Background Rates on FAEcal

backgrounds	FAECal rate (MHz)	ΔT (ns)	total time windows
π^0	5.08	196.99	$\sum_{i=0}^{N} \Delta T1 \Big/ 30$
EM	13620.7	0.0734	$\sum_{i=0}^{N} \Delta T2 \Big/ 30$

backgrounds	LAECal rate (MHz)	ΔT (ns)	total time windows
π^0	10.15	98.50	$\sum_{i=0}^{N} \Delta T1' \Big/ 30$
EM	23585.0	0.0424	$\sum_{i=0}^{N} \Delta T2' \Big/ 30$

Background Data Structure

backgrounds	Root files TTrees	Merge TTrees branches followed by the time information (output file)
π^0	Skimmed root Files (save events have hits on EC virtual plane)	Events time axis Time window(30ns) 1: 0.0734176 (EM) 0 2: 0.1468353 (EM) 0 3: 0.2202529 (EM) 0 . . . 2669: 196.98611(π^0) 6 . . .
EM		

Background Rates on FAEcal

backgrounds	FAECal rate (MHz)	ΔT (ns)	total time windows
AllnoeHallD	11.50	86.91	$\sum_{i=0}^{N} \Delta T1 \Big/ 30$
Windown AllnoeHallD	0.127	7838.3	$\sum_{i=0}^{N} \Delta T2 \Big/ 30$
Winup AllnoeHallD	3.088	323.80	$\sum_{i=0}^{N} \Delta T3 \Big/ 30$
EM	13620.7	0.0734	$\sum_{i=0}^{N} \Delta T4 \Big/ 30$

Background Rates on FAEcal

backgrounds	LAEC rate (MHz)	ΔT (ns)	total time windows
AllnoeHallD	23.88	41.874	$\sum_{i=0}^{N} \Delta T1 \Big/ 30$
Windown AllnoeHallD	0.238	4195.7	$\sum_{i=0}^{N} \Delta T2 \Big/ 30$
Winup AllnoeHallD	7.398	135.17	$\sum_{i=0}^{N} \Delta T3 \Big/ 30$
EM	23583.0	0.0424	$\sum_{i=0}^{N} \Delta T4 \Big/ 30$

Outputs from merged background file (FAEcal)

```
*****************************************************************************************************************
*    Row   * Instance * ev.evtime * ev.evtime *      hitn *       pid *        px *        py * pz.pz. pz *        vx *
*****************************************************************************************************************
*        0 *        0 * 0.0734176 *         0 *         1 *         1 *         0 *         0 *     11000 * -1.647238 *
*        1 *        0 * 0.1468353 *         0 *         1 *         1 *         0 *         0 *     11000 * 0.7338665 *
*        2 *        0 * 0.2202529 *         0 *         1 *         1 *         0 *         0 *     11000 * -0.369918 *
*        3 *        0 * 0.2936706 *         0 *         1 *         1 *         0 *         0 *     11000 * 0.1559579 *
*        4 *        0 * 0.3670883 *         0 *         1 *         1 *         0 *         0 *     11000 * 0.2794354 *
*        5 *        0 * 0.4405059 *         0 *         1 *         1 *         0 *         0 *     11000 * 0.6845967 *
*        6 *        0 * 0.5139236 *         0 *         1 *         1 *         0 *         0 *     11000 * 0.9392325 *

                    .                                   .                   .
                    .                                   .                   .
                    .                                   .                   .

*     1164 *        0 * 85.531580 *         2 *         1 *         1 *         0 *         0 *     11000 * 0.8799813 *
*     1165 *        0 * 85.604998 *         2 *         1 *         1 *         0 *         0 *     11000 * 0.0436450 *
*     1166 *        0 * 85.678415 *         2 *         1 *         1 *         0 *         0 *     11000 * -0.096526 *
*     1167 *        0 * 85.751833 *         2 *         1 *         1 *         0 *         0 *     11000 * 1.4611018 *
*     1168 *        0 * 85.825251 *         2 *         1 *         1 *         0 *         0 *     11000 * -0.519626 *
*     1169 *        0 * 85.898668 *         2 *         1 *         1 *         0 *         0 *     11000 * -0.839934 *
*     1170 *        0 * 85.972086 *         2 *         1 *         1 *         0 *         0 *     11000 * 0.3612140 *
*     1171 *        0 * 86.907249 *         2 *         3 *      2112 *  -51.2568 *    344.364 *    481.527 * -0.448357 *
*     1171 *        1 * 86.907249 *         2 *         3 *       211 *  -78.1274 *   -27.9891 *    53.8849 * -0.448357 *
*     1171 *        2 * 86.907249 *         2 *         3 *       111 *   129.384 *   -316.375 *    258.346 * -0.448357 *
*     1172 *        0 * 86.045504 *         2 *         1 *         1 *         0 *         0 *     11000 * 2.0294166 *
Type <CR> to continue or q to quit ==>
*     1173 *        0 * 86.118921 *         2 *         1 *         1 *         0 *         0 *     11000 * 1.9984086 *
*     1174 *        0 * 86.192339 *         2 *         1 *         1 *         0 *         0 *     11000 * -1.232259 *
*     1175 *        0 * 86.265757 *         2 *         1 *         1 *         0 *         0 *     11000 * 2.0102627 *
*     1176 *        0 * 86.339174 *         2 *         1 *         1 *         0 *         0 *     11000 * -1.021463 *
*     1177 *        0 * 86.412592 *         2 *         1 *         1 *         0 *         0 *     11000 * 1.6907426 *
```

