



Go4 overview Outline



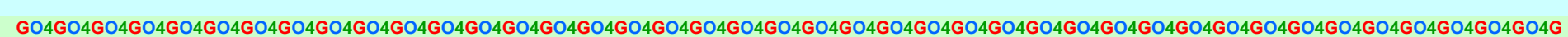
Go4 features

Go4 run modes

Analysis framework and plug-ins

GUI elements

Summary





Go4 key features



Framework for many kinds of experiments (Atomic & Nuclear Physics)

Based on C++, ROOT (CERN) and Qt (Nokia)

Provides **services and interfaces** for user written analysis

Batch mode (CINT or compiled, online/offline)

Interactive mode (online/offline):

- A **non blocking GUI controls and steers the analysis**
- GUI interfaces **ROOT and Qt graphics**
- Analysis can **update graphics asynchronously: live monitoring**
- User can create and **add specific GUIs** (Qt designer)



- **Development start: April 1999**
- Go4 v.1.0 May 2002
- Go4 v.2.0 November 2002
- Go4 v.3.0 December 2005
- **Go4 v.4.4.3 March 2011**

Full distribution on **Linux, Solaris, Windows XP, W7, MacOS X**

- **Users:**

GSI experiments:

FRS, SHIP, AP, ESR,
TASCA, SHIPTrap, CBM testing,..

