

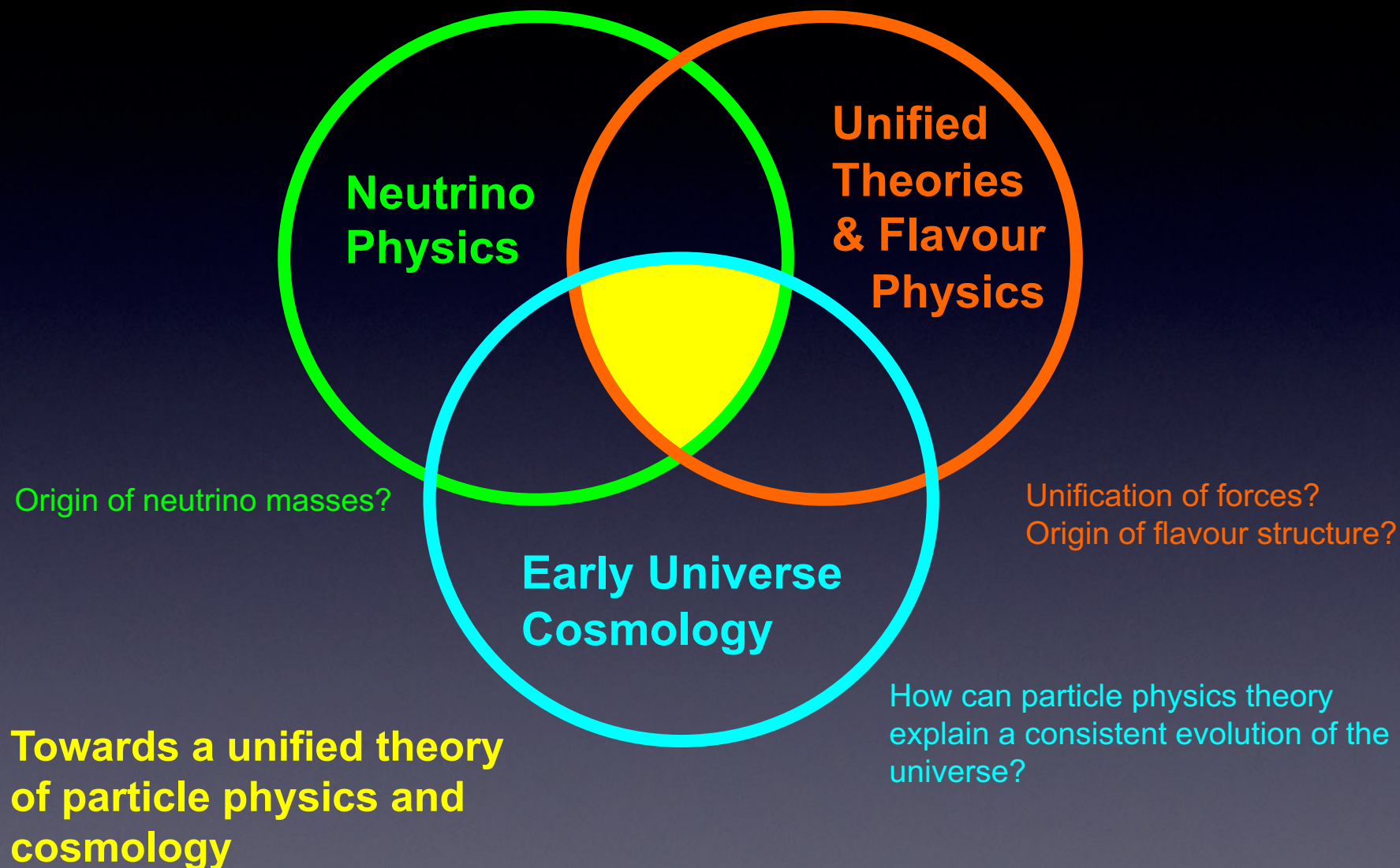
Gravitational wave related research in Basel

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Topics of my research group in Basel:

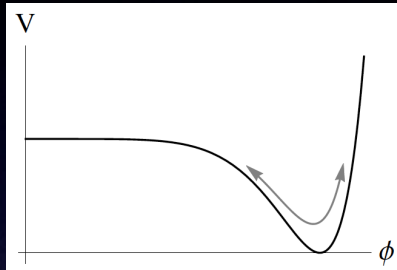


GW as a window into the early universe

- ▶ **GW from "oscillons" after inflation** (or from moduli field dynamics in string theory) – what could we learn from the stochastic GW background about (p)reheating?
- ▶ **GW from cosmic strings forming after GUT inflation** – how can we build realistic & predictive GUT models testable by the future GW experiments?

