Contribution ID: **201** Type: **Dark Matter**

Cosmological PBHs as dark matter

Wednesday 19 May 2021 15:15 (15 minutes)

In the early universe, primordial black holes (PBHs) can no longer be described by the simple Schwarzschild metric– we need a metric which is locally surrounded by the cosmological fluid and asymptotically FLRW. It turns out that the phenomenology of PBHs is very sensitive to the choice of such a metric. In particular, the Thakurta metric stands out as perhaps the most justifiable metric for the radiation-dominated universe. In this description, PBHs have an effective mass proportional to the cosmological scale factor.

We demonstrate two very significant effects of this choice of metric for the phenomenology of PBHs as dark matter (DM) candidates. Firstly, the binary abundance bounds which tightly constrain LIGO-size PBHs as DM candidates are entirely evaded. Secondly, these PBHs are significantly hotter and so evaporate very rapidly– we show that the smallest black hole which actually survives until today is of order 10ˆ21 g, which fully closes the asteroid-mass window for DM candidates, which was previously totally unconstrained.

Primary author: PICKER, Zachary (The University of Sydney)

Presenter: PICKER, Zachary (The University of Sydney)

Session Classification: Primordial Black Holes