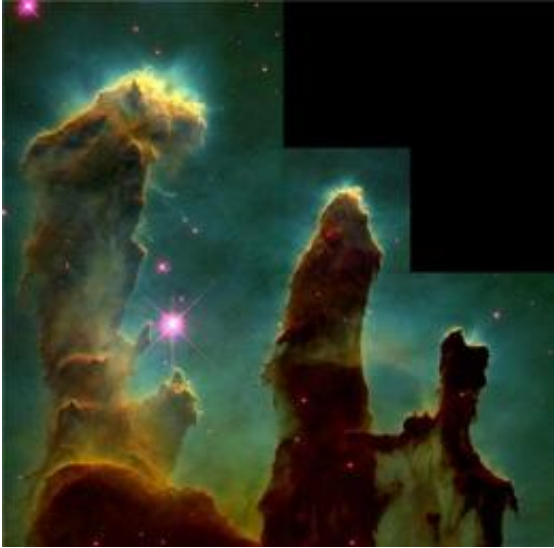


Pillars of Creation formed in the shadows

April 23 2009

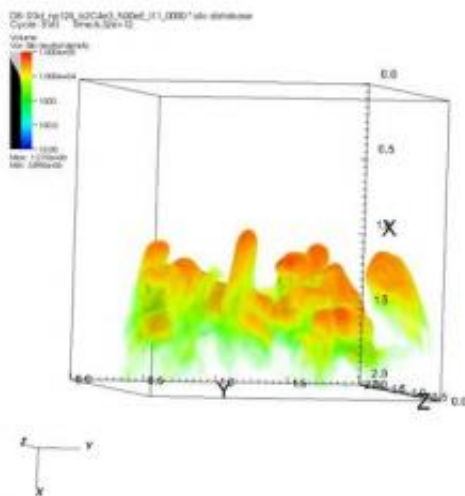


'Pillars of Creation' in the Eagle Nebula. Credit: ESA/NASA

Research by astronomers at the Dublin Institute of Advanced Studies suggests that shadows hold the key to how giant star-forming structures like the famous "Pillars of Creation" take shape.

The pillars are dense columns within giant clouds of dust and gas where [massive stars](#) form. Several theories have been proposed to explain why the pillars develop around the edge of ionised gas bubbles surrounding young, very hot stars. Using computer models, the Dublin group has found that partially-shadowed clumps of gas tend to creep towards darker areas, causing pile-ups behind dense knots of gas and dust that screen the intense [ultraviolet light](#) emitted by the stars.

Jonathan Mackey, who is presenting the results at the European Week of Astronomy and Space Science in Hatfield said, “We created a simulation with a random distribution of lots of dense clouds with different sizes and shapes. We found that in certain cases a number of clouds can merge together in the shadows to form structures that look very like observed pillars. They are sufficiently dense to match the observations, can form in about 150 000 years and can survive for about 100 000 years. Although this is a preliminary study, we believe our results are quite robust and will be confirmed by more detailed modelling.”



Still from 3-D simulation showing development of pillars after 200 thousand years. Credit: Mackey/Lim

The team, led by Dr Andrew Lim, found that the configuration of clumps of gas had to be favourable for the pillars to form. Some age estimates put the Eagle Nebula pillars at no more than 100 000 years old, and models show that the shadow from a single clump would not attain the density to form a pillar in that relatively short timescale.

“Many of our models do not produce pillars that are as long and narrow as those in the Eagle Nebula, at least not at the observed gas density. It needs the right configuration of dense clumps of gas to form a long pillar. Unless the shadowed region is already very dense to begin with, it just takes too long to collect and organise the gas into a pillar,” said Lim.

The group plans to add increasing levels of realism to the model over the next couple of years, bringing in more accurate representations of the complex chemistry of interstellar gas, the effects of radiation from diffuse sources. Adding in the effects of gravity will also be important as the pillars contain dense gas condensations which are in the process of collapsing under their own weight to form the next generation of stars.

Mackey said, "Gravity is relatively unimportant when the pillars are forming, but there comes a point when they get very dense and it cannot be ignored any longer. We plan to include gravitation in future work so that we can study the next generation of stars which are forming in the pillars."

Source: Royal Astronomical Society ([news](#) : [web](#))

Citation: Pillars of Creation formed in the shadows (2009, April 23) retrieved 17 April 2024 from <https://phys.org/news/2009-04-pillars-creation-shadows.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.