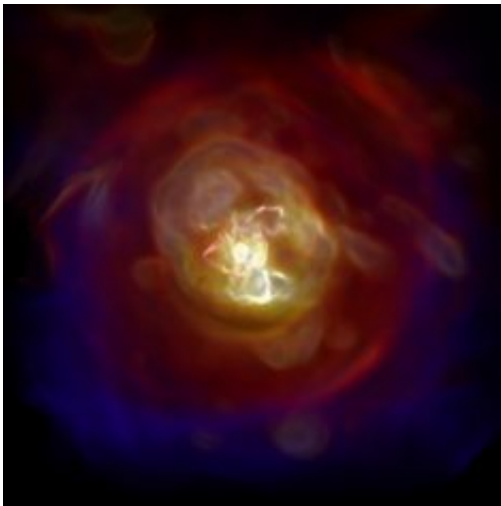


# Intense heat killed the Universe's would-be galaxies, researchers say

July 1 2009

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Gas around young galaxy

(PhysOrg.com) -- Our Milky Way galaxy only survived because it was already immersed in a large clump of dark matter which trapped gases inside it, scientists led by Durham University's Institute for Computational Cosmology (ICC) found.

The research, to be presented at an international conference today (Wednesday, July 1), also forms a core part of a new ICC movie charting the evolution of the [Milky Way](#) to be shown at the Royal Society.

The researchers said that the early Milky Way, which had begun forming

stars, held on to the raw gaseous material from which further stars would be made. This material would otherwise have been evaporated by the high temperatures generated by the "ignition" of the Universe about half-a-billion years after the Big Bang.

Tiny [galaxies](#), inside small clumps of [dark matter](#), were blasted away by the heat which reached approximate temperatures of between 20,000 and 100,000 degrees centigrade, the scientists, including experts at Japan's University of Tsukuba, said.

Dark matter is thought to make up 85 per cent of the Universe's mass and is believed to be one of the building blocks of [galaxy formation](#).

Using [computer simulations](#) carried out by the international Virgo Consortium (which is led by Durham) the scientists examined why galaxies like the Milky Way have so few companion galaxies or satellites.

Astronomers have found a few dozen small satellites around the Milky Way, but the simulations revealed that hundreds of thousands of small clumps of dark matter should be orbiting our galaxy.

The scientists said the heat from the early stars and [black holes](#) rendered this dark matter barren and unable to support the development of satellite star systems.

The findings will be presented to The Unity of the Universe conference to be held at the Institute of Cosmology and Gravitation, at the University of Portsmouth on Wednesday, July 1. The work has been funded by the Science and Technology Facilities Council (STFC) and the Japanese Society for the Promotion of Science.

The simulations also form part of a new ICC movie - called Our Cosmic

Origins - which combines ground-breaking simulations with observations of galaxies to track the evolution of the Milky Way over the 13-billion-year history of the Universe.

The movie is part of the ICC's exhibit at The Royal Society's annual Summer Science Exhibition which runs until this Saturday (July 4).

Joint lead investigator Professor Carlos Frenk, Director of the Institute for Computational Cosmology, at Durham University, said: "The validity of the standard model of our Universe hinges on finding a satisfactory explanation for why galaxies like the Milky Way have so few companions.

"The simulations show that hundreds of thousands of small dark matter clumps should be orbiting the Milky Way, but they didn't form galaxies.

"We can demonstrate that it was almost impossible for these potential galaxies to survive the extreme heat generated by the first stars and black holes.

"The heat evaporated gas from the small dark matter clumps, rendering them barren. Only a few dozen front-runners which had a head start on making stars before the Universe ignited managed to survive."

By providing a natural explanation for the origin of galaxies, the simulations support the view that cold dark matter is the best candidate for the mysterious material believed to make up the majority of our Universe, the scientists added.

It is now up to experimental physicists to either find this dark matter directly or to make it in a particle accelerator such as the Large Hadron Collider at CERN.

Professor Frenk, added: "Identifying the dark matter is not only one of the most pressing problems in science today, but also the key to understanding the formation of galaxies."

Joint lead investigator Dr Takashi Okamoto from the University of Tsukuba said: "These are still early days in trying to make realistic galaxies in a computer, but our results are very encouraging."

Source: Durham University ([news](#) : [web](#))

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