

Team Validation

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2018 Workfest, Day 1

Team Validation

- Big Questions:
 - How do we know our reconstruction is working correctly?
 - How do we quantify the improvement (or reverse) in our reconstruction?
- Currently we use yields of $\gamma\rho \rightarrow \pi^+\pi^- (\rho) p$ and $\gamma\rho \rightarrow \pi^+\pi^-\pi^0 (\omega) p$
 - Doesn't cover full detector phase space 😞
 - Doesn't reflect realistic physics analysis 😞
 - Need to extend suite of tests 👍💪
 - Plan to run per week — per month

Proposed Studies

- Branching fraction ratios (incl. data and efficiency)
 - $\omega \rightarrow \pi^0 \gamma / \omega \rightarrow \pi^+ \pi^- \pi^0$
 - $\eta \rightarrow \gamma \gamma / \eta \rightarrow \pi^+ \pi^- \pi^0$
 - $\eta' \rightarrow \pi^+ \pi^- \eta / \eta' \rightarrow \pi^0 \pi^0 \eta$
- Cross sections determination: $\rho \rightarrow \pi^+ \pi^-$
 - Evaluate all ingredients: yield, efficiency, flux
- Rare channel studies: J/ψ , Ξ , ...
- Comparison of data and weighted MC
 - SDME extraction using AmpTools
 - Other statistical tests

Framework

- Goal: Produce turn-key analysis package
 - How much data is needed?
 - What are desired results?
 - Numbers, number, numbers!
- Suggested starting point: `recon_test_example`
 - Runs over 1 file of data with DANA plugin on farm, generates histograms and images
 - *script.sh* — where all the action happens
 - *jana_recon_test.config* — hd_root configuration
 - Other files are bonus points

Visualization

- Outputs
 - Figures for monitoring (PNG format)
 - Text file containing quantitative results
 - Package it all up into a directory
- Pass on details to experts
 - Monitoring webpages (Thomas)
 - Monitoring DB (Sean)
 - Need: description of quantitative results
metadata (“configuration”) for dashboard

Offline Data Monitoring: Reconstruction Test



Select Run Period/Run number

RunPeriod-2018-02/011529

Select Test Dates:

Start Date 10/05/2016

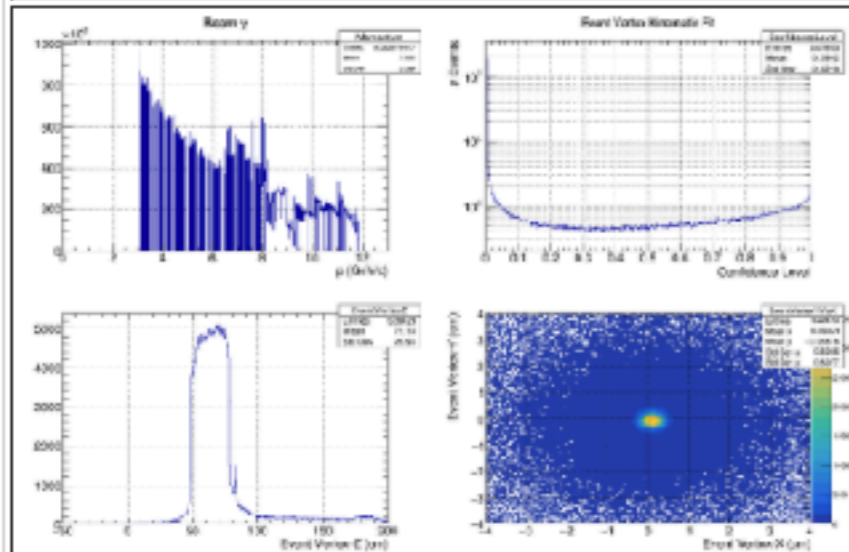
End Date 05/14/2018

Select plot to display: Recon. Event Info

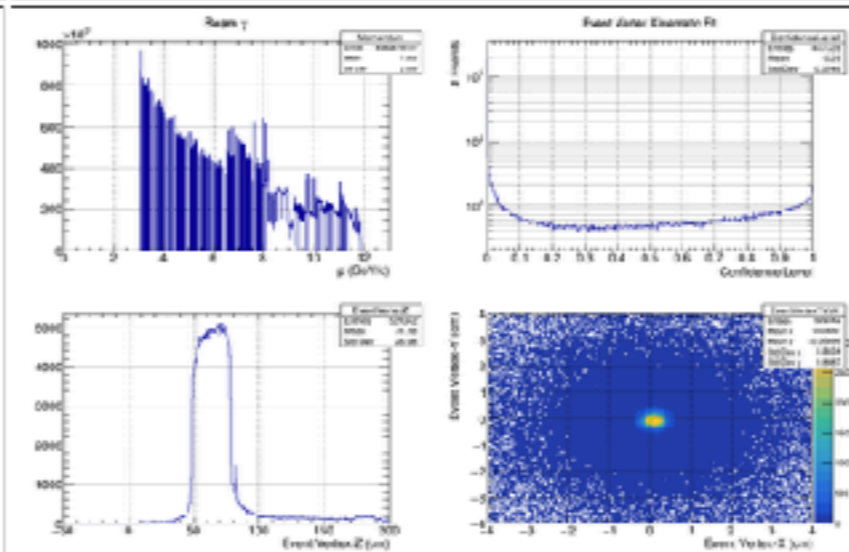
Select number of columns to display: 3

Note: Click on figure to open larger image in new tab, or click on a date to take you to the reconstruction test webpage for that specific date

