

A new channel for supermassive black hole formation (online talk)

Monday, 12 June 2023 17:30 (30 minutes)

Observations support the idea that supermassive black holes (SMBHs) power the emission at the center of active galaxies. However, contrary to stellar-mass BHs, there is a poor understanding of their origin and physical formation channel. In this article, we propose a new process of SMBH formation in the early Universe that is not associated with baryonic matter (massive stars) or primordial cosmology. In this novel approach, SMBH seeds originate from the gravitational collapse of fermionic dense dark matter (DM) cores that arise at the center of DM halos as they form. We show that such a DM formation channel can occur before star formation, leading to heavier BH seeds than standard baryonic channels. The SMBH seeds subsequently grow by accretion. We compute the evolution of the mass and angular momentum of the BH using a geodesic general relativistic disk accretion model. We show that these SMBH seeds grow to $\sim 10^9\text{--}10^{10}$ Msun in the first Gyr of the lifetime of the Universe without invoking unrealistic (or fine-tuned) accretion rates.

Primary author: Prof. ARGÜELLES, Carlos Raúl (Universidad Nacional de La Plata)

Presenter: Prof. ARGÜELLES, Carlos Raúl (Universidad Nacional de La Plata)

Session Classification: Monday afternoon session