-- AlexeiPavlinov - 21-Jan-2011

Test beam "publish"(performance) plot - PS data.

To make progress with the energy scale and non-linearity we need to "publish" a few things from the test beam analysis, to be included in an EMCal analysis note. These are things which must be compared to MC, to be sure that we have the MC under control. We have data for 10 values of beam momenta - 0.5, 0.75, 1, 1.25, 1.5, 2, 3, 4, 5 and 6 GeV.

Cell threshold is *2 adc units (~30 MeV)*

The number of cells per cluster at each momenta.

- PS_th2_NcellsInCluster.root: File with hists for each beam momenta : number of cells in cluster
- pdf file: Presentation for EMCAL phone meeting at Jan 20,2011 by Alexei Pavlinov.

You can read the list of histograms with next peace of code:

```
TFile f("PS_th2_NcellsInCluster.root","READ");
TIter nextkey(f.GetListOfKeys());
int nKeys = f.GetListOfKeys()->GetSize();
printf("\t Keys %i \n", nKeys); // Should be one
TKey *key=(TKey*)nextkey(); // get first key (only one exist)
TObject *obj = key->ReadObj();
TList *l = dynamic_cast<TList *>(obj);
TH1 *h = dynamic_cast<TH1 *>(l->At(i));  // i is index of hist
```

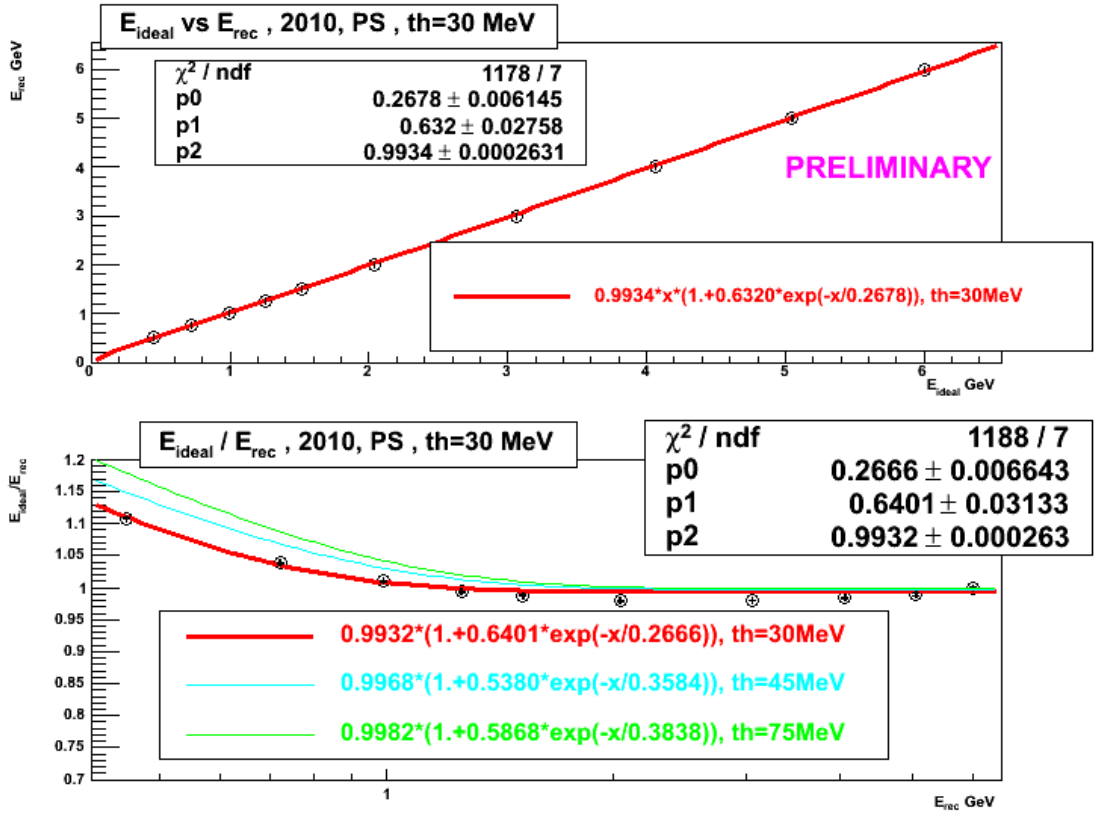
Correction function - "measured" non-linearity function : ration P_{beam}/P_{rec} vs P_{rec},

relative resolution - 100.*(rms of P_{rec})/P_{rec} vs P_{beam}. Below is c-code for all numbers which you need for calculation of resolution and correction function.