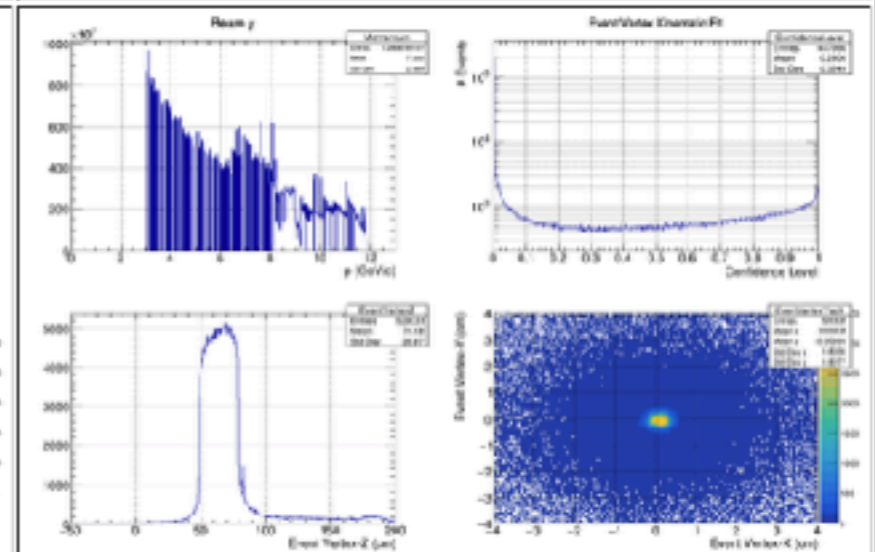
2018-05-13



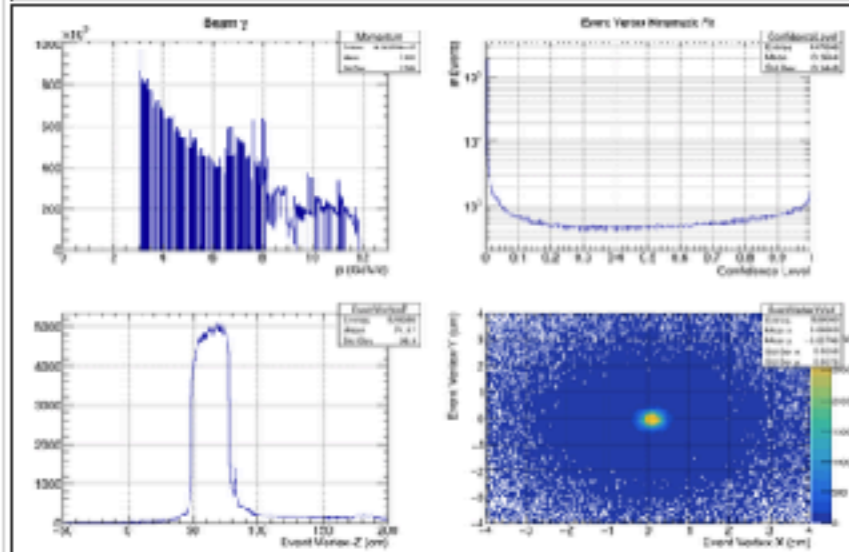
2018-05-10