Background EC shower map

Backgrounds part

1. For each 30-ns time window (13400 time windows)
   Push_back EC_shower_map(EC_hitblock_ID, Etotdep)
2. Clear the EC_shower_map after each 30-ns window

Signal part

1. Loop evenly distributed e/π^- signal
2. Generate a random time window to get the backgound EC_shower_map information
3. Add EC_shower_map of backgrounds to the signal, then find 6 plus 1 cluster deposit energy to study the trigger efficiency.

Summary and Outlook

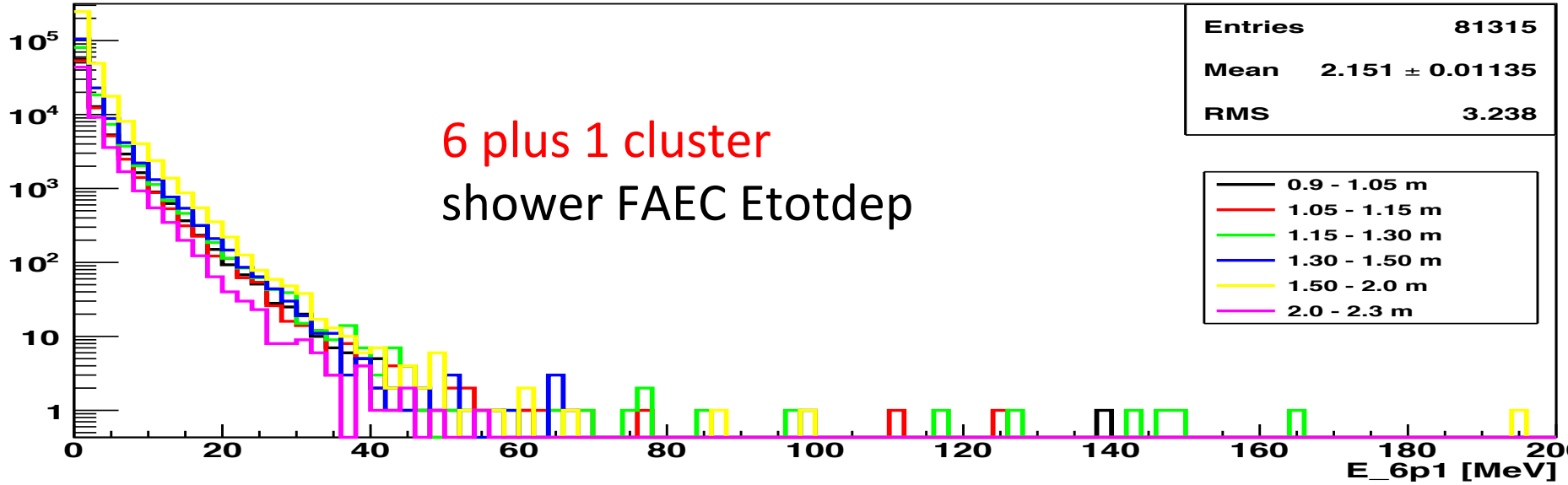
- Improve the trigger efficiency results by increasing the hadron samples and using more realistic model to merge background events.
- The plots and response functions of e/π^- trigger efficiency are stored in the svn: https://jlabsvn.jlab.org/svnroot/solid/subsystem/ec/triggerfile_GEMCYe/
- Apply same method to the PVDIS and Jpsi configurations
- Working on create sub-function that can do initial electron identification event by event level (sample fraction cut)