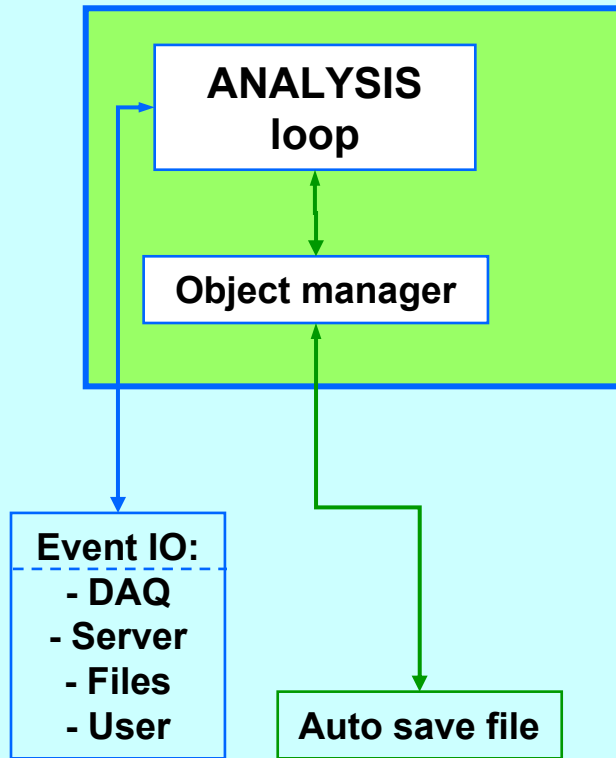


Analysis batch mode



Standard executable **go4analysis** with user parameters; or CINT

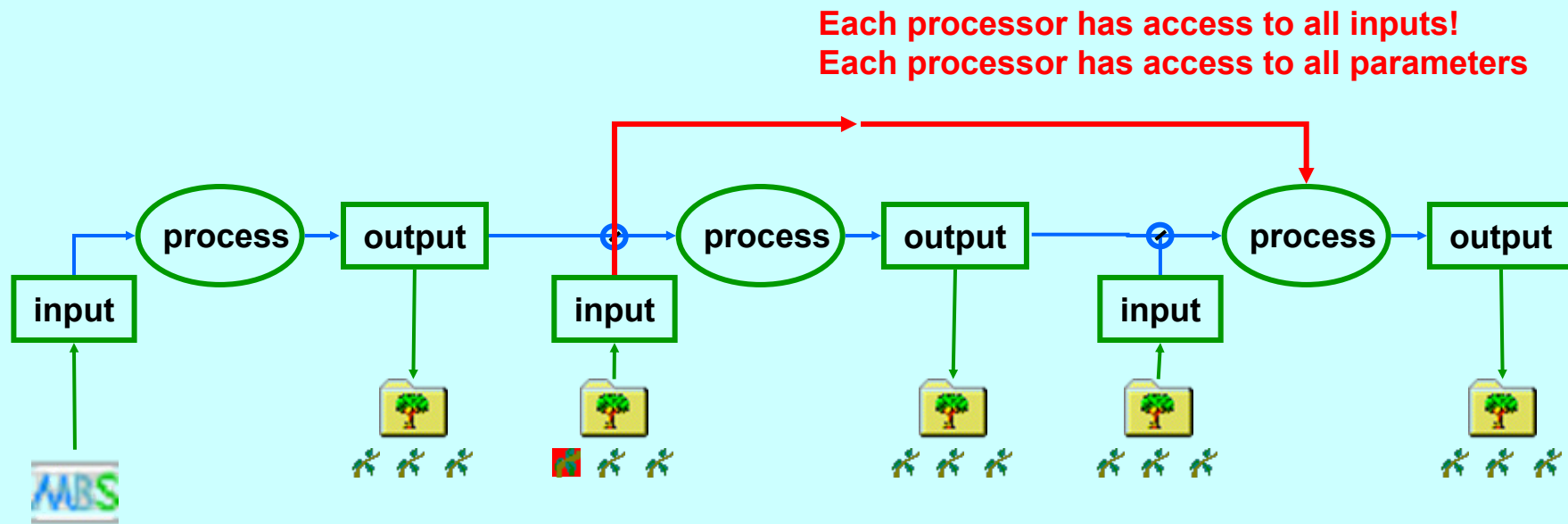
Analysis process





Analysis steps

Chain of analysis steps processed **sequentially**
Each step can be **en/disabled** (framework)
Input/output can be switched (framework)





Framework Services:

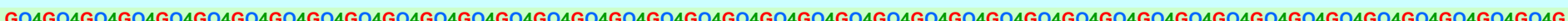
- **GSI standard DAQ (Mbs)**
data formats, data input (*.lmd file and DAQ sockets)
- **Root I/O :**
event source and store with TTree; object manager TFile i/o

Required user implementations:

- Event data processing code
at least **one function *BuildEvent()***

Optional user implementations:

- Event data structures
output event class for ROOT TTree
- **Parameter** container (set up, calibration, control)
- **User event source** (input file format, **proprietary DAQ** connection)
- **Initialization factories** (advanced set-up of event classes)





standard executable **go4analysis**

- provided by framework
- **generic command line arguments** for analysis set up
- **optional arguments** passed to user's TGo4Analysis subclass

examples:

- `go4analysis -stream r3g2 -step 0 -store workshop_events.root
-step 1 -store workshop_analyzed.root -asf workshop_auto.root`
(setup as from gui: mbs stream server as data source, 1. and 2. step storage files, autosave file specified)
- `go4analysis -file gauss.lmd -disable_store
-step Analysis -store analyzed_events.root -number 100000 -disable_asf`
(process 100000 events from file gauss.lmd, no store of first step, storage file of step „Analysis“, autosave disabled)
- `go4analysis -user mydaq.gsi.de -server dataserver -norun -v 2 -log logfile.txt`
(start analysis as data server, user defined DAQ event source, do not start processing, log output to file with verbosity 2)
- `go4analysis -file gauss.lmd -args result.root 1 5000 7.0 42`
(process file and pass user specific arguments to analysis constructor)
- `go4analysis -help`
(show all options)





Some Go4 GUI Features



- **Control and setup** analysis steps (remote analysis)
- Extended **browser** and **tree viewer** (local, remote)
- **Viewpanel** with graphical markers
- **Show and edit object properties** (local, remote)
- **Fit panel** for histogram and graphs (local)
- **Event data inspection and dump** (remote analysis)
- Define „ad hoc“ **histogramming** (remote analysis)
- **Macro execution** (local, remote analysis)
- Adding **User written GUI** possible (Qt designer)
- **Hot start mechanism** to save/restore complete set-up



Screenshot of Go4 v4.4



Go4 v4.4.0 @lxg0523 <Controller name:MyAnalysis> - [Panel1: Copy of picture]

