Space rocks spun out of fairy floss-like dust clouds

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PhD student Lucy Forman, from Curtin University Faculty of Science and Engineering with a small section of meteorite Allende. Credit: James Campbell.

Extraterrestrial space rocks have provided a window to the early beginnings of our solar system.

Curtin PhD student and meteorite enthusiast Lucy Forman says she has uncovered evidence that shows asteroids and rocky planets are formed from the collision of fairy floss-like dust clouds, contrary to existing formation theories.

Ms Forman, who shared her theory at the Fresh Science competition, held at the Brisbane Hotel last month, says studying wafer thin sections of the meteorite, Allende, can reveal insights into solar system formation that occurred billions of years ago.

She says by studying the crystalline sections using an electron backscatter diffraction (EBSD) technique, she has concluded that small crystals in the meteorite have been pressurised and heated into a rocky body, but the large crystals appear untouched.

"The meteorite contains mostly unaltered large round crystals, called chondrules, and comparatively deformed little crystals, called matrix grains," Ms Forman says.

Heat and pressure was applied where pore spaces once were when it was compressed from dust cloud to asteroid, which only affected the smaller grains," she says.

The window provides a much better understanding of a solar-system evolutionary process, Ms Forman says.

"This is the first evidence of such an early process occurring, because the problem we have with meteorites is that when they're part of an

asteroid or a planet lots of changes often occur after they become a solid rock," she says.

"Whereas in the case of the Allende meteorite it has more or less been preserved in its original state from its formation in space," she says.

The next phase of the study will be to look at meteorites that have been exposed to heat and pressure since becoming a rock and explore if the same compaction process is detectable, Ms Forman says.

Curtin microstructural geology expert Dr Nick Timms, who supervised Ms Forman's study, says her findings has shone a light on how primitive bodies started out in the early stages of the solar system.

"Initially, these rocks weren't as solid as they are now, as many previously thought, and, in fact, the rocks have compacted over time," he says.

"And the fact that these bodies came together in a very loose way, kind of like fairy floss, means that they behave quite differently when they collide, which changes the way we think about how the solar system has evolved over time," he says.

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