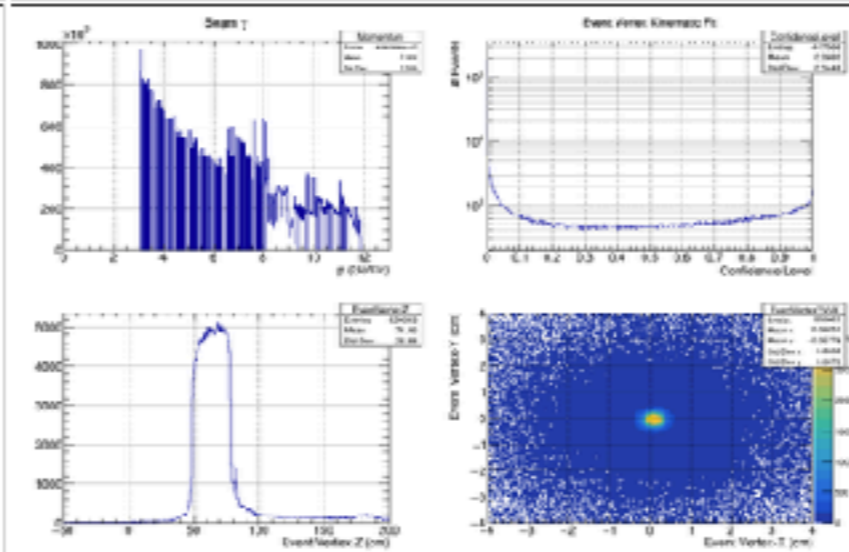
2018-05-07



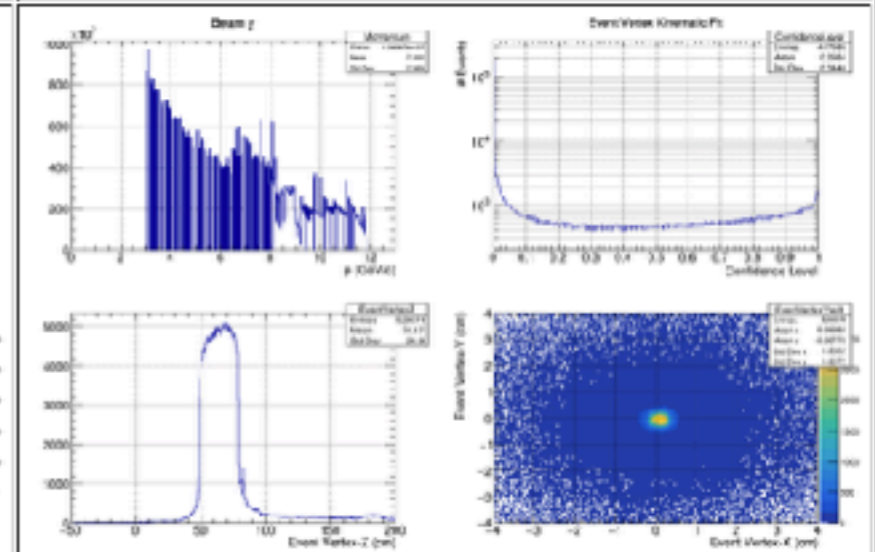
2018-05-04



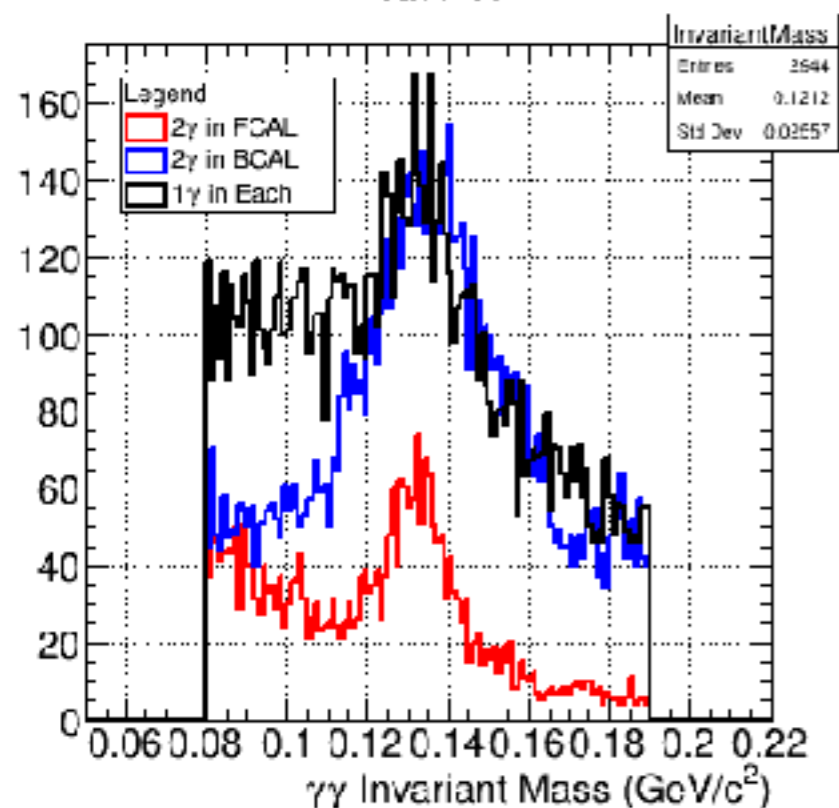