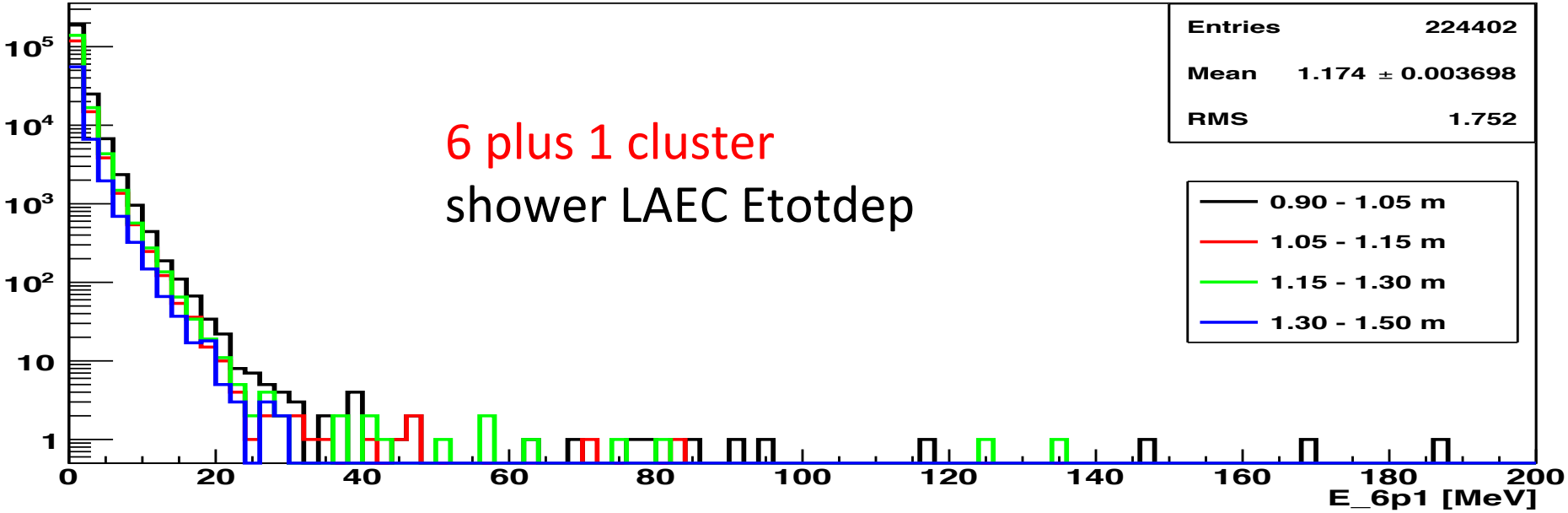
Any comments and suggestions ?

