Distant stars have more in common with the Earth than one would think.

Just ask David Arnett.

A theoretical physicist at the University of Arizona's Steward Observatory, Arnett has spent a lifetime studying the processes that drive stars.

His mathematical formulations and theories helped to decipher where Earth's elements may have come from and provided scientists with a consistent method for mapping the location of distant celestial bodies.

He said there is an intuitive connection between objects in the world around us and those in the farthest reaches of the universe.

"They obey the same physics, the same mathematical equations," he said. "It is kind of amazing that we can use what we read in textbooks to discover what is happening halfway across the universe."

The American Astronomical Society recently awarded Arnett the Henry Norris Russell lectureship in honor of his lifetime contributions to astronomy.

He said he has hardly ever touched a telescope. Instead, he has relied on mathematical equations and the number-crunching ability of supercomputers to simulate the complex events that occur inside of stars.

Arnett, 71, came to the University of Arizona in 1987. One of his milestone discoveries came in 1982, when he came up with an equation that accurately predicted the light curve of type IA supernovae.

These occur when a star more massive than the sun (but not massive enough to collapse into a neutron star or black hole) runs out of nuclear fuel and begins to collapse in on itself. Eventually, pressure builds to such a degree that an immense, cataclysmic explosion occurs, hurling matter deep into space.

Arnett's simulations revealed type IA supernovae give off light at a consistent rate. Astronomers now use type IA supernovae as "standard candles" to measure distances far out in space. While at the California Institute of Technology in the 1960s, he discovered that isotopes found in meteorites matched those produced in a nuclear reaction.

The discovery helped scientists formulate that heavier elements in the universe such as iron, carbon and oxygen are produced in nuclear reactions that occur in stars. At the end of a star's life, these elements are shot out into surrounding space, providing the material for planets, water, air and life.

Arnett said researchers using supercomputers can predict the ebb and flow of plasma inside of stars.

"The thing about choosing what you like to do over what other people tell you to do is that it has a sense of adventure," said of his career path. "My advice is to follow what you like, and it will probably turn out better."

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