Wow! signal

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The **Wow! signal** was a strong narrowband radio signal detected by Dr. Jerry R. Ehman on August 15, 1977, while working on a SETI project at The Big Ear radio telescope of Ohio State University. The signal bore expected hallmarks of potential non-terrestrial and non-solar system origin. It lasted for 72 seconds, the full duration Big Ear observed it, but has not been detected again. Much attention has been focused on it in the media when talking about SETI results.

Amazed at how closely the signal matched the expected signature of an interstellar signal in the antenna used, Ehman circled the signal on the computer printout and wrote the comment "*Wow!*" on its side. This comment became the name of the signal.

Interpretation of the paper chart

The circled letter code **6EQUJ5** describes the intensity variation of the signal. A space denotes an intensity between 0 and 0.999.., the numbers 1-9 denote the correspondingly numbered intensities (from 1.000 to 9.999...), and intensities of 10.0 and above are denoted by a letter ('A' corresponds to intensities between 10.0 and 10.999..., 'B' to 11.0 to 11.999..., etc). The value 'U' (an intensity between 30.0 and 30.999...) was the highest ever detected by the telescope. The intensity in this case is the unitless signal-to-noise ratio, where noise was averaged for that band over the previous few minutes.[1]

The bandwidth of the signal is less than 10 kHz (each column on the printout corresponds to a 10 kHz-wide channel; the signal is only present in one column). Two different values for its frequency have been given: 1420.356 MHz (J. D. Kraus) and 1420.456 MHz (J. R. Ehman), both within 50 kHz of the frequency of the hydrogen line, which is at 1420.406 MHz.

Location of the signal

Determining a precise location in the sky was complicated by the fact that the Big Ear telescope used two feed horns to search for signals, each pointing to a slightly different direction in the sky following Earth's rotation; the Wow! signal was detected in one of the horns but not in the other, although the data were processed in such a way that it is impossible to determine in which of the two horns the signal entered. There are therefore two possible right ascension values:

- $19^h22^m22^s \pm 5^s$ (positive horn)
- $19^h25^m12^s \pm 5^s$ (negative horn)

The declination was unambiguously determined to be $-27°03' \pm 20'$. The preceding values are all expressed in terms of the B1950.0 epoch.[2] Converted into the J2000.0 epoch, the coordinates become RA= $19^h25^m31^s \pm 10^s$ or $19^h28^m22^s \pm 10^s$ and declination= $-26°57' \pm 20'$

This region of the sky lies in the constellation Sagittarius, roughly 2.5 degrees south of the fifth-magnitude star group Chi Sagittarii.

Time variation

The Big Ear telescope was fixed and used the rotation of the Earth to scan the sky. At the speed of the Earth's rotation, and given the width of the Big Ear's observation "window", the Big Ear could observe any given point for just 72 seconds. A continuous extraterrestrial signal, therefore, would be expected to register for exactly 72 seconds, and the recorded intensity of that signal would show a gradual peaking for the first 36 seconds—until the signal reached the center of Big Ear's observation "window"— and then a gradual decrease.

Therefore, both the length of the Wow! signal, 72 seconds, and the shape of the intensity graph would correspond to a possible extraterrestrial origin.[3]