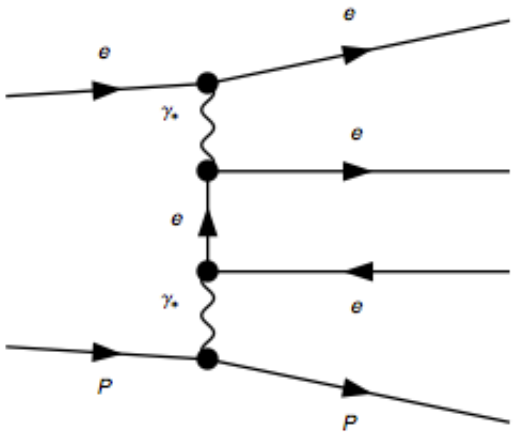
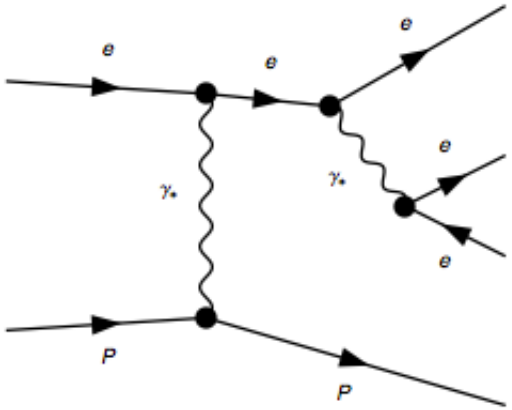
Using the CLAS12 Analysis Framework to Analyze CLAS6 Data

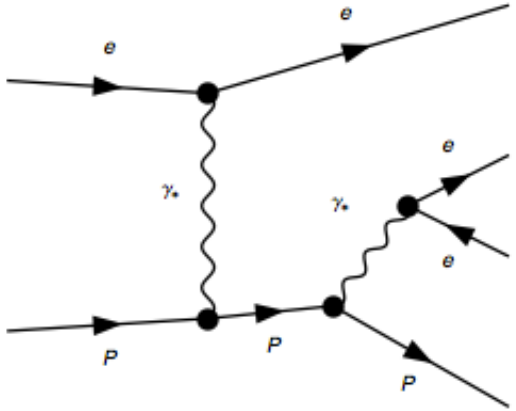
Timothy B. Hayward

DPWG Meeting, June 15

Looking for lepton-trident events ($e^- + p \rightarrow e^{-\prime} + e^- + e^+ + p'$).







Why Trident Spin Asymmetries

- Double spin asymmetries are known in terms of the form factors for the elastic scattering region.

- As CLAS moves to 12 GeV, there is concern about rates of elastic scattering events.

Goals

- Be the first to use CLAS12 software to analyze CLAS6 data. (A learning process!)
- Use CLAS12 software to develop kinematic fitter based on previously developed cuts to pick out trident events from eg1-dvcs data.
- Write a Java class responsible for the analysis routine.

```
public static void main(String[] args) {

    HipoDataSource reader = new HipoDataSource();
    reader.open("/volatile/clas12/thayward/eg1dvcs_data/temp/hipo/run_58799_pass1.a00");
    GenericKinematicFitter fitter = new fitter_A(5.887);
    EventFilter filter = new EventFilter("11:2212");

    while(reader.hasEvent()==true){
        HipoDataEvent event = reader.getNextEvent();
        PhysicsEvent  recEvent  = fitter.getPhysicsEvent(event);

        if(filter.isValid(recEvent)==true){
            Particle mx = recEvent.getParticle("[b]+[t]-[11]-[2212]");
            System.out.println(mx.e());
        }
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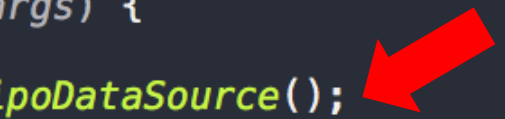
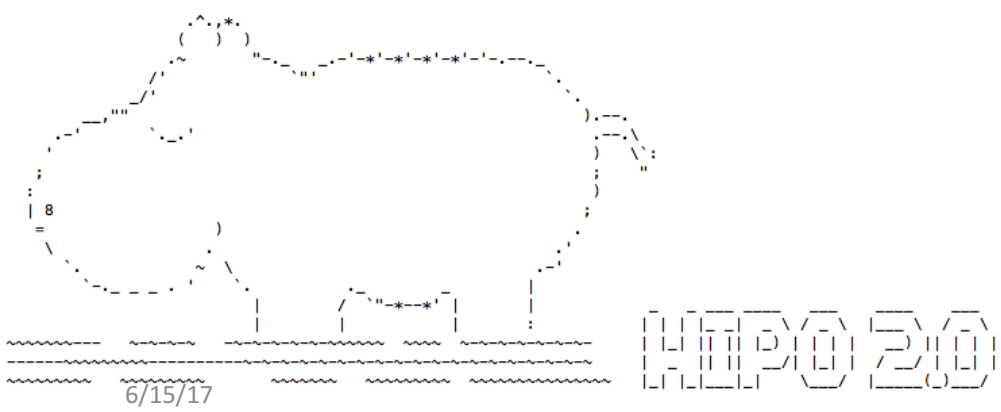


- CLAS12 software uses new data compression .hipo files.

- Old CLAS6 .bos files are stored on tape and must be converted.



