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News & Comments

Interstellar Carbon Nanotubes Could be Seeded by Dying Stars

Khalid Ul Islam

In environments like the spirograph nebula, 2,000 light-years from Earth, carbon nanotubes can form complex structures.

In the 1980s, complex molecules drifting through interstellar space were discovered. Graphene rearranges its structure to produce buckyballs. In interstellar space, fullerenes are the largest molecules known to exist.

Buckyballs, spheres made up of 60 or 70 carbon atoms, were discovered drifting through interstellar space by scientists in the 1980s. It has been difficult for scientists to figure out how these large molecules could form in space. A simple explanation has been proposed. Scientists observed the spontaneous formation of carbon nanotubes by exposing silica carbide, a common ingredient in planetary nebulae dust grains, to conditions found near dying stars. Carbon nanotubes are rod-like molecules made up of carbon sheets stacked on top of each other. Before this, the researchers demonstrated that buckyballs could be created by using the same experimental setup.

They found that dying stars can produce the interstellar medium with buckyballs, carbon nanotubes, and complex carbon molecules. Then the elevated temperature shockwaves, along with the stellar wind can bleed silicon out of the silicon carbide, resulting in spare carbon.

Instead of assembling individual carbon atoms, buckyballs and nanotubes are a result of the rearrangement of graphene structure, the authors observed. The graphene could have formed at the top surface of heated silicon carbide grain.

When the scientists heated silicon carbide to 1050 °C, it resulted in tiny hemispherical structures 1 nanometer in size on the grain surface. The authors reported, "it was surprising that we could make these extraordinary structures. Chemically, nanotubes of current study are very simple, but they are extremely beautiful."

KEYWORDS

Interstellar carbon nanotubes, dying stars, nanotubes, silicon carbide, Buckyballs, graphene