GW from "oscillons" in hilltop-shaped potentials

Hilltop-shaped potential:

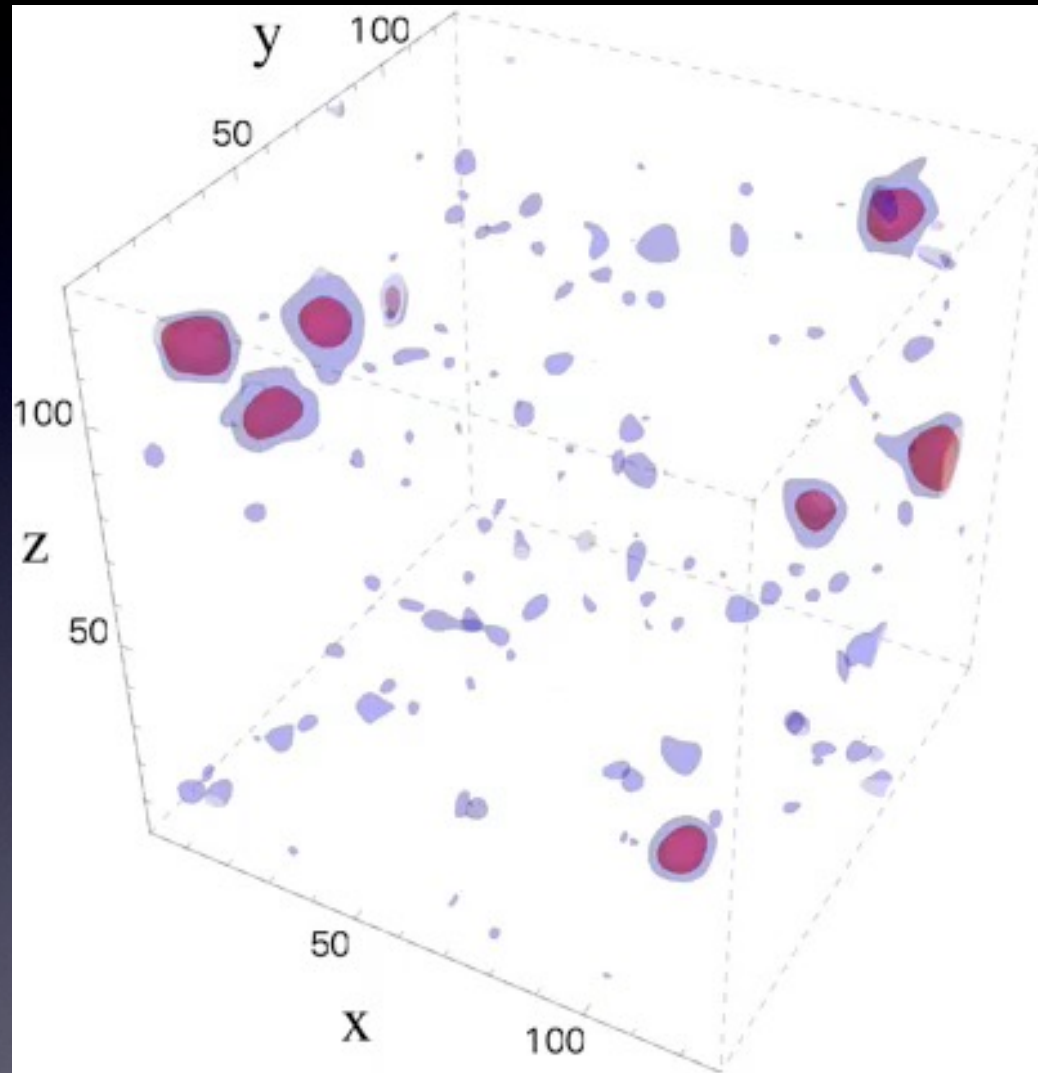


Energy overdensities of the scalar field (e.g. inflaton field, modulus of string theory):

- **blue**: small overdensities
- **red**: large overdensities (oscillons)

