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The Identification of Supermassive Dark Star Candidates in JWST Data

Monday, 8 July 2024 16:00 (30 minutes)

Early James Webb Space Telescope (JWST) observations defied expectations from the standard Λ CDM model of cosmology. There is an overabundance of very massive, high-redshift galaxies and quasars when the universe was only a few hundred million years old. Supermassive Dark Stars (SMDS) offer a potential solution to this paradox. They are candidates for the first stars in the universe, alongside Population III stars. SMDS are distinguished from Population III stars in that they are cooler and much puffier, and are powered by dark matter (DM) annihilations rather than nuclear fusion. SMDS can grow to be 10 million times the mass of the sun, and shine 1 billion times as bright as the sun. At the end of their lives, SMDS directly collapse into black holes, offering an explanation for the surprising amount of high-redshift quasars observed. We have identified the first SMDS candidates from the JWST Advanced Deep Extragalactic Survey (SMDS): JADES-GS-z13-0, JADES-GS-z12-0, and JADES-GS-z11-0.

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