File Tools Analysis Settings Windows Help

scatter No Errors Cartesian X: Lin Y: Lin Z: Lin 10 %

Browser

- Workspace
 - histo1
 - Panel1
 - 93TC0244_ASF.root
 - Histograms
 - Calib
 - Pos0
 - Histo0_C_P0
 - Histo1_C_P0
 - Histo2_C_P0
 - Histo3_C_P0
 - Histo4_C_P0
 - Histo5_C_P0
 - Histo6_C_P0
 - Histo7_C_P0
 - Pos1
 - Histo0_C_P1
 - Histo1_C_P1
 - Histo2_C_P1
 - Histo3_C_P1
 - Histo4_C_P1
 - Histo5_C_P1
 - Histo6_C_P1
 - Histo7_C_P1
 - Pos2
 - Histo0_C_P2
 - Histo1_C_P2
 - Histo2_C_P2
 - Histo3_C_P2
 - Histo4_C_P2

File Edit Select Options

Style Binning

Name Histo0_C_P1::TH1D

Line 1

Fill 1

Title Calibrated Channel 1 Pos 2

Histogram Plot 2-D 3-D

Error: No Errors

Style: No Line

Simple Drawing

Show markers

Draw bar chart

Bar option

Marker 1.0

Crate 1 channel 1x2

Calibrated Channel 1 Pos 1

Calibrated Channel 1 Pos 2

Crate 1 channel 1x2

Marker Modes

loop new

MBS monitor

r2-d2 Ev/s Ev kB/s MB

NO SERVER % - file closed - MB file Status Setup SetupML SetupMO

5 s 200 bins trend

X: Y: Z: V0

GUI command: rebin("", 2, kTRUE);

Divide Pad : 2 x 2 SetPalette 1 Pad

2 s All items

Current Ev/s: 76.103

Average Ev/s: 89905

1360 s

122353000 Events

2010-01-19 18:10:16



Folders for:

Workspace (GUI memory)

ROOT files

Analysis (remote memory)

Histogram servers

(Mbs, TNetFile, RFIO)

The screenshot shows the 'Browser' window with a table of items and a context menu. The table has two columns: 'Name' and 'Info'. The context menu is open over the 'Analysis' folder, showing options: Flags, Info, Date, Time, Class, and Size.

Name	Info
Workspace	folder
histo1	histo title
d0016.root	
decay-times.root	
Decay_1	frequencies
Decay_2	frequencies
Analysis	Controller
Histograms	All Histogram objects
Crate1	UserFolder
Crate2	UserFolder
Cr1Ch1x2	Crate 1 channel 1x2
His1	Condition histogram
His2	Condition histogram
His1g	Gated histogram
His2g	Gated histogram
Conditions	All Condition objects
Parameters	All Parameter objects
123 Par1	This is a Go4 Parameter Object
DynamicLists	Dynamic List Instances
Trees	References to trees
Pictures	Picture objects
condSet	Set conditions

