CW Spectrum

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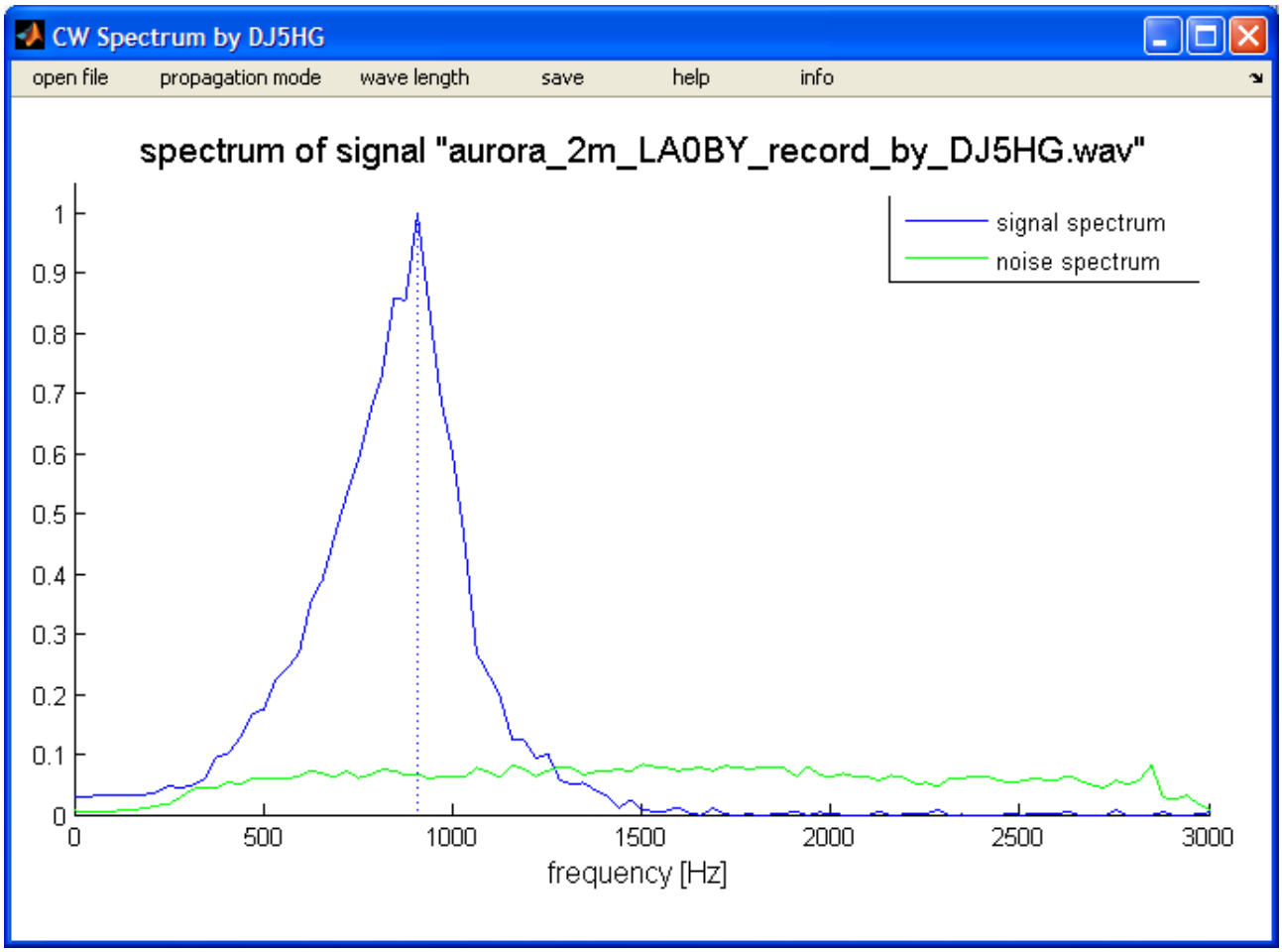
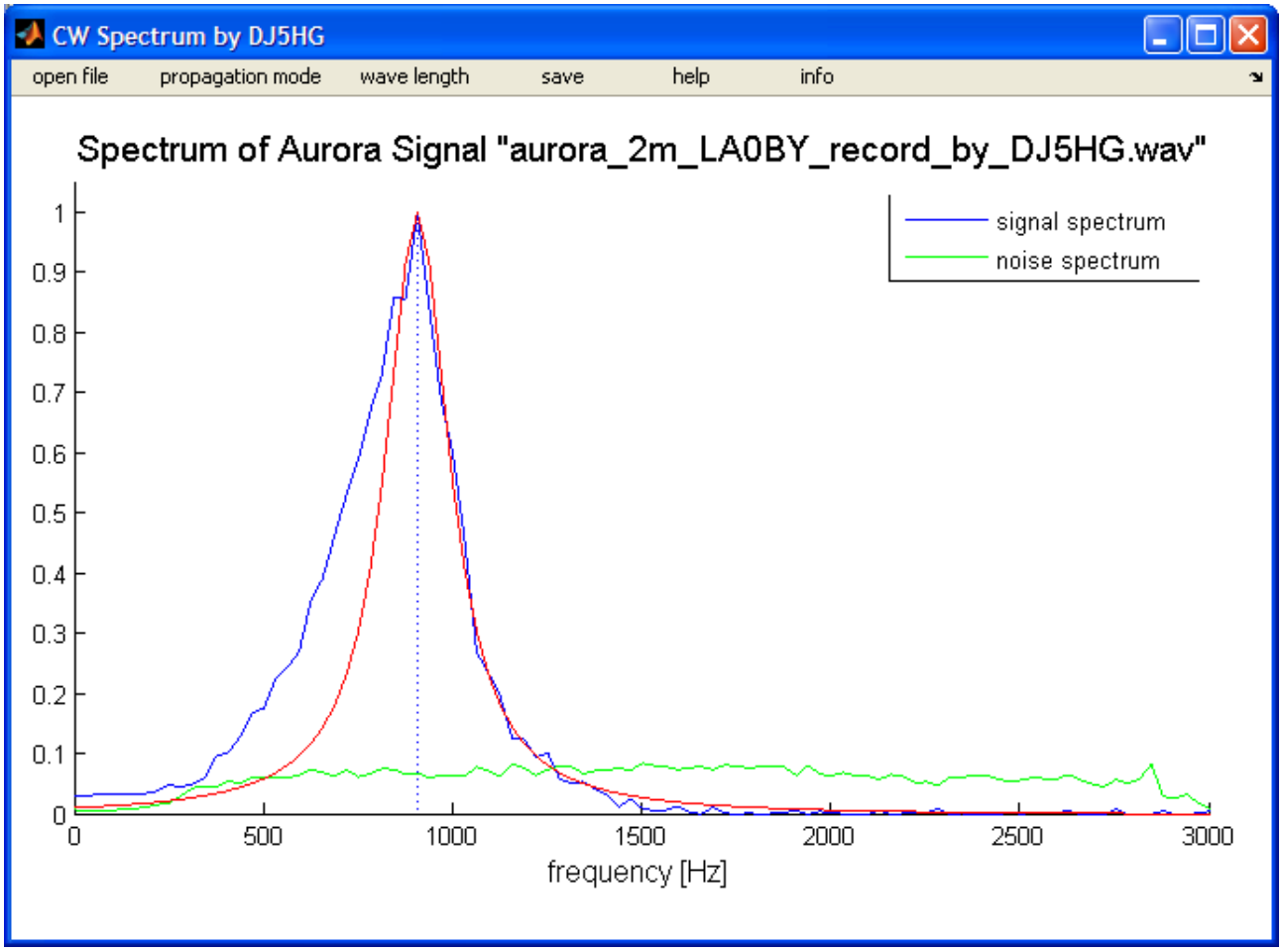
The program `cwspectrum` computes the spectrum of a WAVE-file that contains a recorded telegraphy signal. The spectrum of the noise is computed from the unkeyed parts of the record and it is subtracted from the spectrum of the keyed parts. The purpose of the program is to visualize the frequency spreading of different proagation modes. It further gives a feedback to the operator on correct tuning.

