

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

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WHISPERS FROM THE DARK UNIVERSE – PARTICLES & FIELDS IN THE GRAVITATIONAL WAVE ERA

HELMHOLTZ

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The (first) LISA miracle

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The recent adoption of the LISA mission by the European Space Agency marks a significant milestone for gravitational wave cosmology, offering unprecedented sensitivity to gravitational wave backgrounds emitted at temperatures around a few hundred GeV. Intriguingly, this temperature range not only corresponds to the electroweak epoch but also coincides with the scale at which the freeze-out of WIMP dark matter is expected to happen. In this talk, I will present our recent work demonstrating how dark matter freeze-out triggered by a strong first-order phase transition in a dark sector can produce gravitational waves in the milli-Hertz range. Our findings suggest that a gravitational wave background detected by LISA could indicate such a phase transition, pointing to a specific dark matter candidate and opening new avenues for exploring the connection between dark matter and gravitational waves.

Primary authors: TASILLO, Carlo (T (Cosmology)); KAHLHOEFER, Felix (KIT (TTP)); MATUSZAK, Jonas (Karlsruhe Institute of Technology (KIT)); GONZALO, Tomas (KIT); BRINGMANN, Torsten (Oslo University)

Presenter: TASILLO, Carlo (T (Cosmology))

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