

Signatures of the first stars

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A primitive star with extremely low iron content has been discovered by an international research team from Sweden, Japan, Germany, USA, Australia and Great Britain. This indicates the original composition of the gas from which the star formed had low iron content. The results are published in *Nature* online this week.

In 2001, the giant star HE0107-5240 was discovered among a large number of stars examined as part of the Hamburg/ESO* survey. Detailed studies revealed that the star had by far the lowest iron content ever recorded - 200 000 times lower than the Sun. Previously, only stars with iron contents up to 10 000 times lower than the solar value were known. Recently, a second star was discovered with similar iron content, designated HE1327-2326.

"These two stars are the most chemically primitive stars known, and therefore provide information on the nature of the first objects that formed in the Universe after the Big Bang," Paul Barklem from Uppsala university, Sweden, says.

Notably, HE1327-2326 is not a giant but a dwarf or sub-giant star, meaning that it is comparatively unevolved. The abundance of some chemical elements in evolved giant stars may have been altered by processes occurring during the star's evolution; however, in an unevolved dwarf or sub-giant star we expect that the chemical composition is close to the original composition of the gas from which the star formed.

Analysis of the spectra for both stars, obtained with the world's largest telescopes, allows the chemical composition of each star to be determined. The stars' chemical abundances show similarities, such as large abundances of carbon and nitrogen, which suggest that these two stars may have formed in a similar way. The detailed interpretation of the chemical signatures of these two stars, and similar stars for which we continue to search, should help us to understand exactly how the first generations of stars were formed, and which

elements were produced when they ended their lives in supernova explosions.

Source: Swedish Research Council

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