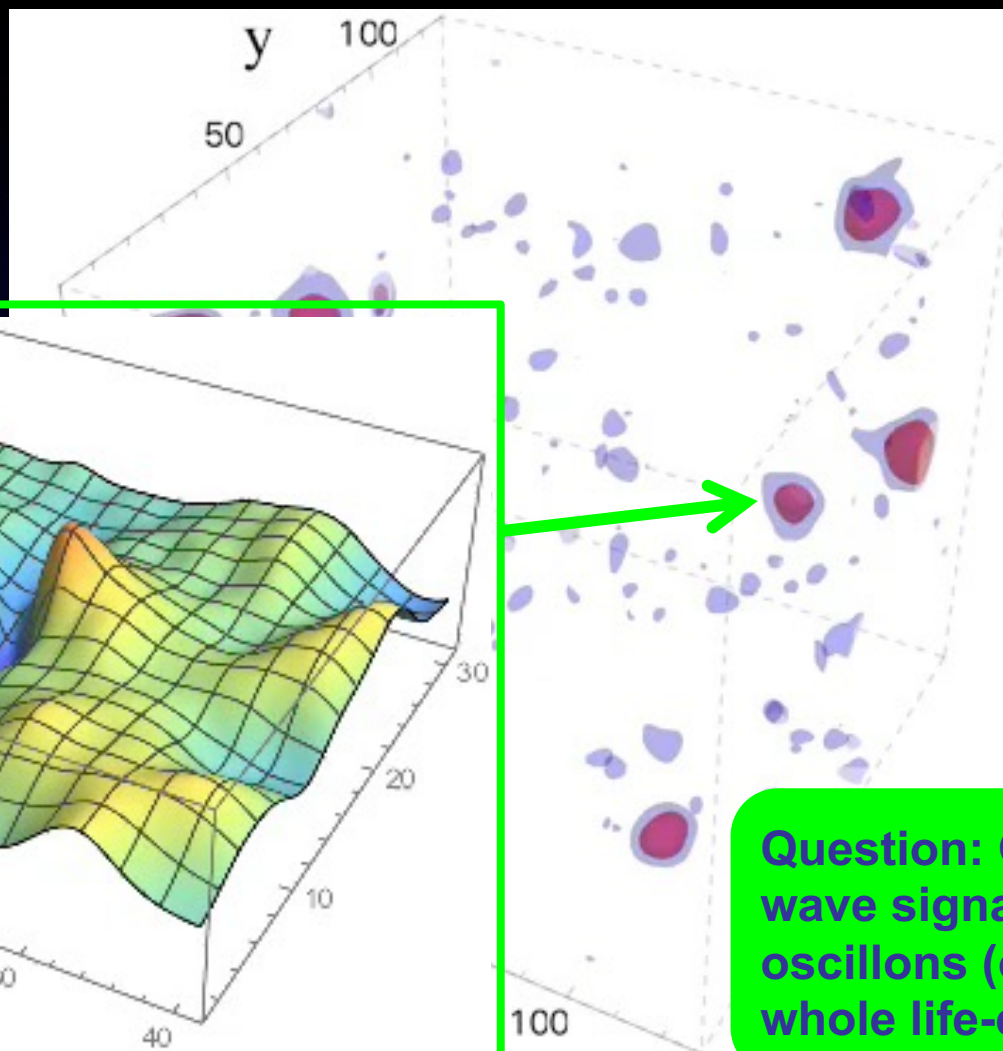
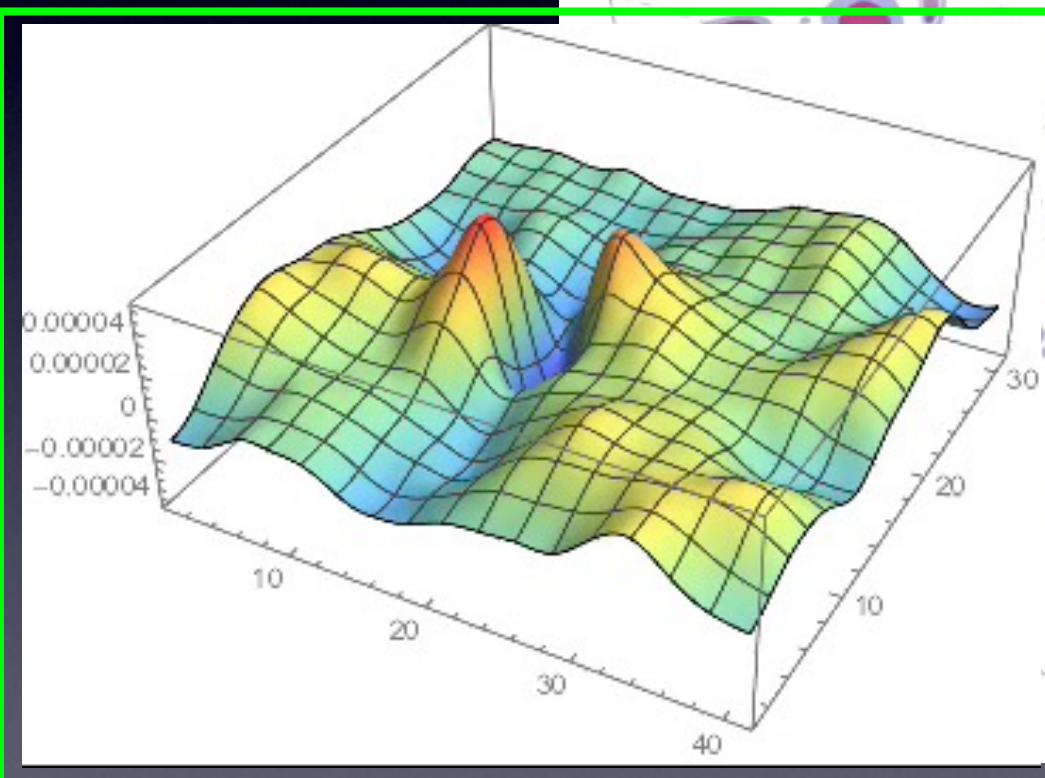
Movies from lattice simulations:

