

SSS- HIGH ENERGY NEUTRON SPECTROMETER

The Simple Scintillation Spectrometer (SSS) is a research neutron spectrometer intended to complement the range of ROSPEC™ by allowing measurements from 4 to 16 MeV.

DETECTOR DESCRIPTION

The Simple Scintillation Spectrometer detector elements are an array of small plastic scintillators coupled to a photomultiplier tube. The dimensions of these scintillators are selected to optimize the neutron response functions of the detector while at the same time minimizing the sensitivity to gamma radiation.

The physical appearance of the SSS is very similar to the portable gamma spectrometer made by BTI (MICROSPEC™), consisting of two sections: a probe containing the neutron detector, its photomultiplier, a light pulser driver, and a high voltage supply; and an analyzer module which includes a shaping amplifier, analog-to-digital converter, display, keyboard, and system power supply.

Like ROSPEC, the SSS produces raw data, which is, to a first approximation, the integral of the neutron spectrum. Software is included with the SSS to unfold the raw data and produce an energy spectrum; this works in much the same way as the program SPEC4 which is used with ROSPEC data.

CALIBRATION OF SPECTROMETER

The primary calibration of the SSS is performed using mono-energetic neutrons (see enclosed spectra). However, it is usually the case that mono-energetic neutrons are not available at the site where the SSS is to be used, and in order to provide a calibration at the measurement site, a secondary calibration can be performed using a ¹³⁷Cs gamma ray source. A temperature stabilized light pulser is provided to check that the calibration is unchanged during a particular series of measurements or in a particular environment.

The calibration of the SSS must take into account the non-linear response of plastic scintillator to protons. A correction for this characteristic is included in the unfolding code. BTI has determined the ratio of signal amplitudes between neutrons and ¹³⁷Cs gamma rays, and this information has been incorporated in the auto-calibration routine used for calibration in the field.

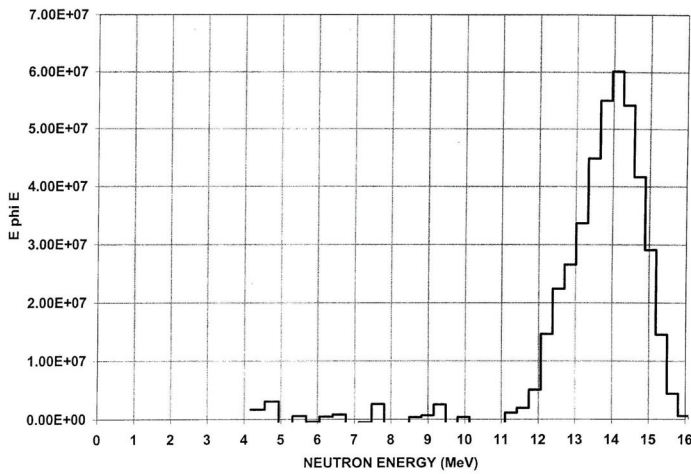
UNFOLDING (ON ROSPEC)

Unfolding the data from the SSS is initiated from within the ROSP program, which is used for acquiring and unfolding ROSPEC™ data. Pressing the [Ctrl]+U key starts the SSS unfolding program. The user will be prompted to provide the filename where the data are stored. The user is then asked for a filename for the program output.

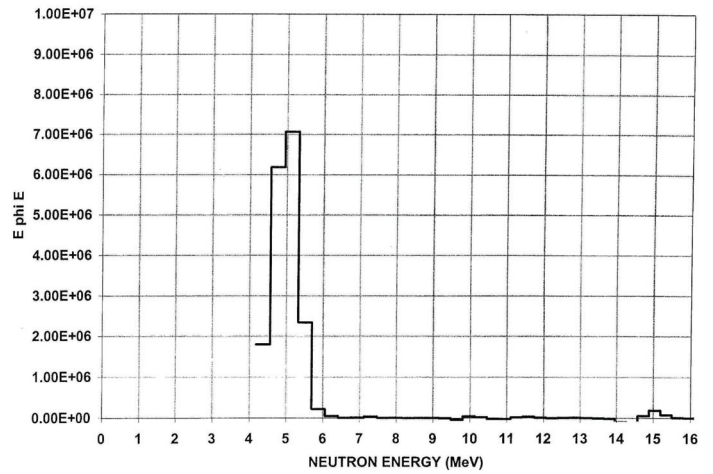
The program will then proceed to unfold the spectrum. The results of the unfolding will appear on the screen, and will be written to a file with the name given by the user above with the extension .SPM. The results are also written to the file \ROSPEC\SSS.TMP, which can be used to transfer the spectrum observed by the SSS to the input of the ROSPEC™ unfolding program.

The unfolding routine will also, if desired, merge the ROSPEC and SSS spectra to obtain a continuous spectrum extending to 16MeV.

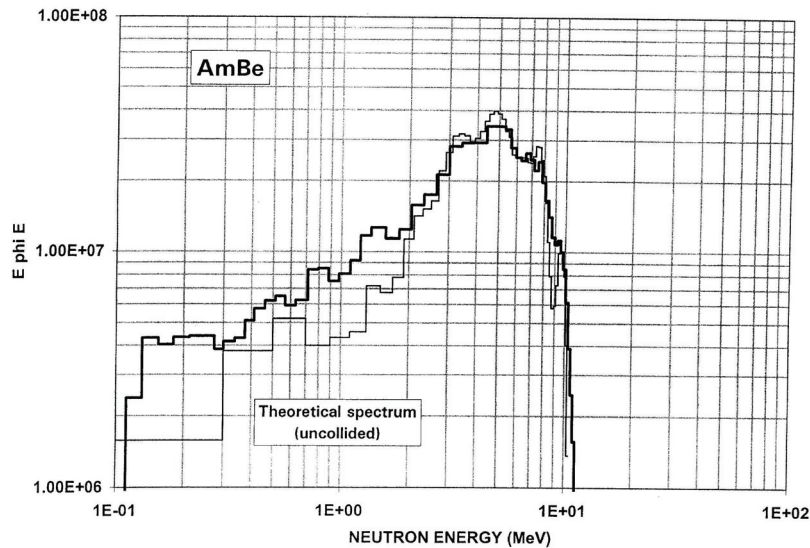
SSS Spectrum : En = 13.8 MeV



SSS Spectrum : En = 4.9MeV



ROSPEC + SSS SPECTRAL MEASUREMENT



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