

Researchers' simulation shows the birth of stars, galaxies - and light filling the universe

By [Martin Finucane](#) Globe Staff, Updated March 31, 2022, 5:25 p.m.

A striking simulation by researchers shows how the early universe began to be populated - and illuminated - by stars and galaxies after hundreds of millions of years of darkness that cosmologists call the Dark Ages.

“You have this dark universe where there are no stars, then you form these stars and these stars emit light,” said Rahul Kannan, an astrophysicist at the Center for Astrophysics/ Harvard & Smithsonian who worked on the research. “You keep illuminating more and more of the universe with this light. ... The light in the end permeates through most of the universe.”

A large suite of the simulations was created by researchers from the Center, the Massachusetts Institute of Technology, and the Max Planck Institute for Astrophysics. They're described in a series of three papers accepted to the Monthly Notices of the Royal Astronomical Society, the Harvard Gazette, Harvard's official newspaper, reported.

The video shown here covers a period from 250 million years after the Big Bang to 1.044 billion years after the Big Bang, Kannan said. The shot pans to the left and, as it pans, the years elapse. (The Big Bang, when the universe began expanding from a single point to what it is today, happened about 13.7 billion years ago.)

Internal 3D view of the gas density evolution in Thesan-1



Toward the end, the video shows bright areas where stars and galaxies have clumped together and web-like structures where clouds of gas have been illuminated. “The galaxies will be at the brightest intersections of this root-like structure,” Kannan said.

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“It was a neutral, dark cosmos that became bright and ionized as light began to emerge from the first galaxies,” researcher Aaron Smith, a NASA Einstein Fellow in MIT’s Kavli Institute for Astrophysics and Space Research, told the Gazette.

The simulations - named [Thesan](#) after the Etruscan goddess of dawn - were created to prepare for observations by the recently launched James Webb Space Telescope, which

prepare for observations by the recently launched James Webb Space Telescope, [which will be able to see very early galaxies.](#)

Kannan told the Gazette the simulations would “help us interpret real observations of this period and understand what we’re seeing.”

The Webb telescope is expected to be able to do [a better job looking at early galaxies than its predecessor, the Hubble Space Telescope.](#)

Hubble researchers made headlines this week when they revealed that they had detected [the farthest, oldest star yet.](#) The star was shining 12.8 billion years ago, or just 900 million years after the Big Bang, researchers said. The star, Earendel, will now be one of the targets of the Webb telescope.

Material from Globe wire services was used in this report.

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