```
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/mss/clas/eg1dvcs/production/pass1/v3/data/main/run_58799_pass1.a02
/mss/clas/eg1dvcs/production/pass1/v3/data/main/run_58799_pass1.a03
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/mss/clas/eg1dvcs/production/pass1/v3/data/main/run_58799_pass1.a26
/mss/clas/eg1dvcs/production/pass1/v3/data/main/run_58799_pass1.a27
```

```
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    while(reader.hasEvent()==true){
        HipoDataEvent event = reader.getNextEvent();
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            Particle mx = recEvent.getParticle("[b]+[t]-[11]-[2212]");
            System.out.println(mx.e());
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```

Where the work gets done!

- With the latest build, all relevant CLAS6 detector information is available for perusal with the CLAS12 software.

- Each analysis group can develop their own Kinematic Fitter.

```
<bank name="DETECTOR" tag="23000" info="detector banks">
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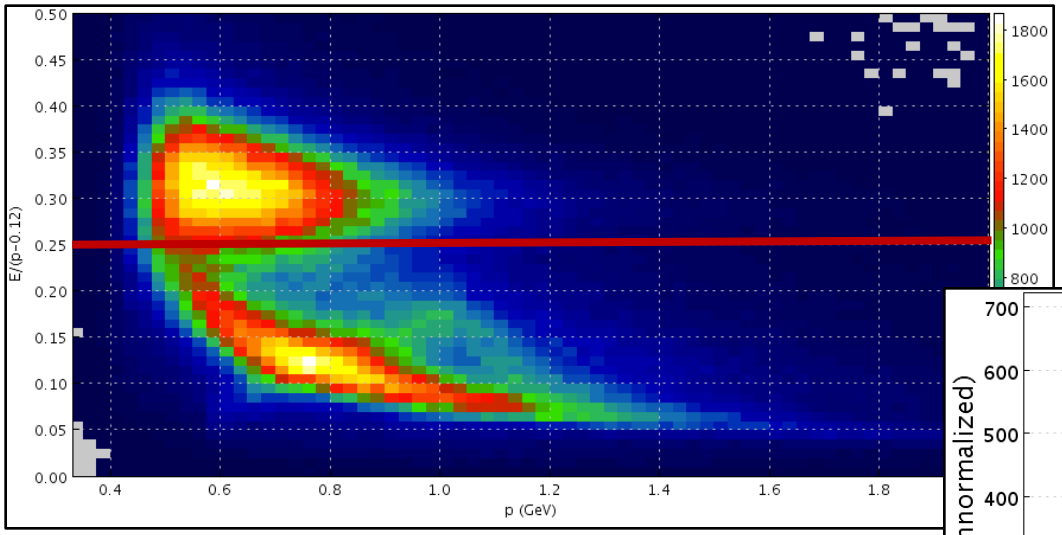
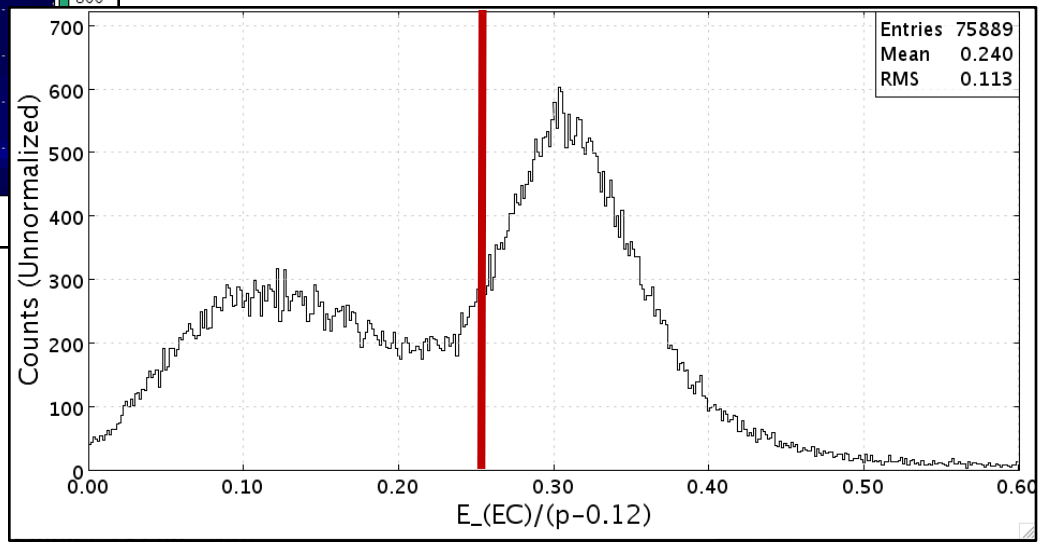
    <column name="ein"      type="float32"  num="3"   info="inner  energy of the hit"/>
    <column name="eout"     type="float32"  num="4"   info="outter energy of the hit"/>
    <column name="time"     type="float32"  num="5"   info="time of the hit"/>
    <column name="path"     type="float32"  num="6"   info="path of the hit"/>
    <column name="x"        type="float32"  num="7"   info="x coordinate of the hit"/>
    <column name="y"        type="float32"  num="8"   info="y coordinate of the hit"/>
    <column name="z"        type="float32"  num="9"   info="z coordinate of the hit"/>
  </section>
```