Back up

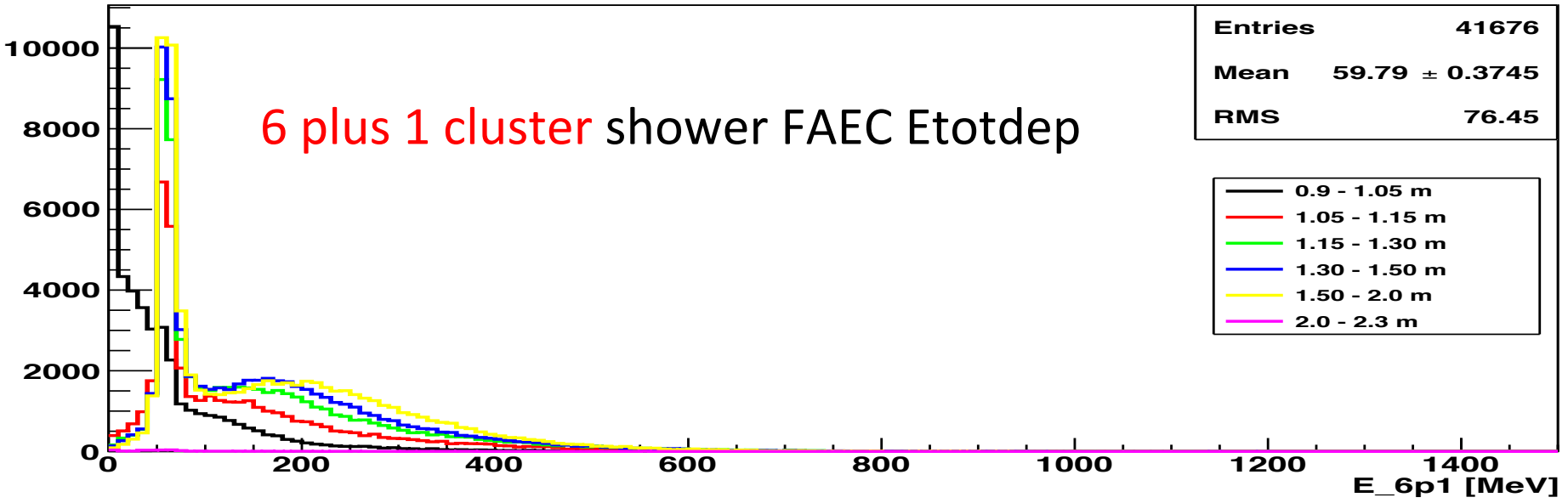
EM Background Energy Spectrum at ECAL

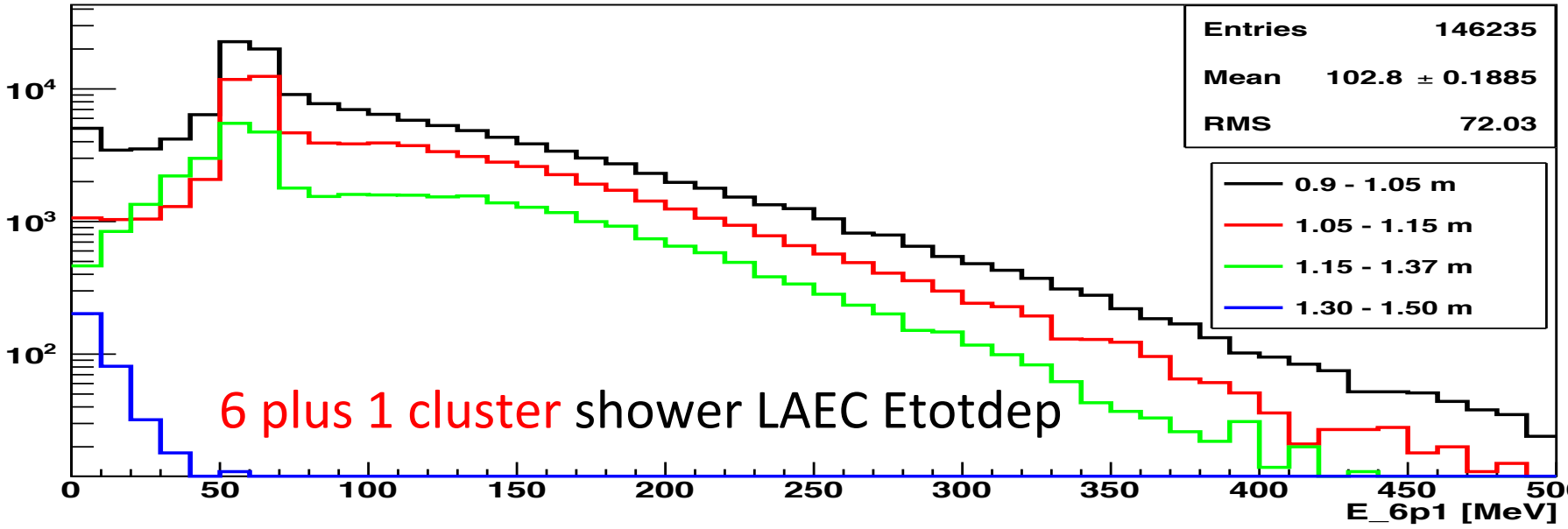
11 GeV e^- beam SIDIS configuration



