

AI Simulates the Universe's Birth

Lumina captures cosmic dawn in unprecedented detail.

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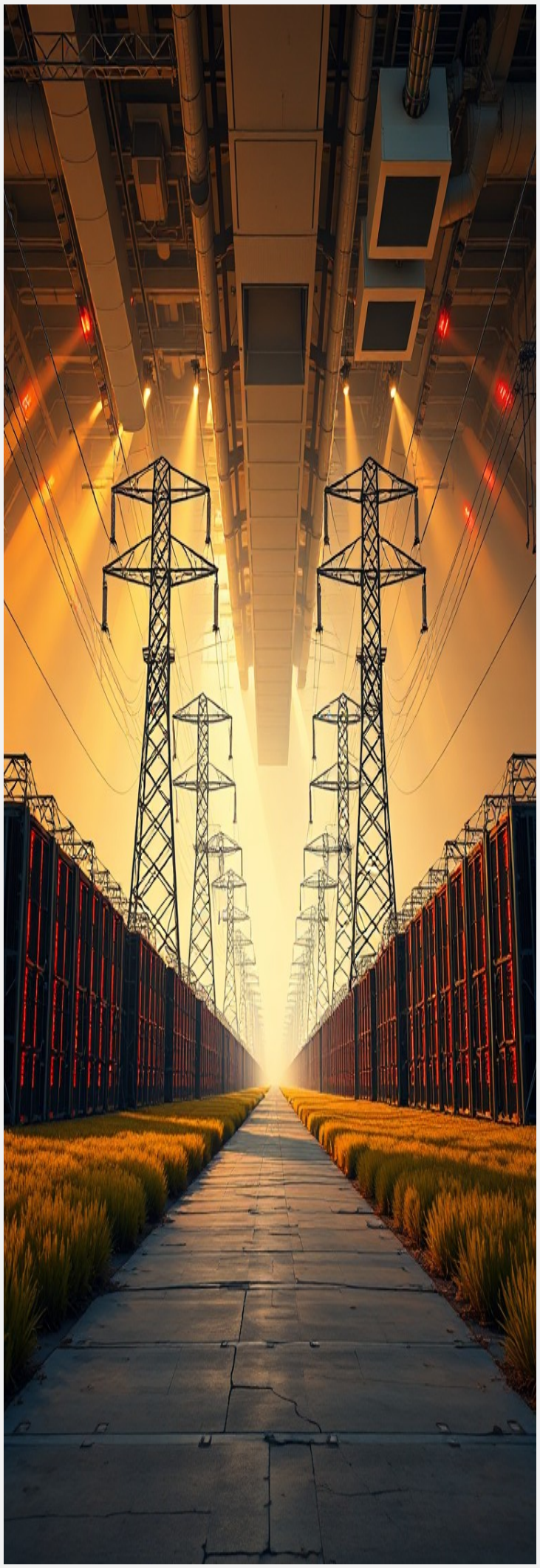
THE DATA

30 times higher-resolution

Simulation Resolution

Lumina surpasses its predecessor, IllustrisTNG, in detail across cosmic scales.

This leap in resolution allows scientists to model the formation of individual galaxies and stars within vast cosmic structures, a feat previously impossible at such volume. The simulation resolves half a trillion cells—dark matter particles, gas cells, and radiation—across 500 megaparsecs of space.

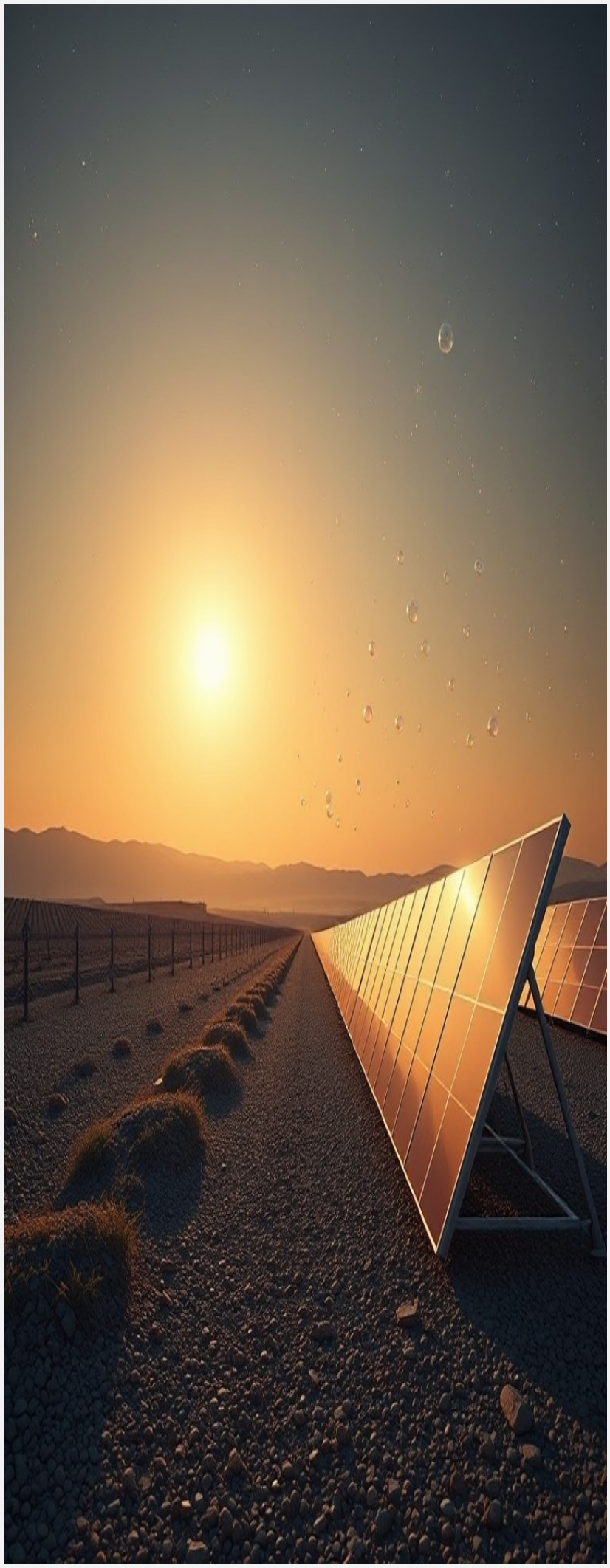


Source: MIT News · Published October 26, 2026
https://news.mit.edu/2026/watch-universe-emerge-from-dark-ages-with-lumina-1026

01

AI as Cosmic Architect

Lumina demonstrates that AI-driven simulations are no longer just tools for modeling— they are becoming instruments of discovery. By integrating radiation transport with galaxy formation at scale, the simulation reveals that hydrogen re-ionization was driven by early galaxies, while helium re-ionization required supermassive black holes. This causal distinction would have remained hidden without high-fidelity AI modeling.



02

Energy of Computation Mirrors Cosmic Evolution

The computational load of Lumina—100,000 CPU cores and 15,000 GPUs at peak scale—mirrors the energy demands of the systems it simulates. This isn't a metaphor: the energy required to simulate the early universe's re-ionization events is comparable to the energy those events released. The simulation's own power consumption underscores a deeper truth: AI in energy systems must account for not just operational efficiency, but for the embodied energy of the models themselves.

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