

# Theoretical Astroparticle Physics (TAsP)

The TAsP research network is composed by a well-established scientific community formed by 12 INFN nodes, with a strong tradition of common scientific interests, research programs and integrated activities in the field of astroparticle physics.

National coordinator: F. Donato (TO)

The goal of TAsP is to undertake a vast and diversified research program at the crossroad of

**particle physics, astrophysics and cosmology,**

where deeper levels of theoretical understanding are clearly demanded by a number of phenomena, including:

- dark matter and dark energy
- baryon asymmetry of the universe
- high-energy cosmic rays and  $\gamma$  rays
- neutrino masses and mixings



# Preventivi 2023 Ferrara(+Cagliari\*)

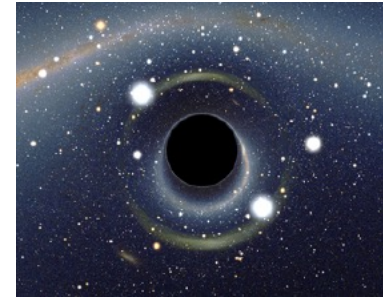
MEMBERS	TAsP	CSN	RESEARCH ITEMS
I. Masina (Resp Loc)	100%	IV	primordial black holes
M. Lissia*	40%	IV	detectors for dark matter
B. Ricci	20%	II	detectors for geo-neutrinos

See Gr. II

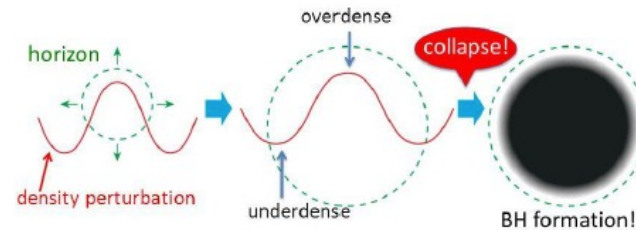
**1.6 FTE** → Richieste: 3.0 kEuro

# Recent activity for Primordial Black Holes

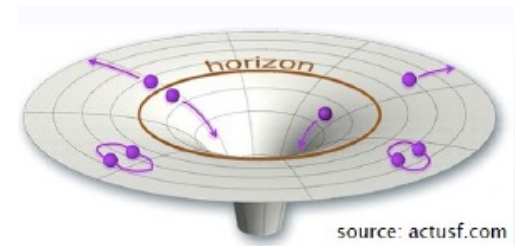
Primordial black holes in the mass range ( $10^{-5}$  -  $10^9$ ) g might have existed in the early universe.



Formed after inflation  
due to overdensities



Via their evaporation mechanism (completed before BBN), they might have released stable particles beyond the SM

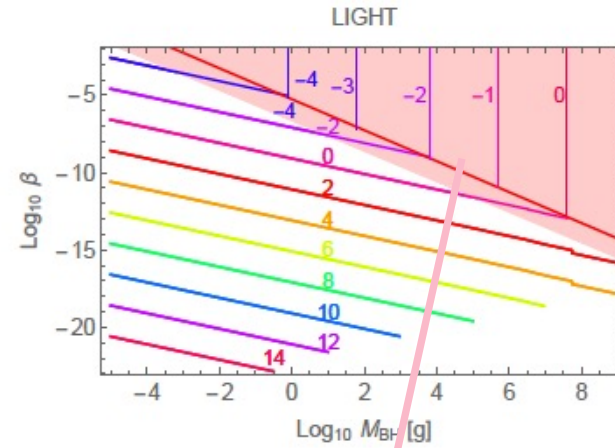
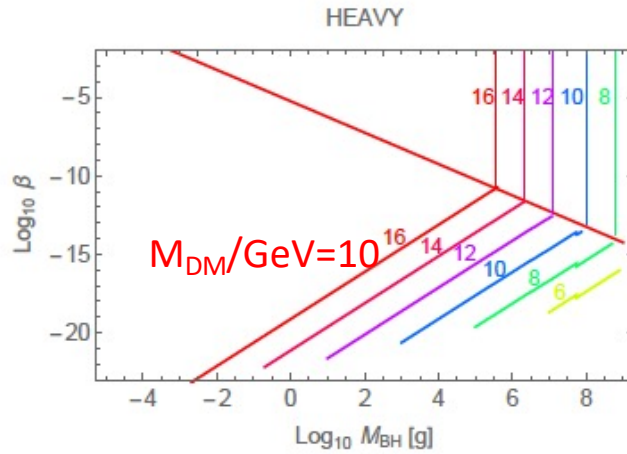


