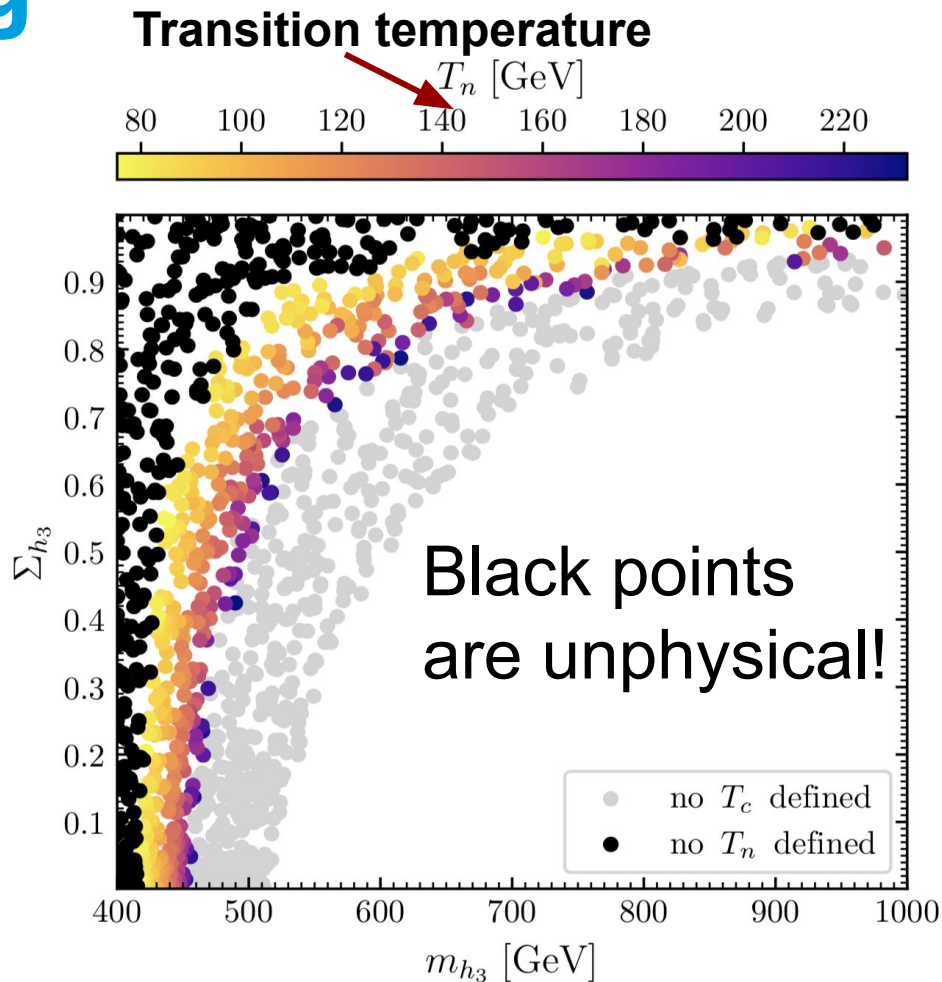
What is the “vacuum is trapped”
in a false minimum?



Vacuum trapping

- Vacuum trapping constrains BSM scenarios.
- Example. Doublet + Singlet extension of the SM:
 - 3 CP-even, $h_{1,2,3}$
 - 1 CP-odd, A
 - 2 charged scalars, H^\pm

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**Thank you for your
attention!**

Any questions?