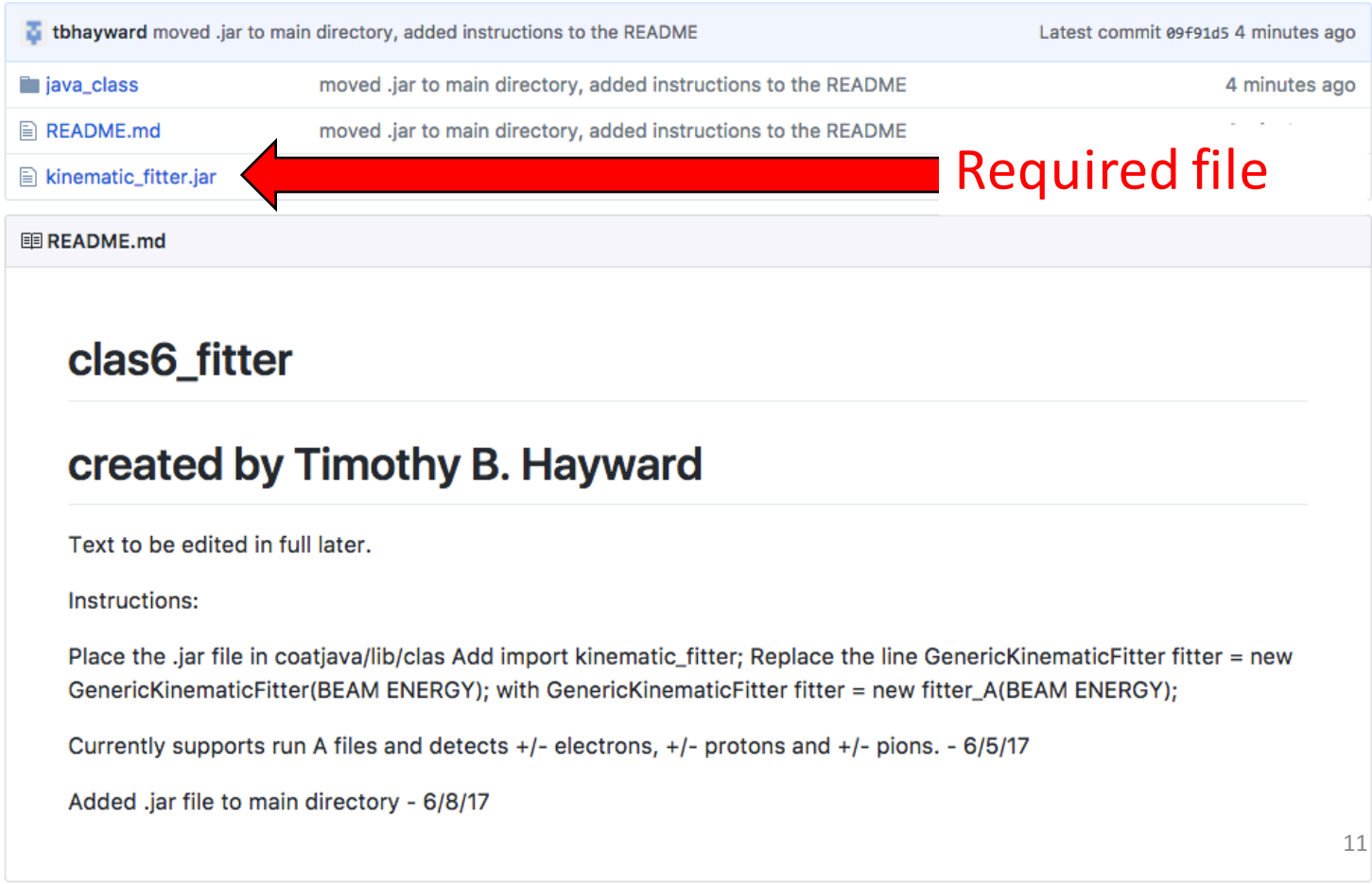
Positron Cuts – EC Energy





Energy deposited in EC divided by momentum with 0.12 GeV offset to account for energy loss by positron throughout detectors. Good positrons required to have E_(EC)/(p-0.12) > 0.25.

- Compiled fitter jar file available at github.com/tbhayward/clas6_fitter



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            System.out.println(mx.e());
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    }


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```

Filter by event type.

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}
```

Create missing mass.

Summary

- All relevant CLAS6 banks and event information included in the bos2hipo converter.
- Now possible to analyze CLAS6 data using the new CLAS12 Java framework.
- Contact: tbhayward@email.wm.edu