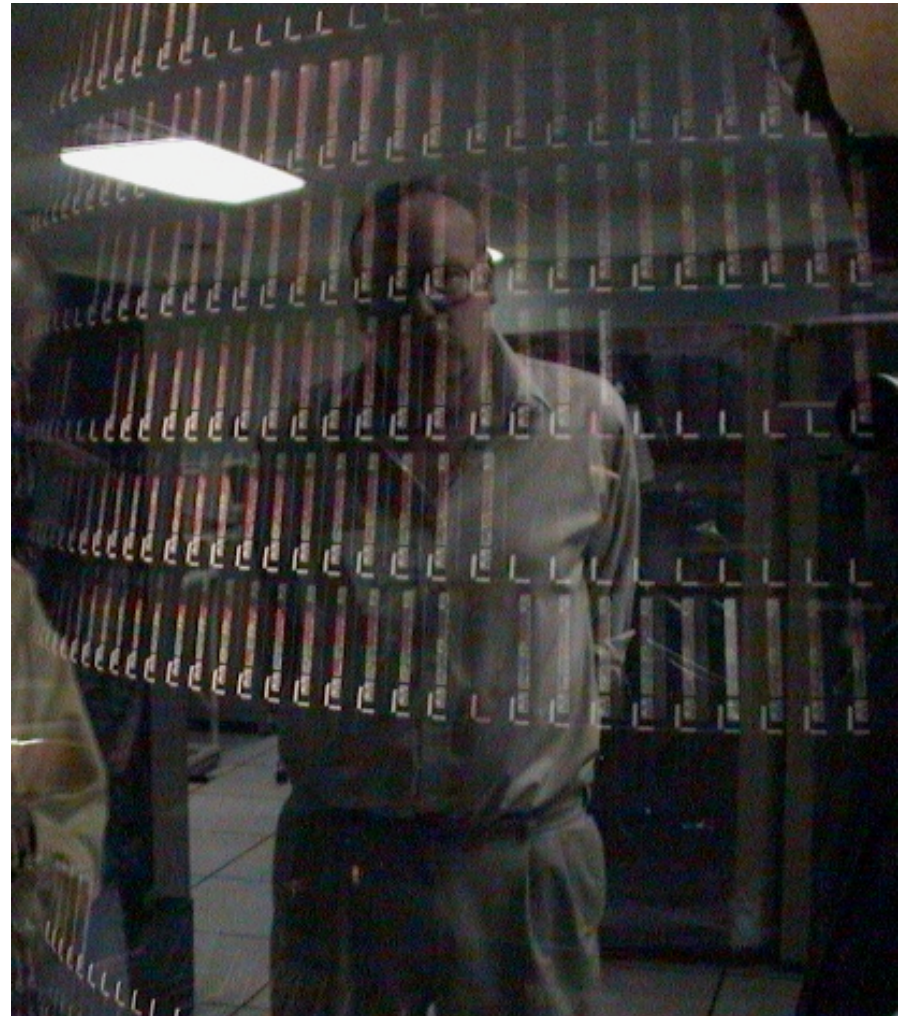


# Human Interface Issues

Optimum Use of Information

# Very large data sets

Data is not information, it must be processed and transformed into a form we can interact with, may not know how we want to do this before we start, must be able to do this easily.



# How?

- Easily define the problem
- Easily execute whatever tasks must be executed
- Interact with the results, make conclusions
- Keep track of status, make archives
- GOTO step 1

# Partial Wave Analysis

Graphical Setup

$4^{+-} 1^{+}(a_2^0 \pi^-) \mathbf{H}$	<input type="checkbox"/>	$4^{+-} 1^{+}(a_2^- \pi^0) \mathbf{H}$	<input type="checkbox"/>
$4^{+-} 1^{-}(a_2^0 \pi^-) \mathbf{H}$	<input type="checkbox"/>	$4^{+-} 1^{-}(a_2^- \pi^0) \mathbf{H}$	<input type="checkbox"/>
$4^{-} 0^{+}(a_2^0 \pi^-) \mathbf{I}$	<input type="checkbox"/>	$4^{-} 0^{+}(a_2^- \pi^0) \mathbf{I}$	<input type="checkbox"/>
$4^{-} 1^{+}(a_2^0 \pi^-) \mathbf{I}$	<input checked="" type="checkbox"/>	$4^{-} 1^{+}(a_2^- \pi^0) \mathbf{I}$	<input checked="" type="checkbox"/>
$4^{-} 1^{-}(a_2^0 \pi^-) \mathbf{I}$	<input type="checkbox"/>	$4^{-} 1^{-}(a_2^- \pi^0) \mathbf{I}$	<input type="checkbox"/>

Self-Documenting

Analysis Name:  (Mandatory)