After starting the program you have to select a wavefile. Then the spectrum will be displayed:



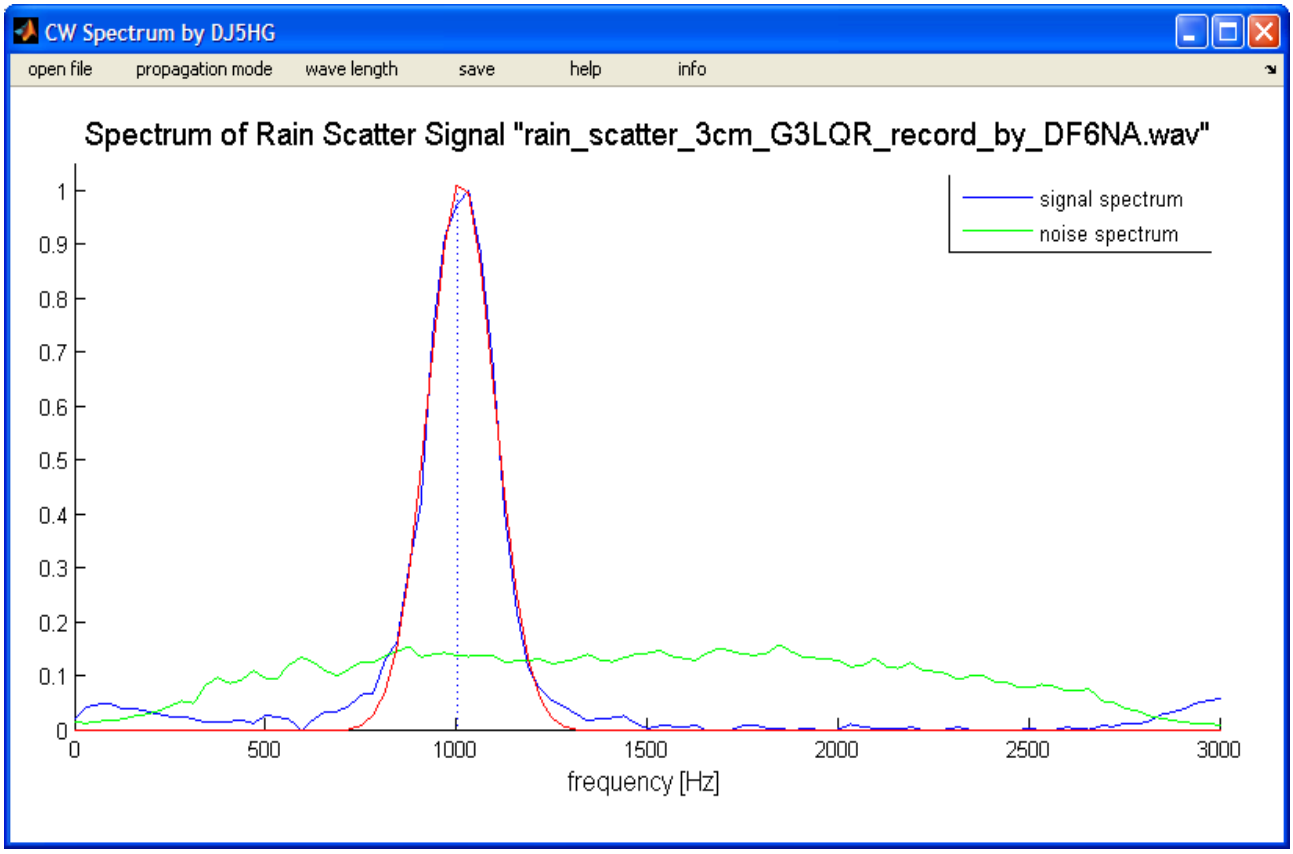
This is a spectrum of a typical aurora signal. The noise is well separated from the signal such that the signal vanishes above 1700 Hz while the noise is still present.

If the propagation mode is set to „aurora“ by the menu, and the wavelength to „2m“ then the point spread function from a single magnetic field line is added at the maximum of the spectrum:



The point spread function of aurora has a narrow triangular shape with considerable large wings. If the signal is much stronger than that shown here then these wings modulate the noise far away from the carrier and render all other small aurora signals unreadable.

In the case of rain scatter the scattering cells change continuously in efficiency and location, but do not instantaneously dissapear as in aurora. Therefore the rain scatter spectra do not show wings. The shape of the spectra closely follow a Gaussian distribution. This Gauss curve is added to the spectrum if „RainScatter“ is chosen as the propagation mode by the menu:



The Gaussian shape as a whole may be shifted up and down in frequency by collective movement of all scatterers (clouds).

If the wave file does not contain a keyed CW signal or if there is considerable fading then the signal and noise cannot sufficiently be separated. There also may be problems with improper settings of the AGC.

FAI and TEP seem to be identical in their spectrum. It is similar to that of aurora but at much lower spreading. Backscatter of sporadic E has an even lower spreading that cannot be resolved by this program. The resolution of the program is given by selecting the file „CW_reference.wav“.