



- RAY ASTRONOMY 2019

Current Challenges and New Frontiers in the Next Decade

8-13 September 2019
CNR/INAF Research Area, Bologna, Italy

Contribution ID: 140

Type: **Contributed**

Model-independent limits on the abundance of SMBH

Thursday, 12 September 2019 09:45 (15 minutes)

The formation channels of Supermassive Black holes (SMBHs) seeds are currently debated, as are their accretion limits, growth and co-evolution with galaxies. Independent of these questions, we investigate the occurrence of SMBH seeds with a simple generic framework. We consider that when halos outgrow a mass threshold, a fraction of them have formed black holes. Following the well-understood hierarchical growth of dark matter haloes in modern cosmological N-body simulations, we expose the link of $z=0$ occupation fraction observations to $z\sim 6$ quasar space densities. The fraction of SMBHs triggered to shine as quasars or Active Galactic Nuclei is minuscule at all redshifts. Our analysis unveils (1) how to constrain masses and histories of $z\sim 6$ quasar hosts by galaxy clustering, (2) why published claims have been contradictory so far and (3) how gravitational wave event distributions will constrain the processes leading from the merging of galaxies to the merging of their SMBH.

Topic

Active Galactic Nuclei: accretion physics and evolution across cosmic time

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Session Classification: ACTIVE GALACTIC NUCLEI