AVIDD-I

AVIDD-B

brizon

mantrid-A

mantrid-B

mantrid-C

mantrid-single node

Automatic Script  
Generation

# What does this do?

- Generates normalization integrals
- Generates documentation for this particular fit
- Generates the scripts needed to run the PWA

$$\Phi_{\alpha\alpha'} = \frac{4\pi}{N_{gen}} \sum_i^{N_{acc}} A_{k\alpha}(\Omega_i) A_{k\alpha'}(\Omega_i)$$

(+3.695582e-01, -8.881118e-21)	(-5.730092e-04, +3.220805e-04)	(-7.037756e-05, -4.352780e-07)
(-5.730092e-04, -3.220805e-04)	(+2.315807e+00, +6.941202e-20)	(-5.217224e-04, -2.627597e-05)
(+1.808334e-04, +8.613940e-05)	(-6.178070e-04, +2.187597e-06)	(-5.324651e-04, +6.684890e-05)
(-5.324651e-04, +6.684890e-05)	(-4.027400e-04, -1.168707e-05)	(-1.098032e-03, -9.140132e-04)
(-1.098032e-03, -9.140132e-04)	(+1.663670e-03, +1.282375e-03)	(-1.252486e-04, +1.494979e-05)
(-1.252486e-04, +1.494979e-05)	(+1.094410e-04, -6.390753e-05)	(-6.776253e-04, -2.457864e-05)
(-6.776253e-04, -2.457864e-05)	(-2.081114e-04, +6.954123e-06)	(+8.843758e-05, -1.962091e-05)
(+8.843758e-05, -1.962091e-05)	(+8.307223e-04, -6.849916e-04)	(-2.999384e-04, +3.522898e-05)
(-2.999384e-04, +3.522898e-05)	(-1.213844e-04, +1.147715e-04)	(+1.107964e-03, +9.735886e-05)
(+1.107964e-03, +9.735886e-05)	(-1.195577e-03, +6.135271e-04)	(-8.327185e-05, -2.087644e-05)
(-8.327185e-05, -2.087644e-05)	(-2.995084e-04, +2.261978e-04)	(-3.694609e-03, -1.494443e-03)
(-3.694609e-03, -1.494443e-03)	(+2.626140e-03, +6.468720e-05)	

MONI (Mother of all Normalization Integrals) is reduced automatically

## Document this fit: (MyPWA.tex)

```
$1^{--}0^{-}(\rho\eta)$P&nwv02\\
$2^{--}1^{-}(\rho\eta)$F&nwv08\\
$3^{--}0^{-}(\rho\eta)$F&nwv10\\
$3^{--}0^{-}(\rm{a})_2^0\pi^{-}$D&nwv48\\
$3^{--}0^{-}(\rm{a})_2^{-}\pi^0$D&nwv49\\
$3^{--}0^{-}(\rm{a})_2^0\pi^{-}$G&nwv54\\
$3^{--}0^{-}(\rm{a})_2^{-}\pi^0$G&nwv55\\
$1^{+-}0^{+}(\rho\eta)$S&pwv02\\
$1^{+-}1^{+}(\rho\eta)$S&pwv03\\
$1^{--}1^{+}(\rho\eta)$P&pwv04\\
$2^{--}0^{+}(\rho\eta)$P&pwv07\\
$3^{+-}0^{+}(\rho\eta)$D&pwv12\\
$3^{+-}1^{+}(\rho\eta)$D&pwv13\\
$3^{+-}0^{+}(\rho\eta)$G&pwv15\\
$3^{+-}1^{+}(\rho\eta)$G&pwv16\\
$2^{--}0^{+}(\rm{a})_0^0\pi^{-}$D&pwv28\\
$2^{--}0^{+}(\rm{a})_0^{-}\pi^0$D&pwv29\\
$3^{--}1^{+}(\rm{a})_2^0\pi^{-}$D&pwv72\\
$3^{--}1^{+}(\rm{a})_2^{-}\pi^0$D&pwv73\\
...
```

Many of these document the “perturbations” used to define a PWA.

Can be used for LaTeX documents or to select a set of PWs.

$1^{+-}1^{-}(\rho\eta)S$	•			•							
$1^{--}0^{-}(\rho\eta)P$	•	•	•	•	•	•	•	•	•	•	•
$1^{--}1^{-}(\rho\eta)P$	•	•	•	•	•	•	•	•	•	•	•
$2^{--}1^{-}(\rho\eta)F$	•										
$3^{--}0^{-}(\rho\eta)F$	•	•	•	•	•	•	•	•	•	•	•
$3^{--}0^{-}(a_2^0\pi^{-})D$	•								•		
$3^{--}0^{-}(a_2^{-}\pi^0)D$	•								•		
$3^{--}0^{-}(a_2^0\pi^{-})G$	•									•	
$3^{--}0^{-}(a_2^{-}\pi^0)G$	•									•	
$1^{+-}0^{+}(\rho\eta)S$	•	•	•	•	•	•	•	•	•	•	•
$1^{+-}1^{+}(\rho\eta)S$	•		•								
				...							