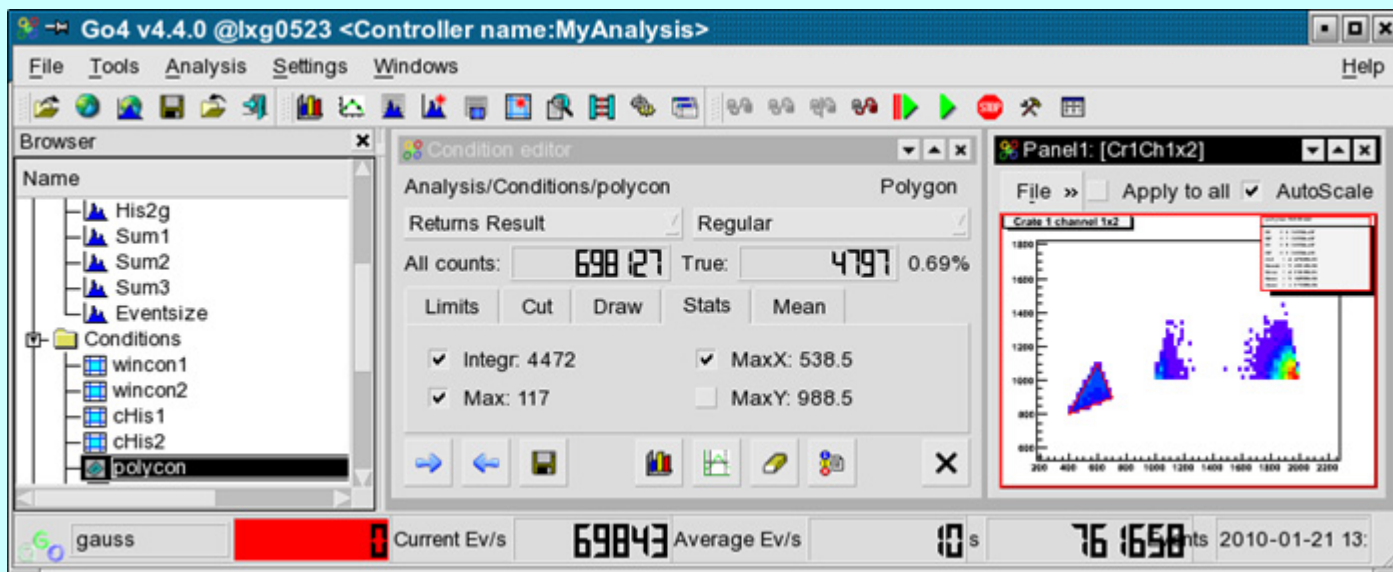
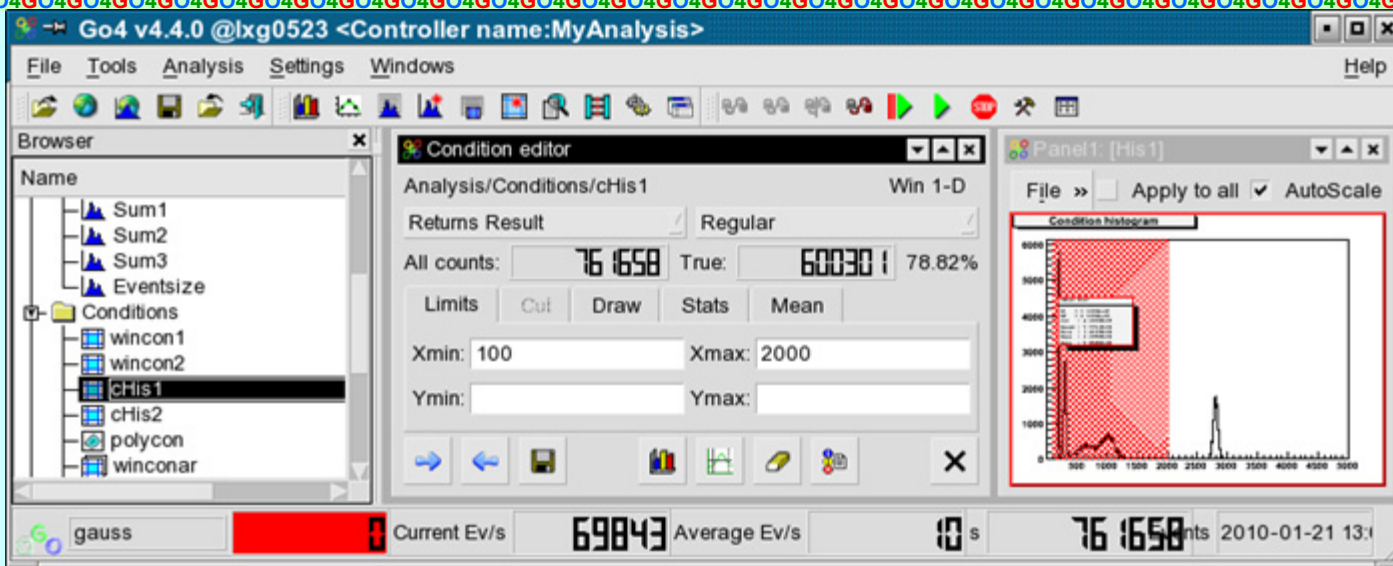
Context menu options:

- Flags
- Info
- Date
- Time
- Class
- Size





Condition editor





Parameter editor



Remote editing of object (data structure) contents

Go4 v4.4.0 @lxg0523 <Controller name:MyAnalysis>

File Tools Analysis Settings Windows Help

Browser

- Name
- chis2
- polycon
- winconar
- polyconar
- Parameters
 - XXXParameter
- DynamicLists
- Trees
- Pictures
- Canvases
- EventObjects

