



University of Crete
Department of Physics

Physics Colloquium

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Dark matter halos from parametric resonance and their signatures

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ABSTRACT

While there is undisputed evidence for Dark Matter, its nature and properties remain one of the biggest questions of our time. What is Dark Matter(DM)? How is it produced? Does it have interactions other than gravitational? In this talk, I will describe how a large class of bosonic particles can account for the DM of the Cosmos. These particles can be much lighter than those of the Standard Model with Compton wavelengths that are bigger than the size of our solar system or smaller than a millimeter. In the presence of attractive self-interactions, there is a parametric resonance effect in the early universe that can cause growth of structure at small scales, an effect so dramatic that can cause structures to collapse well before matter-radiation equality. The signatures of this effect span several experiments and orders of magnitude in parameter space. When the DM boson is heavy, the dense DM halos can alter the optimal search strategies in direct detection experiments. When the DM boson is light, these halos may leave their imprint in searches for dark matter substructure, primordial gravitational waves and alter the star formation history of the universe.