Contribution ID: **6** Type: **not specified**

Tentative evidence for cosmological coupling of black holes and implications for dark energy

Saturday, June 17, 2023 11:00 AM (30 minutes)

Exact solutions of the Einstein equations describing black holes in cosmological backgrounds exhibit time-dependent masses over Hubble times. We report tentative evidence for such a cosmological coupling obtained by studying populations of supermassive black holes in a sequence of red elliptical galaxies spanning 9 billion years. If black holes are non-singular, they typically have de Sitter cores and interior stresses, which corrects the Einstein-Friedmann equations obtained by averaging matter over 180 Mpc. Then, the (conservative) collapse of first-generation stars converting into black holes a mere 3% of the baryons present at z=25 explains the cosmic acceleration without any dark energy outside (de Sitter-cored) black holes. This speculative model based only on GR and common ideas about black hole interiors is astrophysically testable and will be summarized in this talk.
[Based on D. Farrah et al, ApJ Lett. 944, L31 (2023)]

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Session Classification: Relativity, Gravitation and Cosmology

Track Classification: Relativity, Gravitation and Cosmology