Parameter Editor

Parameter

Analysis/Parameters/XXXParameter - TXXXParameter

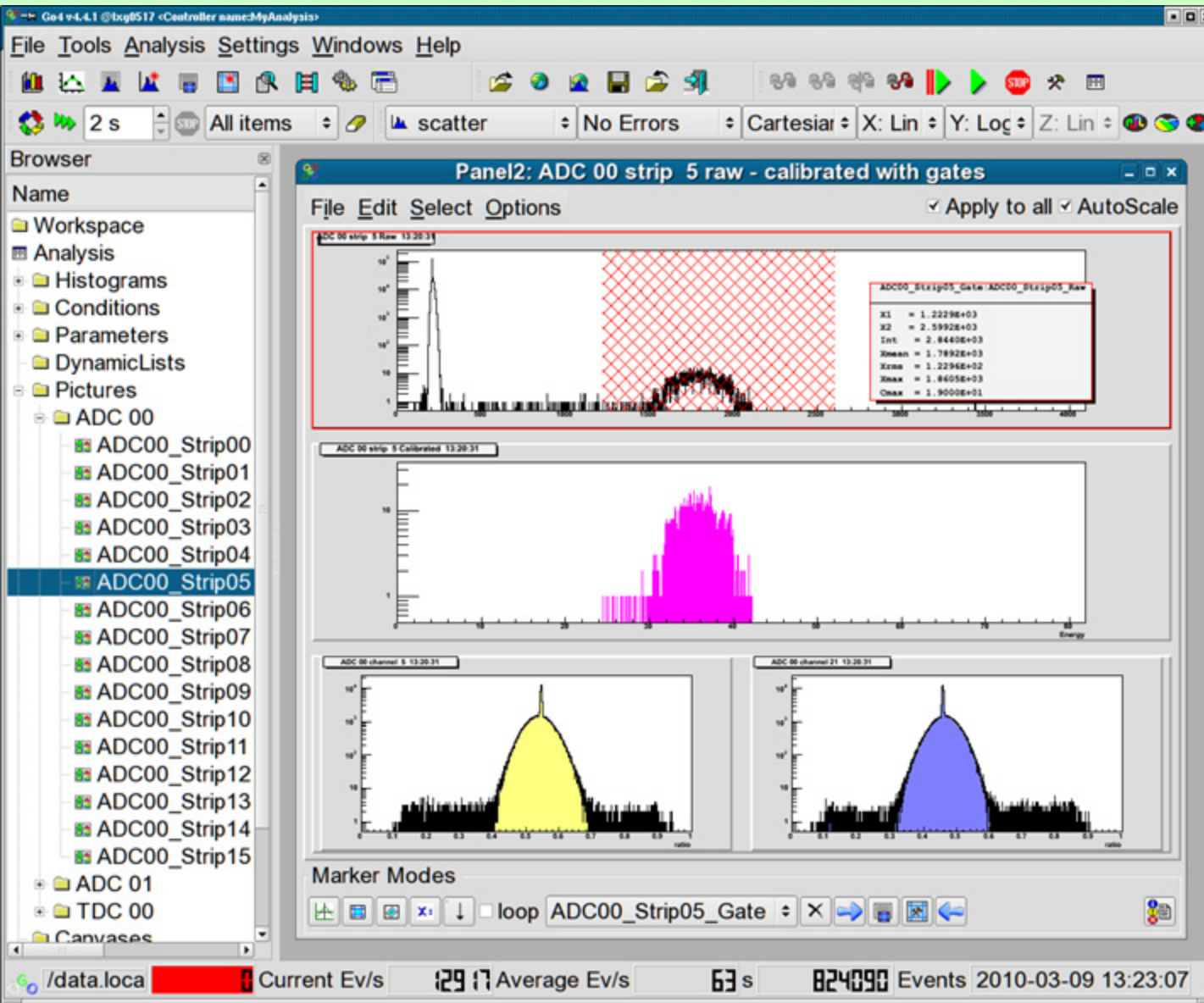
Object Members

Name	Type	Value	Comments
frP1	Float_t	100.000000	Offset for calibration
frP2	Float_t	200.000000	Factor for Calibration
fbHisto	Bool_t	1	Enable Histogramming

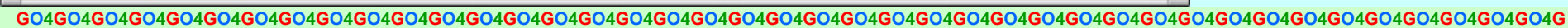
gauss ██████████ Current Ev/s **69843** Average Ev/s **764658** 2010-01-21



Picture view



Set up a view of corresponding histograms, conditions,..