<https://particlesandcosmology.unibas.ch/en/downloads/oscillons-from-string-moduli-movies.html>



GW from "oscillons" in hilltop-shaped potentials

Oscillons



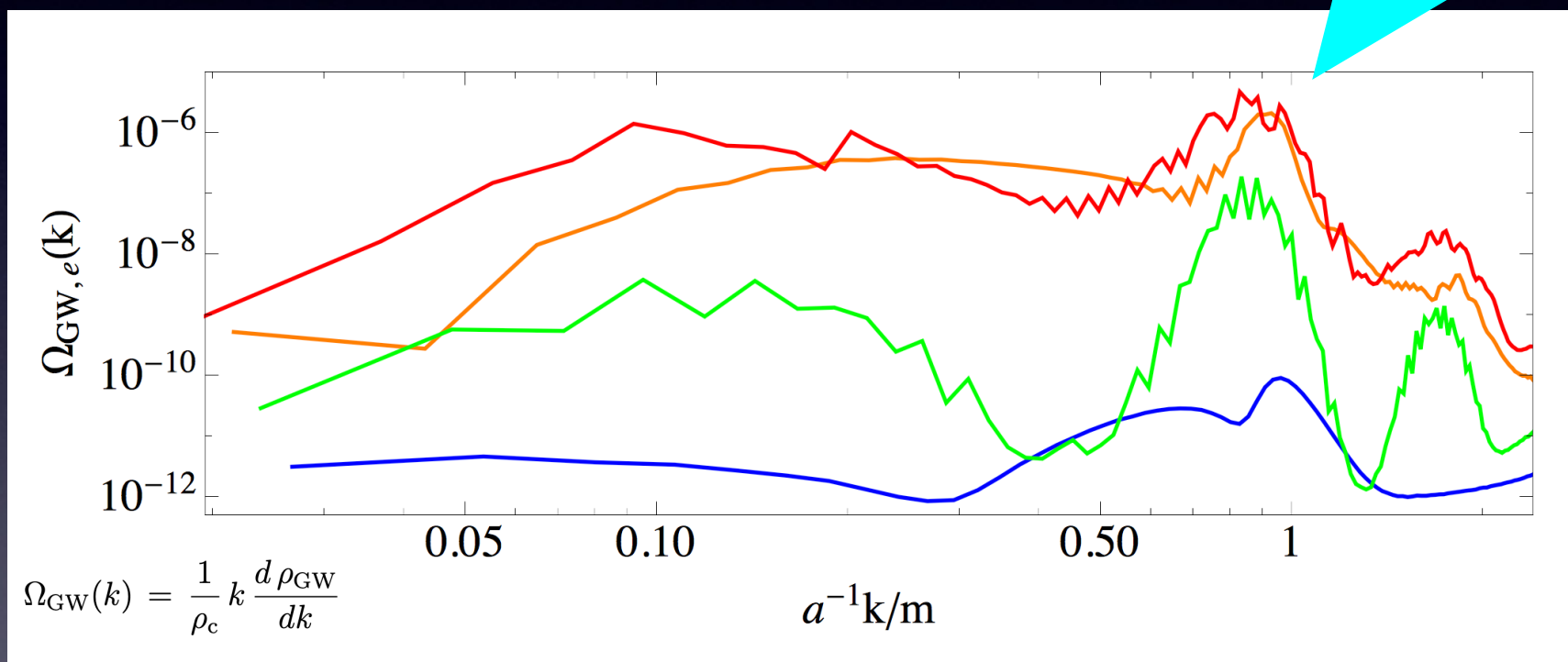
Question: Gravitational wave signal from the oscillons (over their whole life-cycle)?