2018-05-01



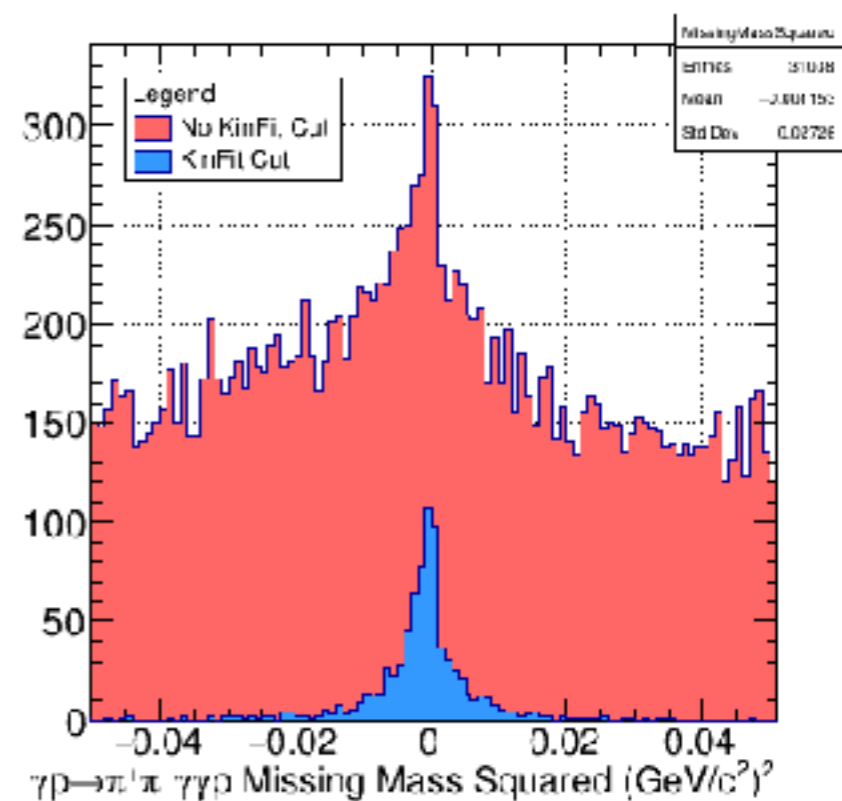
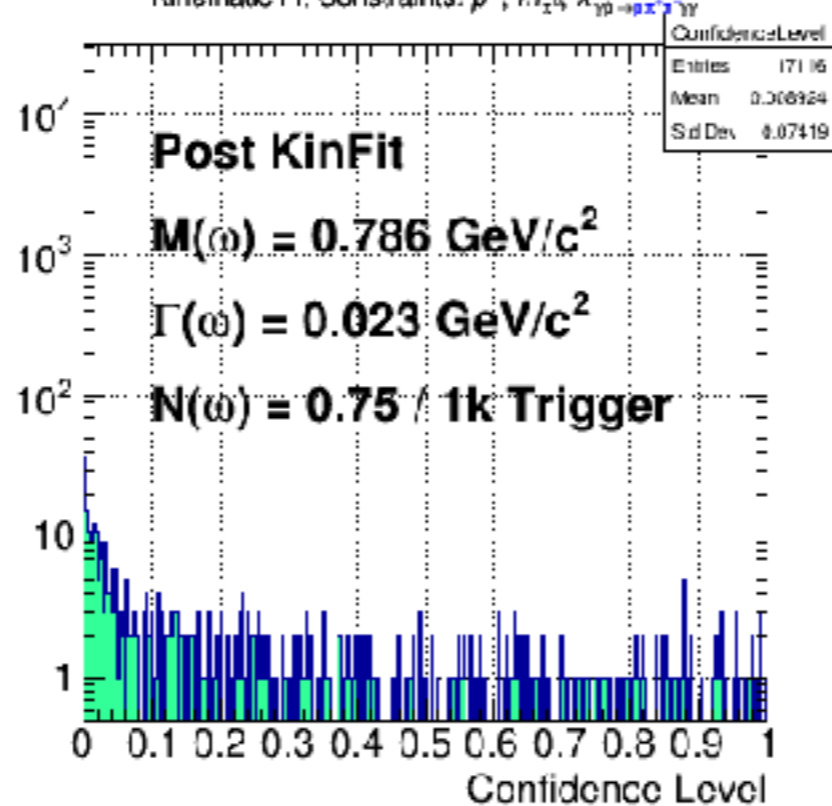
2018-04-28