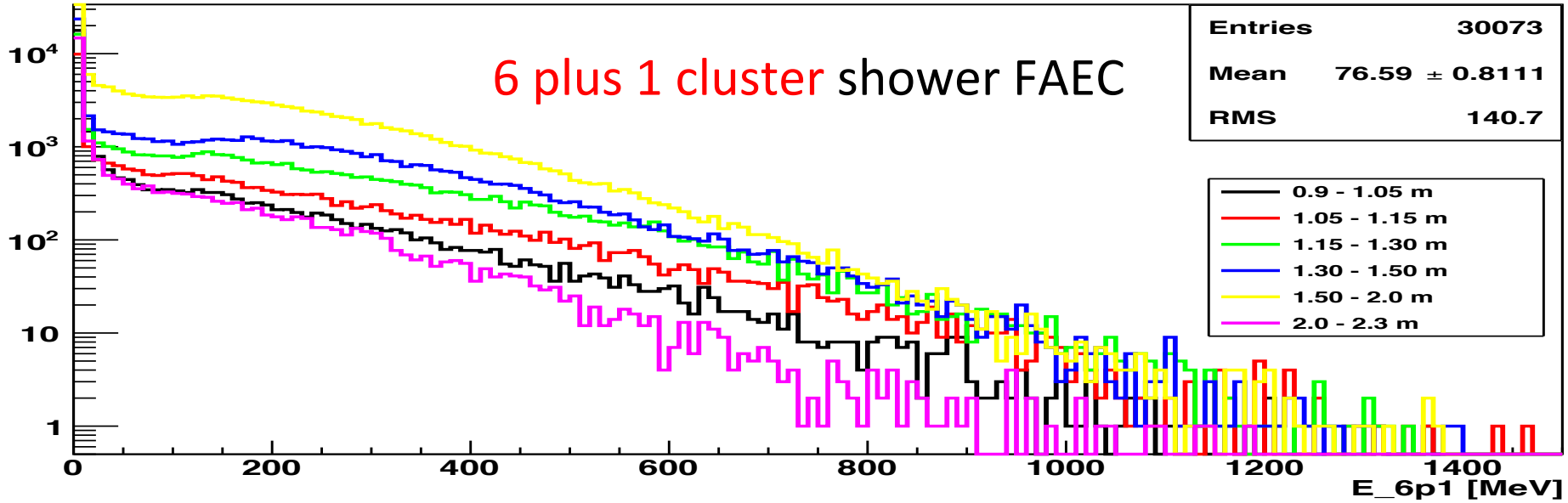


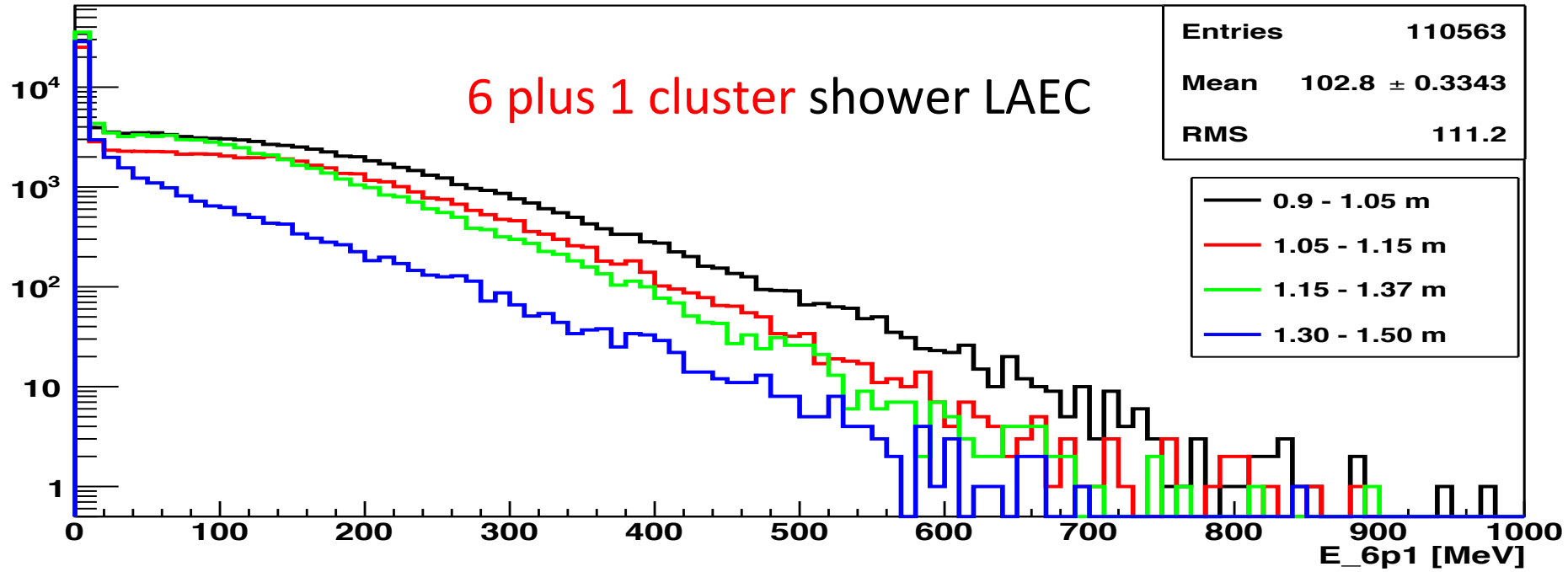
π^- Background Energy Spectrum at ECAL





π^0 Background Energy Spectrum at ECAL





π^+ Background Energy Spectrum at ECAL