

g12 procedures review

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for the review committee

g12 Analysis Procedures Cheat Sheet

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Use of this cheat sheet assumes you have read and understood every word in the official *g12 Analysis Procedures, Statistics and Systematics* CLAS note. The authors are not responsible for lost time due to blindly following the steps described herein.

1 environment

For all analyses:

```
setenv CLAS_PARMS /group/clas/parms
```

For hadron analyses, use the *g12* run index (and run 56855 for MC):

```
setenv CLAS_CALDB_RUNINDEX calib_user.RunIndexg12
```

For lepton analyses, use this run index (and run 10 for MC):

```
setenv CLAS_CALDB_RUNINDEX calib_user.RunIndexg12_mk
```

2 simulation

2.1 Digitization

```
gsm_bat -ffread /home/clasg12/ffread.g12 \  
-kine 1 -mcin events.part \  
-bosout events.gsm -trig 2000000
```

For lepton analyses, use this *ffread* file:

```
/home/clasg12/lepton.ffread.g12
```

2.2 Smearing

```
gpp -Y -s -S -a2.73 -b1.7 -c1.93 -f1 -R56855 \  
-P0x7f -oevents.gpp \  
-A/home/clasg12/gpp_tagger_profile.bos \  
events.gsm
```

For lepton analyses, use the option `-R10`.

2.3 Reconstruction

```
aic -T4 -ct1930 -cm0 -cp0 -X0 -d1 -F \  
-P0x1bff -z0,0,-90 -Aprlink_tg-90pm30.bos \  
-oevents.aic events.gpp
```

2.4 Analysis of Simulation

1. Topology dependent event selection
2. Standard *e*loss correction
3. *g12* TOF knock-out
4. *g12* Fiducial cuts
5. Notice:
 - (a) no beam corrections
 - (b) no momentum corrections

3 Analysis of Data

1. Topology dependent event selection. Analyze only complete runs, refer to the good-run list and sorting of bos event in the CLAS note.
2. Standard *e*loss
3. *g12* Beam energy corrections
4. *g12* Momentum corrections
5. *g12* TOF knock-out
6. *g12* Fiducial cuts
7. Notice for leptons:
 - (a) *g12* EC/CC particle identification cuts
 - (b) *g12* EC knock-out
 - (c) *g12* EC-specific fiducial cuts

3.1 Absolute Normalization Corrections

Use *g12-gflux-all* found in `/home/clasg12/local/scripts` to generate flux for "good" scalar intervals of the runs listed in the file *filelist.txt*:

```
g12-gflux-all filelist.txt good > flux.txt
```

1. Photon multiplicity correction (necessary if the `-A` option in *gpp* is not used)
2. Track-dependent efficiency map. The map was derived without using the start counter and addresses inaccurate simulation of other detector elements
3. If analyses require start counter timing selection, efficiency of the timing cut and detector efficiency must be applied

What can be approved?

- Calibration quality is adequate
- Momentum corrections
- Beam energy correction
- Kinematic fit should be reviewed by individual analysis
- “Lepton ID”
 - we can approve as “Di-lepton ID”. For single lepton the cuts should be tighter.
- PID and event selection should be reviewed by individual analysis
- Inclusive “Good” run list
 - could be reduced in individual analysis

What can be approved?

- Target density and its uncertainty
- Photon flux calculation procedure
- Lower limit for systematic uncertainty of the stability of normalized yield.
- Beam polarization

What can be approved?

- Smearing parameters
- gsim parameters
- processing of MC data
- DC efficiency map
- EC knockout
- Minimal TOF knockout
 - any additions to the list will require recalculating efficiency correction map and its review
- Efficiency correction
- Fiducial cuts
- Multi photon corrections

Path forward

“Use of this cheat sheet assumes you have read and understood every word in the official g12 Analysis Procedures, Statistics and Systematics CLAS note.”

Analyzers should state which of the approved common prescriptions described in the note and one page summary were followed in the analysis. In this case the steps approved as general may be excluded from individual review. Any deviation from approved prescriptions and analysis specific steps will have to be reviewed.

What have we learnt

- It was not easy to review and even to compile g12 procedures in one document 7 years after the experiment!
- This is an example of what we **MUST NOT** do with CLAS12