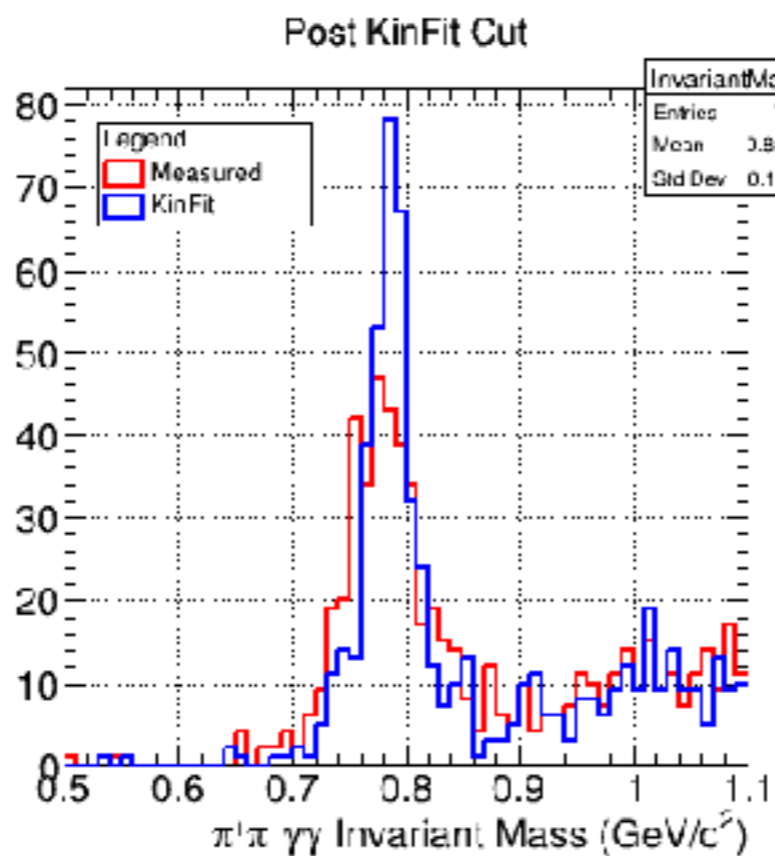
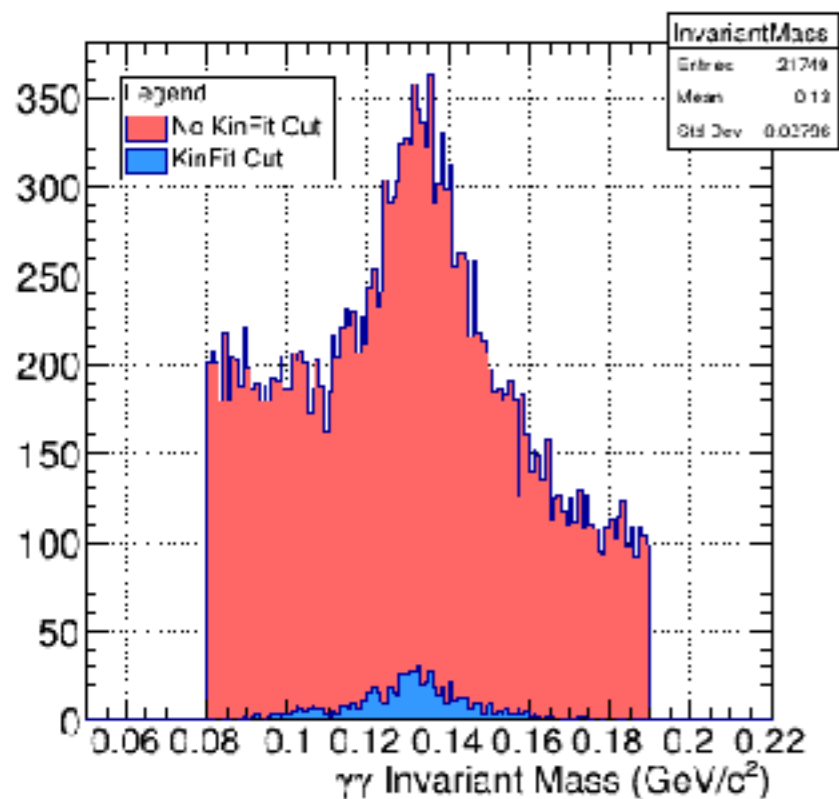
Measured



