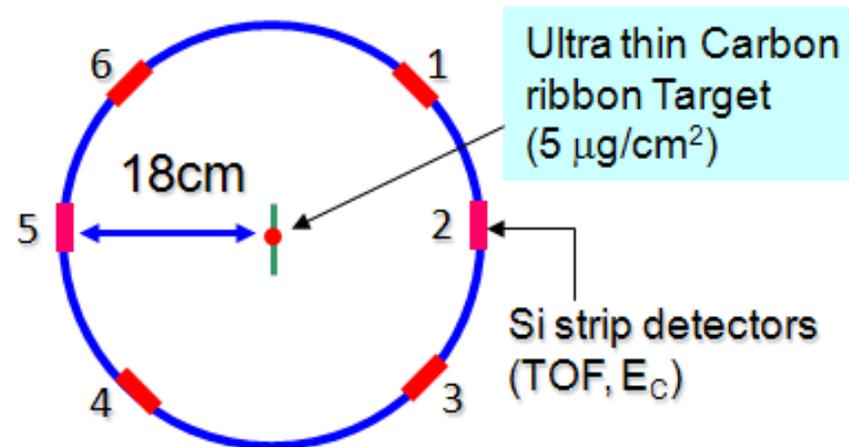


Offline Analysis of p-Carbon Polarimeter Data

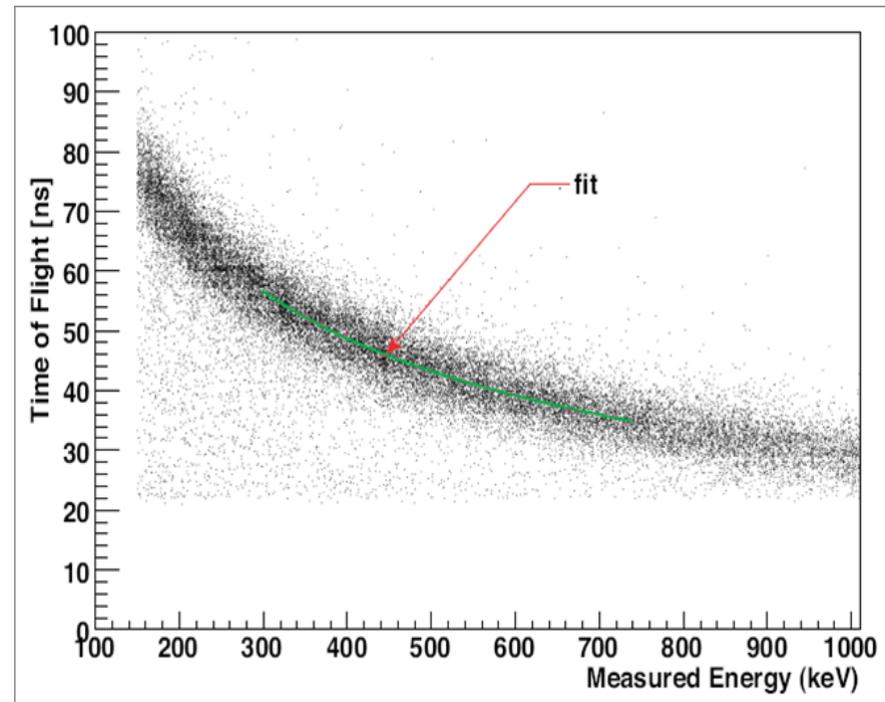
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p-Carbon Polarimeter



- Measures beam polarization for the experiments
 - Also beam polarization profile
- 4 polarimeters: 2 on Yellow and 2 on Blue rings
- 72 channels in 6 groups at $\phi = 0, 180, \pm 45, \pm 135$ degrees
- For each channel we know ADC, TDC, total charge, revolution and bunch numbers (a.k.a. time)