# Recent activity for Primordial Black Holes

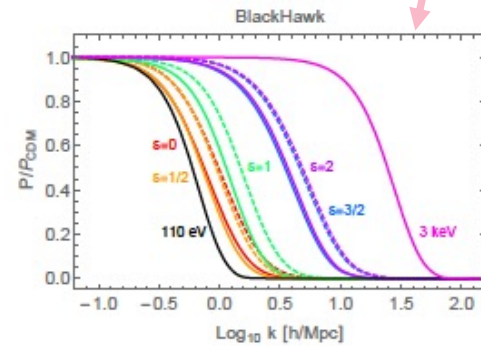
- [1] *Dark matter and dark radiation from evaporating primordial black holes*  
I. Masina,  
*Eur.Phys.J.Plus* 135 (2020) 7, 552, e-Print: 2004.04740 [hep-ph]
  
- [2] *Bounds on warm dark matter from Schwarzschild primordial black holes*  
J. Auffinger (Lyon), I. Masina, G. Orlando (Groningen)  
*Eur.Phys.J.Plus* 136 (2021) 2, 261, e-Print: 2021.09867 [hep-ph]
  
- [3] *Dark matter and dark radiation from evaporating Kerr primordial black holes*  
I. Masina,  
*Grav.Cosmol.* 27 (2021) 4, 315-330, e-Print: 2103.13825 [gr-qc]
  
- [4] *Dark matter from evaporating black holes*  
I. Masina,  
*PoS EPS-HEP2021* (2022) 146, Contribution to EPS-HEP2021, 146

# Recent activity for Primordial Black Holes

We considered the possibility that such particles might constitute the main part or a fraction of the DARK MATTER observed today [1]



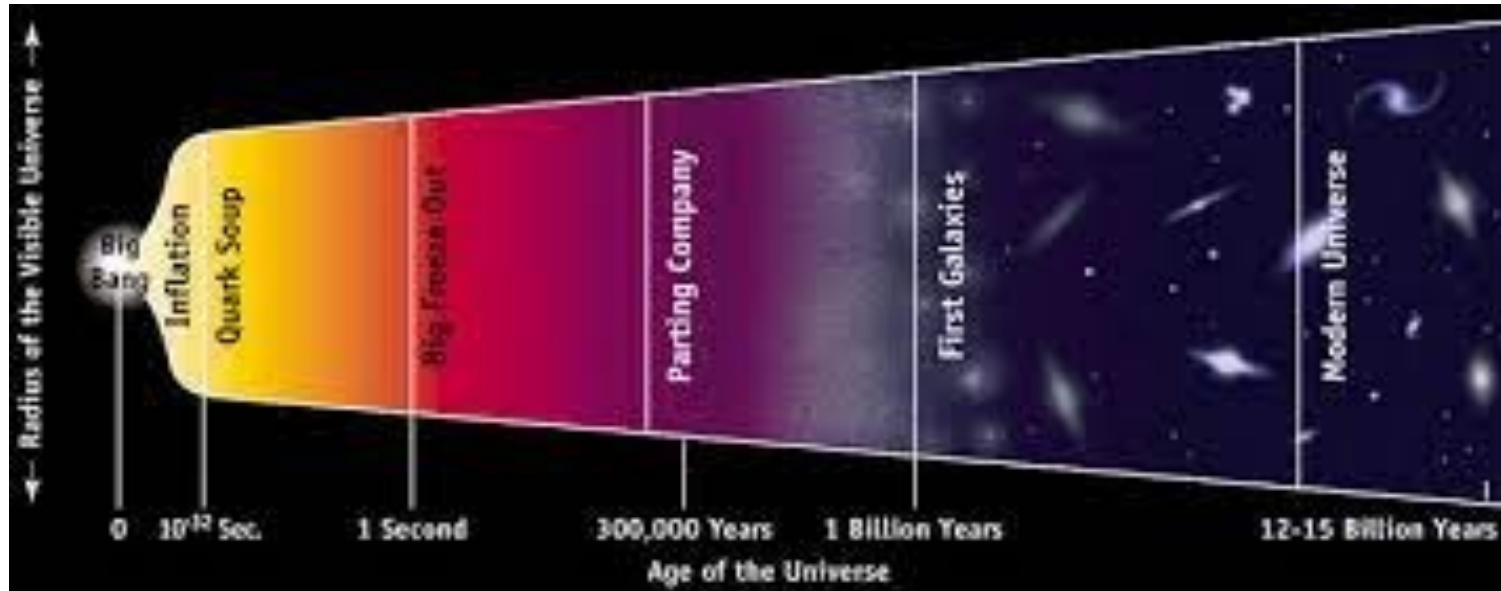
updating the impact on this scenario from warm dark matter constraints [2]



and extending to the Kerr case [3]

→ No significant change with respect to Schwarzschild

# Theoretical Astroparticle Physics



... a wide field of research!