Movie: Single oscillon

GW from "oscillons" in hilltop-shaped potentials

Example: Oscillons from Kähler modulus in KKLT scenario in string theory

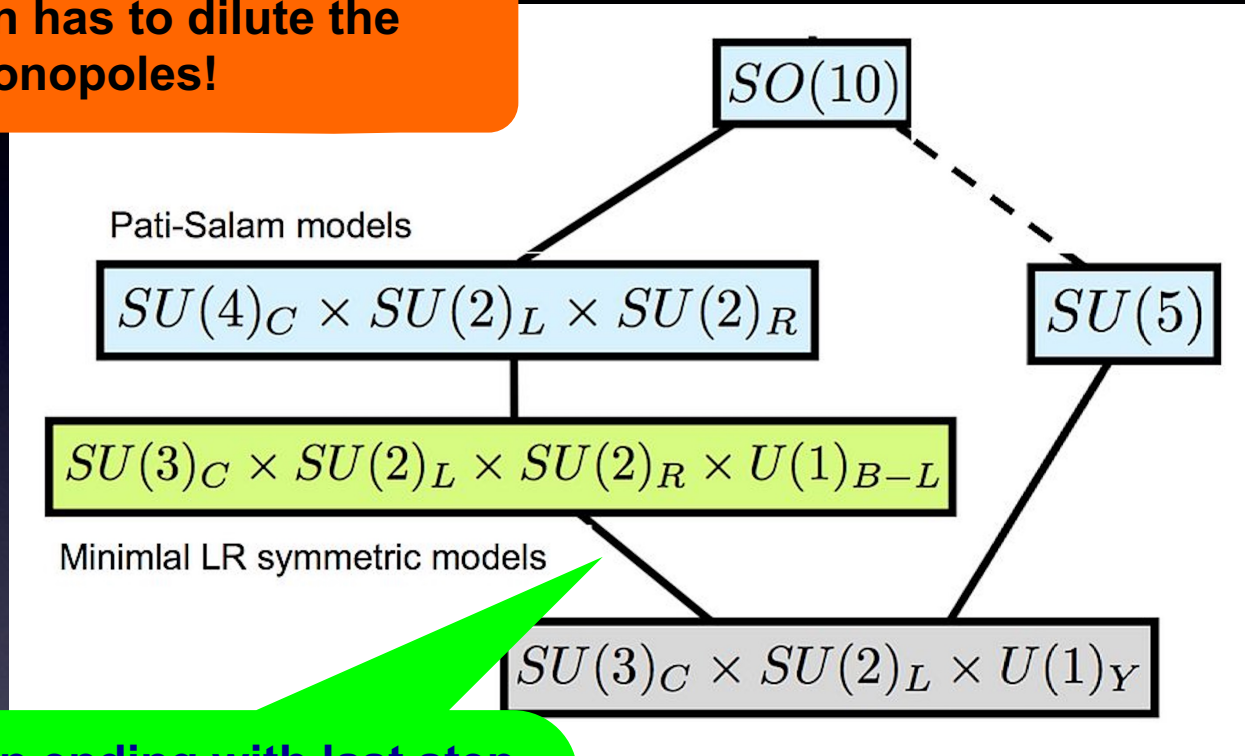
"Oscillon peak" (and higher harmonics) from oscillations of asymmetric oscillons



S.A., F. Cefala, S. Krippendorf, F. Muia, S. Orani, F. Quevedo [arXiv:1708.08922]

GW from cosmic strings after GUT inflation

Inflation has to dilute the GUT monopoles!



Inflation ending with last step of GUT symmetry breaking (e.g. where $U(1)_{B-L}$ is broken) typically produces cosmic strings → signature in stochastic GW background

How can we build realistic & predictive GUT inflation models with testable GW signatures?