Contribution ID: **13** Type: **not specified**

Gravothermalizing into primordial black holes

Very little is known about the universe's history from after the end of inflation until the Big Bang nucleosynthesis (BBN), which spans more than 10^{39} orders of magnitude in time scales. In this work, we show that if there was a long period of matter domination in this unknown period, and if the particle causing the matter domination has moderate self-interactions, then the matter particles can undergo gravothermal collapse to form primordial black holes (PBHs). We show that there is a critical mass threshold below which the $4 \to 2$ self-annihilations of the particles inhibit collapse to a black hole, instead producing a 'cannibal star'. For a conservative estimate of PBH abundance, we find a significant parameter space that predicts present-day PBH abundance of the same order as the dark matter abundance and with a mass range $10^{17} - 10^{21}$ g. For an optimistic estimate of PBH abundance, we find that PBHs with masses less than 10^{9} g can reheat the universe prior to BBN.

Primary author: PERRI, Daniele

Presenter: PERRI, Daniele

Session Classification: PhD student session