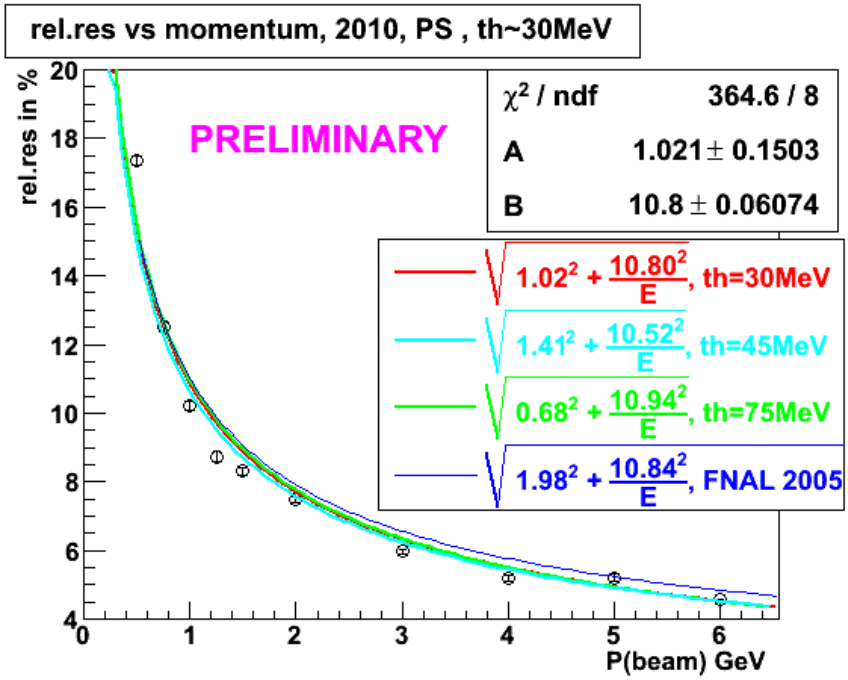
```
// pIdeal - initial beam momenta
// p         - reconstruction value of beam momenta
// ep       - error of p
// res      - rms of p

double  pIdeal[np]=    {   0.5,   0.75,   1.0,  1.25,   1.5,   2.0,   3.0,   4.0,   5.0,    6.0
double   p[np] =       {0.4509,  0.7223, 0.9894, 1.258, 1.518, 2.042, 3.061, 4.064, 5.05, 6.000
double  ep[np] =       {0.0007,  0.001, 0.0012, 0.002, 0.002, 0.002, 0.002, 0.004, 0.01, 0.002}
double   res[np]     = { 17.36,  12.52,  10.21,  8.74, 8.30,  7.48,  5.98,  5.20,  5.20,  4.57}
double  eresStat[np] = {  0.14,   0.15,   0.12,  0.16, 0.10,  0.09,  0.07,  0.09,  0.11,  0.02}
```

- Correction function, threshold is 2 amp unit (~ 30 MeV):



- Resolution function



Cell threshold is *3 adc units (~45 MeV)*

The number of cells per cluster at each momenta.

- PS_th3_NcellsInCluster.root: Not ready yet.!

Correction function - "measured" non-linearity function : ration P_{beam}/P_{rec} vs P_{rec},

```
double  pIdeal[np]=    {   0.5,   0.75,   1.0,  1.25,  1.5,   2.0,   3.0,   4.0,   5.0,   6.0};
double   p[np] =       {0.4315,  0.7015, 0.9677, 1.228, 1.487, 2.007, 3.033, 4.043, 5.041, 6.00
double  ep[np] =       {0.0006,  0.001, 0.0011, 0.002, 0.002, 0.002, 0.002, 0.004, 0.007, 0.002
double   res[np]     = { 17.94,  12.59,   9.95,  8.69, 8.10,  7.49,  5.92,  5.11,  5.07,  4.57}
double  eresStat[np] = {  0.13,   0.14,   0.11,  0.15, 0.10,  0.08,  0.07,  0.08,  0.11,  0.02}
```

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