- Fitting of histograms / graphs for **any kind of model**
- **Peak finder**
- **Interactive set up** of model and fit parameters
- Fit panel modes:
 - simple (quick fit)
 - **wizard (usual)**
 - expert (full control of TGo4Fitter class)
- Different **display modes**
(model components, parameter output, etc.)
- Different **minimization functions**
(Chi square, ML Poisson, ...)
- **Store fitter** object in ROOT file for re-use



Fit panel



Interactive peak finding and fitting. Save fitter for use in macros

The screenshot shows the Go4 v4.4.0 software interface. The main window is titled "Go4 v4.4.0 @lxxg0523 <2>". The "Fit panel" is active, showing a "Fitter" window with the following settings:

- Name: Fitter
- Minimizer: (empty)
- Peak finder: (empty)
- Data: Data0
- Models: Gauss4, Gauss5, Gauss6, Gauss7, Gauss8, Gauss9 (selected), Gauss10, Gauss11
- Model: Gauss9 of class: TGo4FitModelGaus
- background:
- use buffers:

	Fixed	Value	Error	Epsilon
Ampl	<input type="checkbox"/> fix	92.8146	3.29964	
Pos	<input type="checkbox"/> fix	2717.64	0.787184	
Width	<input type="checkbox"/> fix	11.6812	0.668406	

The histogram plot shows the data "hDeg120_CND" with a red line representing the "Model". The x-axis ranges from 2000 to 3400, and the y-axis ranges from 100 to 600. The plot shows a peak at approximately 2717.64. The legend indicates the data is from "histograms.root/hDeg120_CND" and the model is "Model".



Dynamic list editor



Histogramming "ad hoc" from event data

Go4 v4.4.0 @lxg0523 <Controller name:MyAnalysis>

File Tools Analysis Settings Windows Help

Browser

- Name
- adHocHisto
- Conditions
- Parameters
 - XXXParameter
- DynamicLists
- Trees
- Pictures
- Canvases
- EventObjects
 - EventStores
 - EventSources
 - EventProcessors
 - Events
 - MbsEvent-10
 - UnpackEvent
 - fiCrate1[16]
 - fiCrate2[16]

Dynamic List Editor

Entry: TGo4HistogramEntry

enable Analysis/DynamicLists/AdHoc

Histogram

Analysis/Histograms/adHocHisto

Event data Condition TreeDraw

X UnpackEvent/fiCrate1[0]

Y

Z

Panel1: [adHocHisto]

File Edit Select >> Apply to all AutoScale

histogram title

12000

10000

8000

6000

4000

2000

0

0 100 200 300 400 500 600 700 800 900 1000

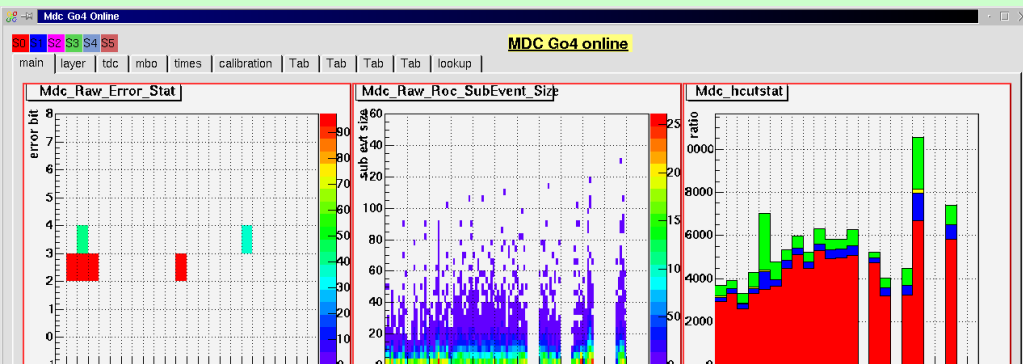
gauss 3442 Current Ev/s 34853 Average Ev/s 199 s 6968000 Events 2010-01-21 13:58

