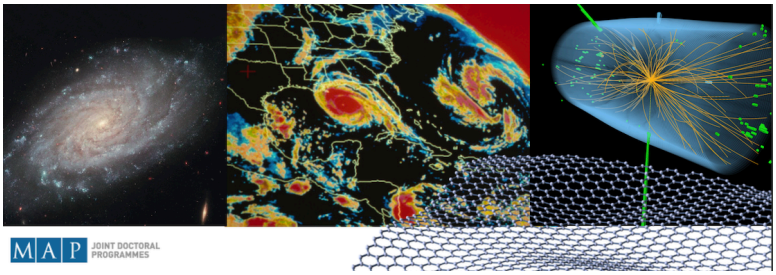

Contribution ID: **159** Type: **Contributed Talk (20 minutes)**

Invisible Higgs decay from dark matter freeze-in at stronger coupling

We study the Higgs boson decay into dark matter (DM) in the framework of freeze-in at stronger coupling. Even though the Higgs-DM coupling is significant, up to order one, DM does not thermalize due to the Boltzmann suppression of its production at low temperatures. We find that this mechanism leads to observable Higgs decay into invisible final states with the branching fraction of 10% and below, while producing the correct DM relic abundance. This applies to the DM masses down to the MeV scale, which requires a careful treatment of the hadronic production modes. For DM masses below the muon threshold, the Boltzmann suppression is not operative and the freeze-in nature of the production mechanism is instead guaranteed by the smallness of the electron Yukawa coupling. As a result, MeV DM with a significant coupling to the Higgs boson remains non-thermal as long as the reheating temperature does not exceed
O(100) MeV. Our findings indicate that there are good prospects for observing light non-thermal DM via invisible Higgs decay at the LHC and FCC.

Which topic best fits your talk?

High Energy Physics and Cosmology

Author: OLIVEIRA, Vinícius (Universidade de Aveiro)

Presenter: OLIVEIRA, Vinícius (Universidade de Aveiro)