Contribution ID: **112** Type: **not specified**

Strong electroweak phase transition and simplified dark matter models

Friday 5 May 2023 17:40 (20 minutes)

Beyond the Standard Model physics is required to explain both dark matter and the baryon asymmetry of the universe, the latter possibly generated during a strong first-order electroweak phase transition. While many proposed models tackle these problems independently, it is interesting to inquire whether the same model can explain both. We focus on a dark matter model featuring an inert Majorana fermion that is coupled to Standard Model leptons via a scalar mediator. The latter interacts directly with the Higgs boson. We link state-of-the-art perturbative assessments of the phase transition thermodynamics with the extraction of the dark matter energy density. We discern regions of the model parameter space that reproduce the observed dark matter energy density and allow for a first-order phase transition, while evading the most stringent collider constraints.

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Session Classification: Astrophysical messengers of fundamental physics: Contributed talks