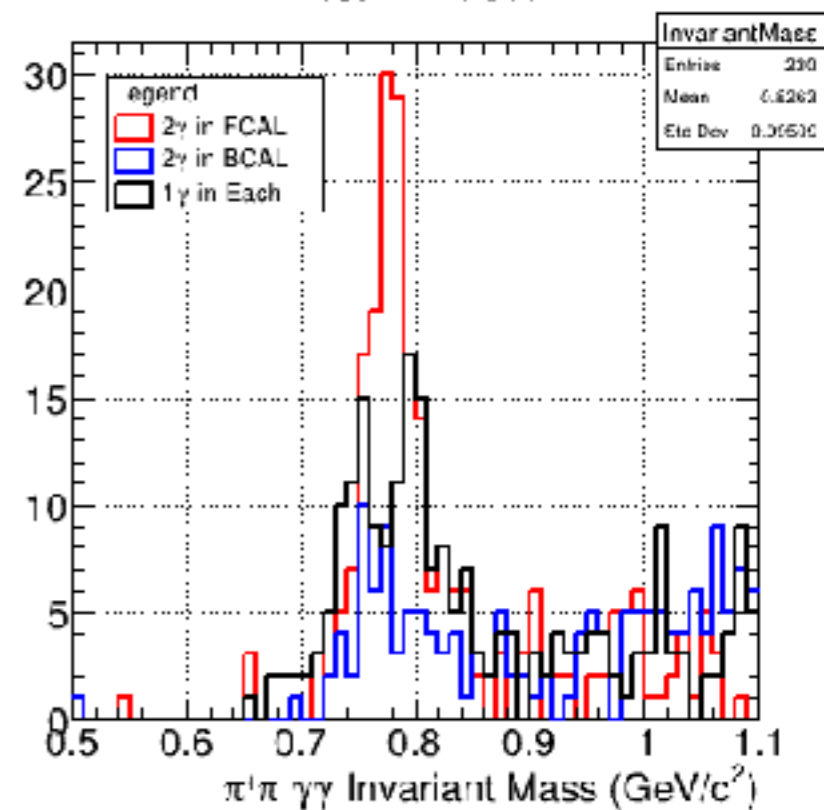
Kinematic Fit Constraints: $p^4, m_{\pi^+\pi^-}, \chi^2_{\text{min}} \rightarrow \pi^+\pi^-\gamma\gamma$



Post KinFit Cut



Post KinFit Cut



Dashboard Configuration Params

- An array of JSON Objects indexed by column name with the following properties:
 - “lowLimit”: [lower limit]
 - “highLimit”: [high limit]
 - “bounding”: [bounding type]
- The bounding type can be:
 - “atLeast” — warn if less than lowLimit
 - “within” — warn if less than lowLimit or greater than highLimit
 - “atMost” — warn if above highLimit
 - “exactly” — warn if not lowLimit = highLimit
 - “typical_low” — warn if above highLimit. Give good indicator if lower than lowLimit

Example JSON Configuration

```
{  
  "recon_pi0": {"lowLimit": 900, "highLimit": -1, "bounding": "atMost"},  
  "recon_omega": {"lowLimit": 2800, "highLimit": -1, "bounding": "atMost"},  
  "recon_b1": {"lowLimit": 3000, "highLimit": -1, "bounding": "atMost"},  
  "recon_b1pi": {"lowLimit": 3000, "highLimit": -1, "bounding": "atMost"},  
  "gen_photons": {"lowLimit": 300000, "highLimit": 300000, "bounding": "exact"},  
  "gen_protons": {"lowLimit": 150000, "highLimit": 150000, "bounding": "exact"},  
  "gen_pip": {"lowLimit": 300000, "highLimit": 300000, "bounding": "exact"},  
  "gen_pim": {"lowLimit": 300000, "highLimit": 300000, "bounding": "exact"},  
  "recon_photons": {"lowLimit": 340000, "highLimit": -1, "bounding": "atMost"},  
  "recon_protons": {"lowLimit": 400000, "highLimit": -1, "bounding": "atMost"},  
  "recon_pip": {"lowLimit": 55000, "highLimit": -1, "bounding": "atMost"},  
  "recon_pim": {"lowLimit": 48000, "highLimit": -1, "bounding": "atMost"}  
}
```

Next Steps

- If you have a project, go for it!
 - If not, ask me or someone else who looks like they have a bright idea (but eventually tell me)
 - Choose a project which may not be completely done by the end of the workfest, but has some concrete goal
- Ask questions!
- Keep informal discussions informal
 - Send me a progress update by the end of Wednesday!
- Have fun!