'Born-again' stars reveal how the earth was created

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Scientists at The University of Manchester have unveiled new research which shows how exploding stars may have helped to create the earth. The discovery was made during a unique research project examining how some dead stars re-ignite and come back to life.
Professor Albert Zijlstra's study of Sakurai's Object - the only star which has been observed re-igniting in modern times - has led him to conclude that 5% of the carbon on earth may have been come from stardust expelled by stars exploding back to life.

"Up to 0.1% of the total mass of the star, which is equivalent to 300 times the mass of the earth, can be expelled when a star re-ignites," says Professor Zijlstra.

"This discovery not only gives us a new understanding of where the natural material that made up the earth came from, but also leads us to believe that part of the carbon in the universe could have come from these events."

Stars die when they have used up most of their hydrogen. For the Sun, this will happen in about 4.5 billion years. But some stars will experience a brief rebirth when their helium suddenly ignites, and the remaining hydrogen in their outer envelope is drawn into the helium shell. After the explosive re-ignition, the star will expand to giant proportions - expelling tonnes of carbon in the process - before rapidly burning out again.

"We expect that some 25% of all stars will experience such a re-ignition,

but this is an extremely rare occurrence, and we will probably only see it happen once every hundred years or so", says Professor Zijlstra.

Incredibly, the earth's formation was not the main focus of Professor Zijlstra's research, which sought to establish a better understanding of why Sakurai's Object had re-ignited.

Computer simulations had predicted a series of events that would follow such a re-ignition, but the star didn't follow the script - events moved 100 times more quickly than the simulations predicted.

"Sakurai's Object went through the first phases of this sequence in just a few years - 100 times faster than we expected - so we had to revise our models. We've now produced a new theoretical model of how this process works, and the observations have provided the first evidence supporting our new model," Zijlstra said.

"It's important to understand this process. Sakurai's Object has ejected a large amount of carbon into space, both in the form of gas and dust grains. These will find their way into regions of space where new stars form, and the dust grains may become incorporated in new planets. Our results suggest this source for cosmic carbon may be far more important than previously suspected," Zijlstra added.

Zijlstra's findings will be presented in the April 8 issue of the prestigious journal Science.

Source: University of Manchester