

CMAT PROGRAM

Part of the GASP Data Analysis Program Package

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1. INTRODUCTION

The **CMAT** program is part of the Data Analysis Program Package developed at Padova/Legnaro designed to analyze multidimensional coincidence matrices produced with GSORT program. It can execute the following operations:

1. 1D projections of the matrices;
2. extracting gated 1D spectra from 2D matrices;
3. extracting gated 2D matrices from 3D/4D matrices;
4. adding multidimensional matrices;
5. compress/decompress matrices;
6. transposing 2D matrices;
7. reading the content of one channel;
8. changing organization of a matrix;
9. 2D scatter plot of 2D matrices;
10. defining automatic banana gates on 2D matrices.

When starting the program it shows the prompt **CMAT>** and waits for a command. Before acting on a matrix it has to be opened with the **OPEN** command. When the matrix is opened the program list its organization (symmetric/nonsymmetric, dimensions of the axis, step values, number of segments). A brief list of the commands can be get using the **?** command.

2. DETAILED DESCRIPTION OF THE COMMANDS

- ADD

It creates a matrix $fact3 \times mat3$ by summing the matrices $fact1 \times mat1$ and $fact2 \times mat2$. After the command the program ask for the name of the matrices to be summed, the name of the final matrix and the factors to be multiplied with; e.g., with the factors 1 -1 1 one subtracts **mat2** from **mat1**. The two matrices involved in this operation must have the same organization.

- BANANA_DEFINE

- CHANNEL_VALUE *ind1 ind2 ...*

It shows the content and the address of a matrix location defined by **ind1**, **ind2**,

- CLOSE

Deallocates the matrix. This command allows to operate on a different matrix. Exiting from the program does not need explicit closure of the matrix.

- COMPRESS_2D *filename.ext*

It creates a compress matrix "**filename.cmat**" starting from the decompressed one "**filename.ext**" organized as **res2** records of 2 bytes **res1** channels. The program asks for the axes length and if they are equal it ask also if the compressed matrix should be symmetrized. When creating a symmetrized compressed matrix the content of each channel on the main diagonal is divided by 2 for consistency with the matrices created directly in compressed form.

- CUBEAID

It is used to identify superdeformed structures with constant dynamical moment of inertia. It uses a 3D grid with constant spacing. There are still problems with background subtraction.

- DECOMPRESS_2D

It produces a decompress matrix. Each location uses a 2 bytes integer and the file consists of **res2** records of **res1** \times 2 bytes. This operation is valid only for 2D matrices. It allows to symmetrize the decompress matrix.

- DIAGN_2D_SYMM

It creates a spectrum from a cut perpendicular on the main diagonal of a 2D symmetric matrix. It is used to evidence ridge structures. The channels for the cut are selected from the projection of the matrix. The spectrum is created with a length equal to the projection of the matrix and its name is automatically generated including the channels in-between which the cut was done and the extension **DIAGN**. Data are centered inside the spectrum.

- DIAGP_2D_SYMM

It creates a spectrum from a cut parallel to the main diagonal of a 2D symmetric matrix. The channels for the cut are selected from a perpendicular cut on the main diagonal. The spectrum is created with a length equal to the projection of the matrix and its name is automatically generated including the channels in-between which the cut was done (distance in channels from the diagonal) and the extension **DIAGP**.

- EXIT

Exit the program. Open matrices are automatically closed.

- GATE

It produces a 1D spectrum from the opened matrix setting gates on ndim-1 of its axis. Gates can be specified from a file or from terminal together with a normalization factor. The name of the spectrum is explicitly asked together with its format.

- GET_PROJECTIONS

It reads the projections saved in the opened matrix file and writes them as spectra on disk. The name of the spectra are PROJ1.DAT, PROJ2.DAT, up to the number of axes (even in the case of symmetrized matrices).

- MOMENTS

It calculates the area, center of mass and FWHM of a spectrum on one of the axes of a 2D matrix. Results are written as spectra and can be used for isomeric states identification from gamma-time matrices.

- M2D_FROM_M3D

It produces a 2D matrix from a 3D matrix by setting a list of gates read from the terminal or from a disk file. One has to specify the axes which are projected. The time needed to execute this command depends on the matrix dimensions and the number of gates.

- OPEN filename

It allocates the file containing the matrix **filename.CMAT** (only **READ** permission).

- PUT_PROJECTIONS

It writes the new projections spectra in a matrix opened with **RWOPEN**.

- RWOPEN filename

It allocates the file containing the matrix **filename.CMAT** (**READ/WRITE** permission).

- SCATTERPLOT_2D

It allows to represent a 2D matrix as a scatter plot on a Tek4010 graphical terminal. The first index is put on horizontal and the second one on vertical. It works only for nonsymmetric matrices. A few simple commands in cursor-mode are available:

T	transposing the two indexes
L	left marker
R	right marker
O	upper marker
U	lower marker
E	expand the region defined by L R O U
Z	low offset on z-axis
space_bar	shows the coordinates and content at the marker point
CTRL_Z	exit the graphics mode.

- SHIFT

It changes the organizations of the opened matrix. It allows to pack together channels and to translate them (only by integer factors).

- STATISTICS

It gives informations on the compression format for a given interval of segments.

- TEST

It is used to test new commands under development.

- TRANSPOSE

It allows to transpose a 2D matrix.