Drag



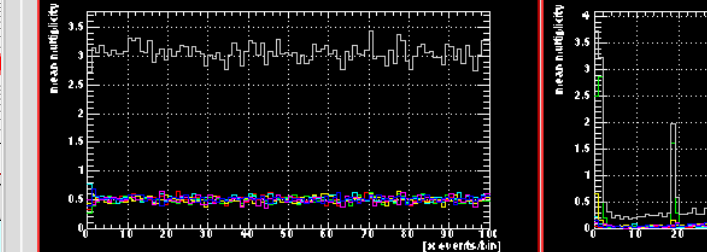
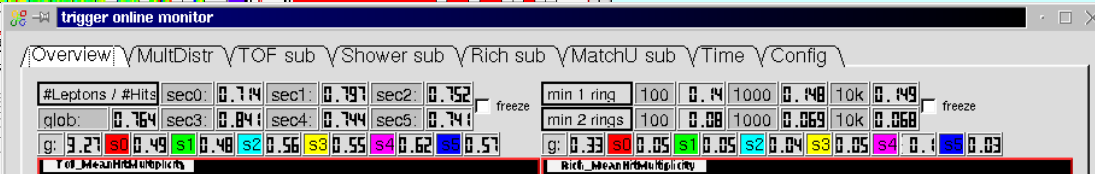
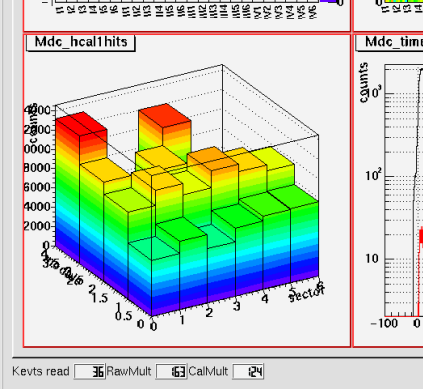


User GUI (Qt)



04G04G04G04G04G04G04G04G04G04G04G04G04G04G04G04G04G04G

- Created with Qt Designer by user
- Plugged in by dynamic library
- All Go4 services available
- Started inside Go4 GUI workspace



Hades Configuration

General Specs

Tree

- Tree Size (kBytes)
- Refresh rate (nev)

Eventloop

- nLoop: 100
- sleep: 100
- maxrate: 1000

Refresh

- TriggerRefresh: 500
- StartRefresh: 500
- RichRefresh: 500
- RichODRefresh: 500
- MdcRefresh: 500
- ToFRefresh: 500
- TofinoRefresh: 500
- ShowerRefresh: 500

Tasks

- Trigger
- Start: hit
- Rich: cal
- Mdc: fit
- ToF: cal
- Tofino: cal
- ShowerTofino
- Shower: hit

MDC SETUP

Calibrator

- TimeCuts: [dropdown]
- NoStartAndCal: [dropdown]

TrackFinder

- magnet on: [dropdown]
- single Chamber: [dropdown]

nLayers

- Level: [6] [6] [6] [6] [10] [50] [10] [30]
- Segments: [1] [3]

Fitter

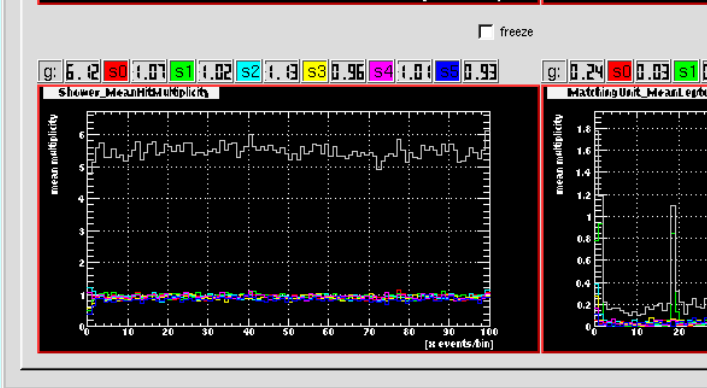
- single Chamber: [dropdown]

get Configuration

submit Configuration

HADES on-line monitoring

Courtesy HADES coll.



04G04G04G04G04G04G04G04G04G04G04G04G04G04G04G04G04G04G

04G04G04G04G



A flexible framework for online monitoring and analysis

Used in production since 2002

Runtime environments: batch, or with asynchronous GUI(s)

User code: Go4 plug-ins, or unlimited ROOT

Applications: atomic and nuclear physics, detector testing

Go4 v4.4 free available under GPL at <http://go4.gsi.de>

