

Cosmological Black Holes

Zachary S. C. Picker

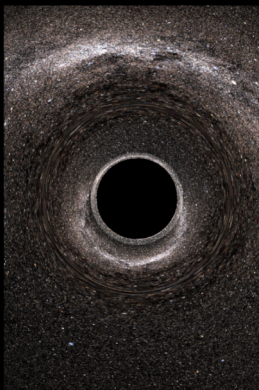
University of Sydney



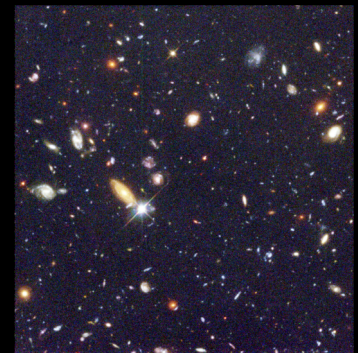
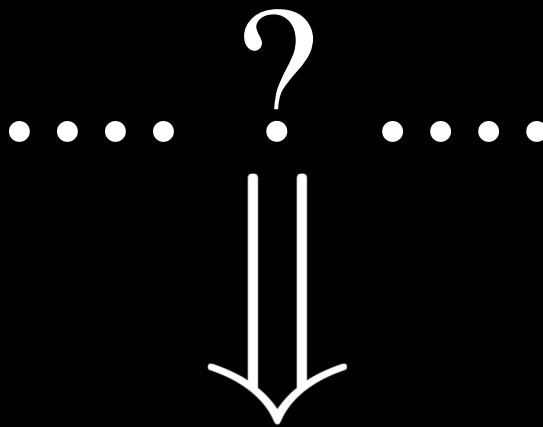
BHIO2021

Cosmologically-embedded black holes have unique phenomenology.

Could they comprise the dark matter?



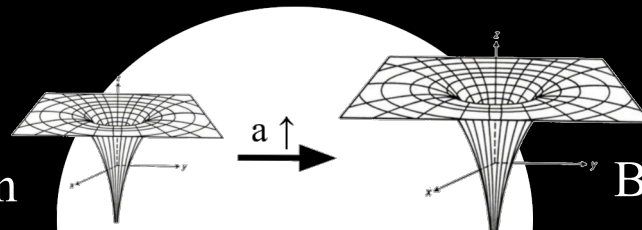
Black Hole Metric



FLRW Metric

Thakurta Metric

Hawking Radiation
arXiv:2103.02815



Binary Abundance
arXiv:2008.10743

$$ds^2 = a^2 ds_{schw.}^2$$

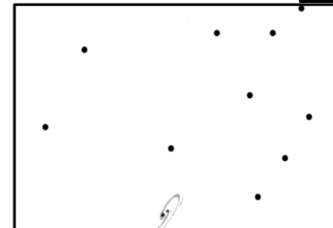
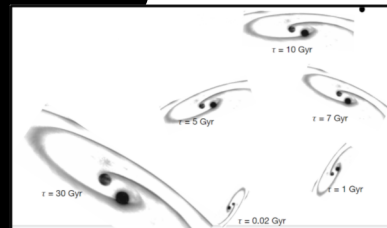
- Pathology-free
- Valid in radiation-domination
- growing effective horizon

$$m_{\text{Misner-Sharp}} \approx 2ma$$

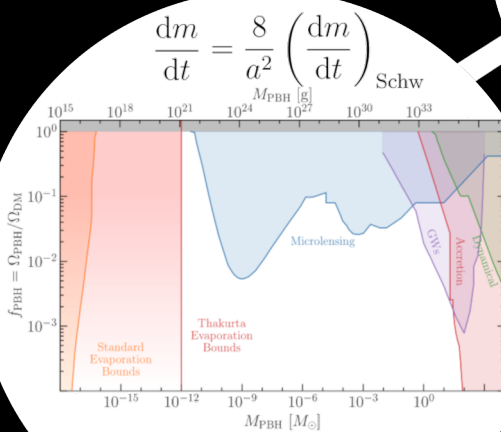
At matter-radiation equality:

Schwarzschild BHs:

Thakurta BHs:



Little binary formation \Rightarrow
strong LIGO BH dark matter
bounds escaped



Quick evaporation \Rightarrow
Asteroid-mass BH dark
matter is constrained

with Celine Boehm, Archil Kobakhidze,
Ciaran O'Hare, and Mairi Sakellariadou