

Routti J T & Prussin S G. Photopeak method for the computer analysis of gamma-ray spectra from semiconductor detectors.
Nucl. Instrum. Methods 72:125-42, 1969.
[Lawrence Radiation Lab., and Dept. Nuclear Engineering, Univ. California, Berkeley, CA]

An accurate photopeak method for the analysis of gamma-ray spectra measured with high-resolution Ge(Li)-detectors is presented and incorporated in a flexible Fortran program, SAMPO, which performs searching and fitting of single and multiple peaks with internally calibrated peak shape functions, energy and efficiency calibrations, and error estimates. Optionally, interactive graphics and nuclide identification can be used. Applications range from nuclear spectroscopy to routine data analysis. [The SCJ® indicates that this paper has been cited over 400 times since 1969.]

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"Gamma spectrometers with high-resolution Ge(Li)-detectors and large-memory pulse height analysers had increased the volume and quality of spectral data enormously in the 1960s. Although these data were routinely analysed by graphical techniques, the need for automated computer analysis was obvious.

"I was pursuing doctoral studies at the University of California, Lawrence Radiation Laboratory. My thesis was in high-energy neutron spectrometry with activation detectors, and included gamma analysis of spallation reactions. Spectral analysis presented problems in other directions, too. Al Smith had quantities of spectra, Fred Bernthal and Jerry Wilhelmy were accumulating complex spectroscopy data, and Matti Nurmia and Pirkko and Kari Eskola were searching for new heavy elements, using alpha spectroscopy. Stan Prussin was one of

my thesis advisors. Together we set out to develop a spectrum analysis method.

"The excellent computer facilities, including two CDC 6600s with interactive graphics, were marvellous. Many futile efforts were first spent, however, and the program was appropriately called Sisyphus after the Greek giant condemned by the gods to roll a big stone up a mountain only to have it roll down again. Only later did we name the program SAMPO, which in the Finnish *Kalevala* epic is a miracle mill fulfilling all the wishes of its owner.

"The photopeak method uses internally calibrated peak shape functions in fitting. The stability and reliability were much improved when compared to earlier proposals to use free Gaussians. Automatic peak search and energy and efficiency calibrations were included and flexible controls were designed for a large number of applications. Online interactive graphics made it possible to analyse even the most complex spectroscopy data while batch processing handled simpler spectra.

"After publishing the analysis method and the description of SAMPO,¹ copies of the program were requested by and sent to different laboratories around the world.

"Further extensions and improvements to the SAMPO analysis have taken place at CERN² and at Helsinki University of Technology by Markku Koskela and other graduate students. An accelerated fitting procedure has been completed and nuclide identification and error estimates have been based on statistical methods. The improved analysis³ has been incorporated in SAMPO80 installed on minicomputers,⁴ while microcomputer versions are being developed.

"The frequent citations derive from two main sources. First, SAMPO was one of the first programs specifically designed for Ge(Li) gamma spectra and is referred to in most subsequent developments. Secondly, the program is very widely used, probably in hundreds of laboratories, and is cited when results are published."

1. **Routti J T.** SAMPO. a Fortran IV program for computer analysis of gamma spectra from Ge(Li) detectors, and for other spectra with peaks. Berkeley, CA: University of California Lawrence Radiation Laboratory, 20 October 1969. Report No. UCRL-19452. 34 p.
2. **Christensen G C, Koskela M J & Routti J T.** Gamma spectrum storage and analysis program SAMPO76 with nuclide identification. Geneva, Switzerland: European Organization for Nuclear Research, 17 March 1978. Report No. CERN HS-RP/015. 40 p.
3. **Koskela M J, Aarnio P A & Routti J T.** SAMPO80: an accurate gamma spectrum analysis method for minicomputers. *Nucl. Instrum. Methods* 190:89-99, 1981.
4. SAMPO80: minicomputer program for gamma spectrum analysis with nuclide identification. *Comput. Phys. Commun.* 24:11-35, 1981.