

# Birth of a star predicted

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The astrophysicist João Alves, director of the Calar Alto Observatory in Almeria, and his colleague Andreas Bürkert, from the German observatory in the University of Munich, believe that "the inevitable future of the starless cloud Barnard 68" is to collapse and give rise to a new star, according to an article which has been published recently in *The Astrophysical Journal*.

Barnard 68 (B68) is a dark nebula located in the constellation of Ofiuco, around 400 light years away. Nebulae are interstellar clouds of dust and gas located within the Milky Way, and some of these are the so-called 'dark' nebulae, the silhouettes of which block out the light of the stars and other objects behind them.

Scientists believe that stars are formed inside nebulae. The most commonly-held theory by astronomers is that they form from the condensation of giant gas clouds as a result of their own gravity, until this reaches a point where the high density and temperatures lead to nuclear fusion that results in the formation of a star. This is the most widely accepted theory among astronomers, although many details of the process are still not understood. The new study may be able to shed some light on this.

The astrophysicists Alves and Bürkert suggest that the collision of two gas clouds could be the mechanism that activates the birth of a star. In relation to Barnard 68, they suggest that it is already in an initial unstable state, and that it will collapse "soon" - within a period of around 200,000 years.

The images they have taken of its density show that B68 is a cold gas cloud with a mass equivalent to that of two suns, but that there is another cloud, 10 times smaller than it (0.2 solar masses), which is getting closer and is "on the verge" of colliding with it.

In order to prove their theory, the two astrophysicists have simulated this scenario in a supercomputer at the University of Munich. Based on the theoretical models, they introduced data relating to two globules separated by one light year, with masses and speeds similar to those of the Barnard 68 nebula and its "small" companion. By using a numerical algorithm, the researchers were able to show how these two virtual gas clouds evolved over time.

## **The Sun will get a new neighbour**

The results showed that the smaller globule penetrated the larger one after around 1.7 million years at a speed of 370 metres per second. The model also showed that the stability of the initial situation declined over time. At the moment when the two globules merged, enormous densities were generated, making the system collapse and creating the ideal conditions for the formation of a star.

The researchers carried out various simulations, varying the physical parameters of the globules, until they could work out the circumstances in which the fusion of two gas clouds will lead to their subsequent collapse. According to Bürkert and Alves' calculations, a new star will form within 200,000 years, not very far from our solar system, with the potential for planets to be formed around it.

Source: Spanish Foundation for Science and Technology

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