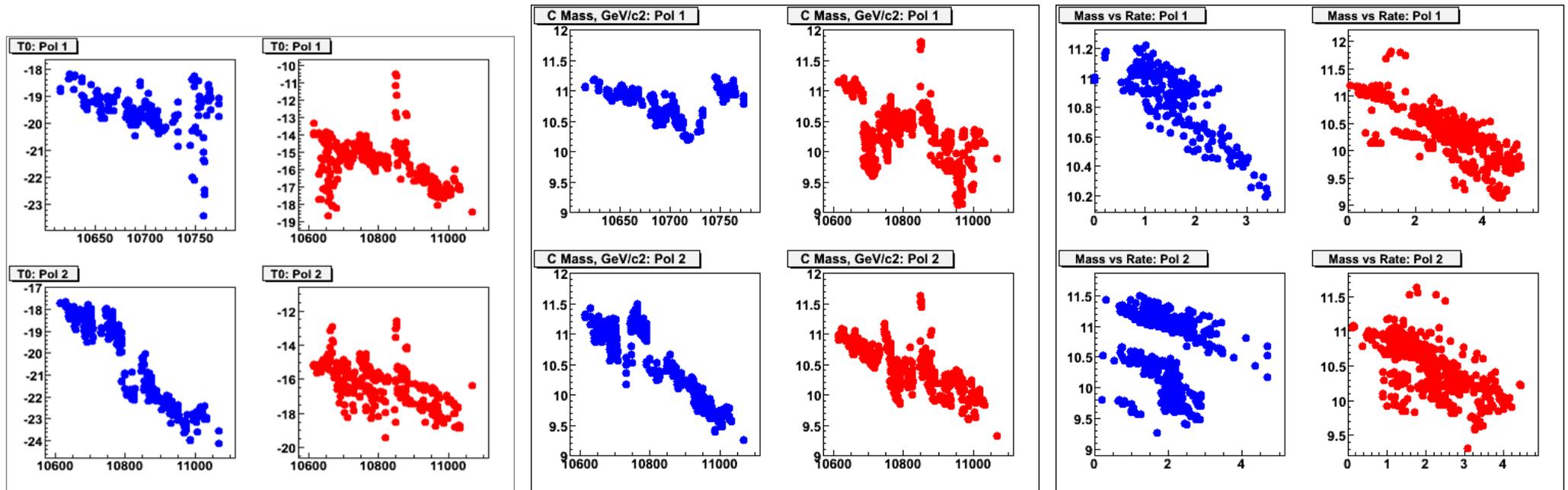


- Fit time vs energy distribution to extract t_0 and $E_{\text{loss}}(x_{\text{DL}})$
- For non-relativistic carbon

$$E_{\text{meas}} + E_{\text{loss}} = \frac{1}{2} \times M_C \times \frac{L^2}{(t_{\text{meas}} + t_0)^2}$$

- M_C and L are constant during the fit

- For extracted E_{loss} and t_0 can invert formula to calculate M_C



- Extracted t_0 and M_C depend on fill number and rate/luminosity

Possible Causes

- Unreliable measurement of energy deposited by carbon
- t_0 drift
- Dead time in electronics, overlap between events
- Background
 - If not polarized should cancel out in calculation of raw asymmetry ϵ
 - Can integral charge help us to identify signal/background events?

- Re-use existing Itaru's and Sasha's frameworks for offline analysis of pC data
 - Most of the functionality is already available in the code
 - Needs to be reorganized to use best of both frameworks (Use SVN)
 - Needs better step-by-step documentation on how to install and run the programs (Wiki)
- Add code implementing some ideas (if practical) for offline analysis
 - Save data in ROOT trees for easier interactive analysis
 - Background estimation?
 - Next slides list a few more ideas

- Do we see a “banana” for alpha particles?
 - Can use the measured alpha’s energy in data to cross check the calibration
 - If pedestal shifts during data taking we can see that with alphas

Ideas for Offline Analysis: Two carbons hit the same strip ^{7 of 10}

- Do we expect to see a second “banana” with twice deposited energy?
 - What is the expected number of scattered carbons within the detector acceptance?
 - If we see the second “banana” the information can be used to check/improve energy calibration

Ideas for Offline Analysis: Two carbons hit different strips ^{8 of 10}

- Two carbons detected by separate silicon strips in the same beam revolution and bunch can provide a cross check for the T0 and E measurements
 - The difference in ToF for same energy carbons should be zero within the measurement uncertainty
 - Can be used to monitor channel by channel stability at different rates

- To check the rate problems we can consider only “isolated” events at high rates
 - “Isolated” events would have a single hit in the polarimeter. The hit can be possibly isolated in time as well
 - If enough such events found the beam polarization can be measured regardless of rate
 - Can help with “event overlap” and dead time
 - Might be biased by selection of specific bunches

Other

- Share /home directory on bluepc, yellowpc and pc2pc
 - Export /home from bluepc
 - Any objections?
- The ITD has setup a wiki web site for the group
 - <https://wiki.bnl.gov/rhicspin>
 - Much easier to use and keep up-to-date than static pages