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CAIUS: SYNTHETIC OBSERVATIONS USING A ROBUST RADIATIVE TRANSFER PIPELINE

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As astronomers peer ever-deeper into the high-redshift Universe, a bevy of astrophysical questions on early star, black hole, and galactic structure formation await on the precipice of their elucidation. However, to truly and more completely decipher the first faint images from the Cosmic Dawn, a new generation of diagnostic and predictive tools is needed to bridge the gap between the state-of-the-art in astrophysical theory and observation. To this end, we have developed the CAIUS Monte Carlo radiative transfer pipeline, which takes cosmological simulations and produces synthetic observations and diagnostics for infrared space telescopes. Using our tools, we produce James Webb Space Telescope diagnostics for a direct-collapse black hole scenario as well as for a statistically significant sample of star-forming galaxies at z = 15. Our studies have found previously unexplored trends in both the evolution of the radiative environment in the early Universe as well as in the ways objects might be discerned and in particular, hope that we might soon observe the formation of a massive black hole.

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Talk/Poster

Talk

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