

PACKAGE ID - 001194MLTPL00 GAUSS ALGORITHMS

KWIC TITLE - Gamma-ray Spectral Analysis Algorithm Library

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LIMITATION CODE -COPY **AUDIENCE CODE** - LIM

COMPLETION DATE - 12/01/1996 **PUBLICATION DATE** - 12/01/1996

DESCRIPTION - The routines of the Gauss Algorithm library are used to implement special purpose products that need to analyze gamma-ray spectra from GE semiconductor detectors as a part of their function. These routines provide the ability to calibrate energy, calibrate peakwidth, search for peaks, search for regions, and fit the spectral data in a given region to locate gamma rays.

PACKAGE CONTENTS - Media Directory; Software Abstract; Installation Instructions (1 page); Media Includes Source Code, Object Library; User's Manual in Adobe Acrobat PDF Format, Compilation Instructions; Linking Instructions; Programmer Documentation; Examples of using Library;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 CD Rom

METHOD OF SOLUTION - The calibration of energy and peakwidth use Bevington's Gauss-Jordan elimination to invert a symmetric matrix and calculate its determinant as part of a linear least squares fit. The peak search determines the initial location of peaks with the crossproduct of the spectrum with the unit squarewave. Then it uses a linear least squares fit to refine the location. The region search computes a background curve and from that, locates likely regions to be fitted. The spectral data fit uses the Levenberg-Marquardt algorithm as implemented in MINPACK's lmdr routine available at the netlib webpage. A square symmetric covariance matrix is calculated from the fit result, and fit uncertainties are calculated from the matrix.

COMPUTER - MLT-PLTFM

OPERATING SYSTEMS - Machine dependent

PROGRAMMING LANGUAGES - ANSI C, and optional Fortran

SOFTWARE LIMITATIONS - Since the user has to provide the storage for the answer, the user has to indicate a maximum number of peaks or regions to be returned by the search routines.

SOURCE CODE AVAILABLE (Y/N) - Y

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UNIQUE FEATURES - The routines are independent. Any one or more of them can be used in an application. A spectral data fit of a region is the sum of one or more gaussian components. With Gauss Algorithms, a user can determine the coordinates not only to plot the curve of this fit, but to plot the curve of each Gaussian component as well.

RELATED SOFTWARE - GAUSS ALGORITHMS is derived from GAUSS IX.

HARDWARE REQS - Memory requirements are minimal.

TIME REQUIREMENTS - The routines were timed on two systems: a Silicon Graphics Iris Indigo (150Mhz running the IRIX operating system, a Pentium personal computer (200MHz) running the Windows 95 operating system. For each routine timed, a program was written to call the routine 1000 times in a loop. On the IRIX system, each timing program was invoked as an option to the /usr/bin/time time command, and the user time was divided by 1000. On the Windows 95 system, a batch program was used to invoke the sequence: time; the timing program; time. The elapsed time was divided by 1000. Peak searches take about .03 seconds to find 219 peaks in 8000 channels using low sensitivity. region searches take less than one second to find 145 regions in 8000 channels using low sensitivity.

REFERENCES - User's guide on media

ABSTRACT STATUS - Released AS-IS 4/27/1998.

SUBJECT CLASS CODE - U

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
G CODES
GAMMA SPECTROMETERS

EDB SUBJECT CATEGORIES -
990200

SPONSOR - DOE/DP

PACKAGE TYPE - AS - IS