This tool takes a set of PWA “listings” and generates a graphical Representation of the PWs used



# Script generation

- Script to run PWA is complicated
- Must know location of NI
- Must know location of Data
- Must know data partitioning
- Must know what (how many/where) CPU resources to use
- Must know where to put the answers...
- All this taken care of automatically by interface

# So now you have a PWA...

- Examine the results in a way meaningful to a physicist, intensities, phase diff., coherent sums...
- Give *your* favorite analysis tools access to the results, paw, ROOT, whatnot.
- Decide what to do next
- Keep track of where you are.

Quit

Phase Difference

Intensity

Normed  $\ln(L)$

S

1+-1-(rho/eta)S



1--0-(rho/eta)P



1--1-(rho/eta)P



2--1-(rho/eta)F



3--0-(rho/eta)F



3--0-(a2/pi)D



3--0-(a2/pi)D



3--0-(a2/pi)G



3--0-(a2/pi)G



1+-0+(rho/eta)S



1+-1+(rho/eta)S



1+-0+(rho/eta)D



1+-1+(rho/eta)D



2--0+(rho/eta)P



3+-0+(rho/eta)D



3+-1+(rho/eta)D



3+-0+(rho/eta)G



3+-1+(rho/eta)G



2--0+(a0/pi)D



2--0+(a0/pi)D



3--1+(a2/pi)D



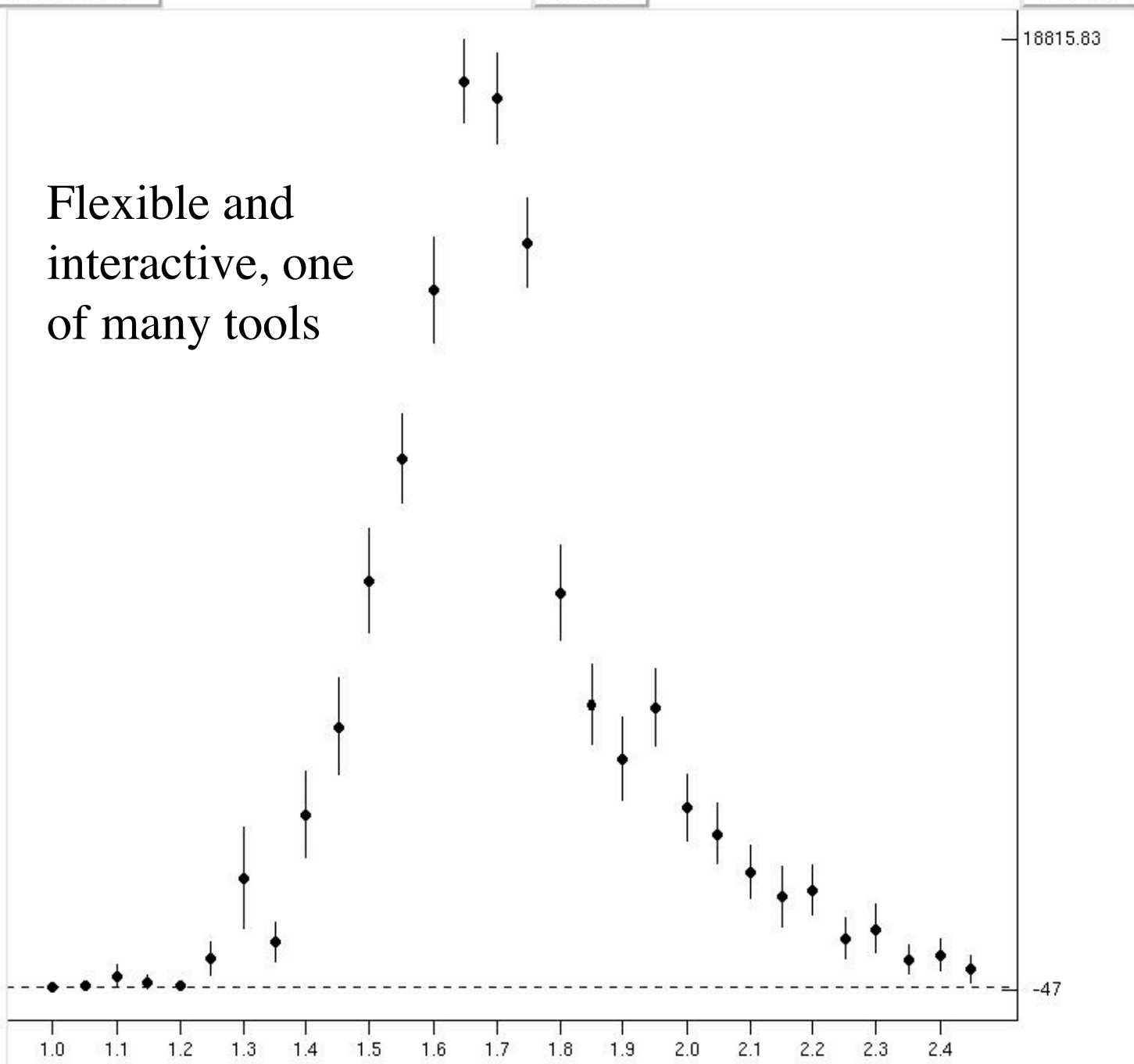
3--1+(a2/pi)D



Background

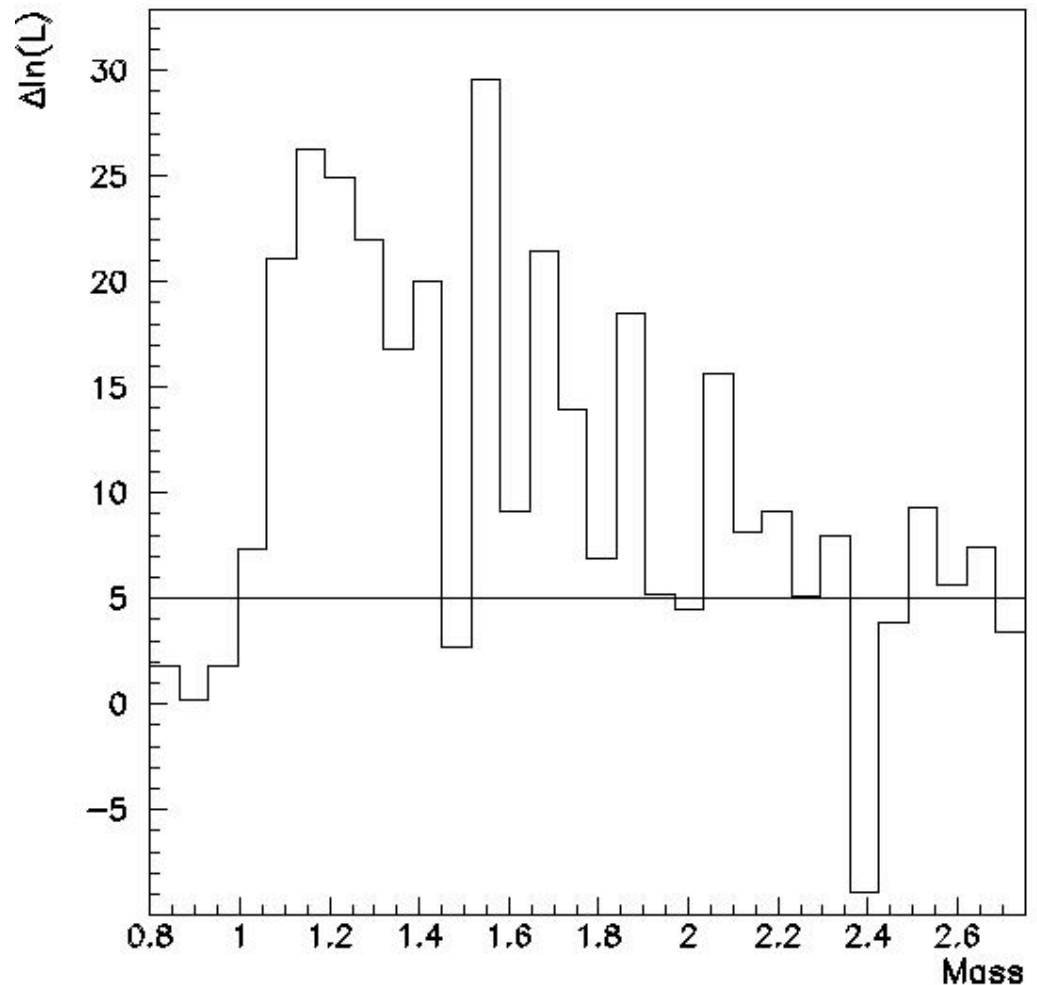


Flexible and  
interactive, one  
of many tools



Tool exists to allow PAW access to physically interesting quantities, this plot made using this tool.

Produce a plot of the change in  $\ln(L)$  as a function of mass, allows user to decide if a particular PW is required





# Now what?

- All these are “ingredients” of a proper PWA toolkit.
- Should be unified, all work together, minimal human input required, that input should be graphical
- Documentation is essential, interfaces should handle it.
- Databases of results...