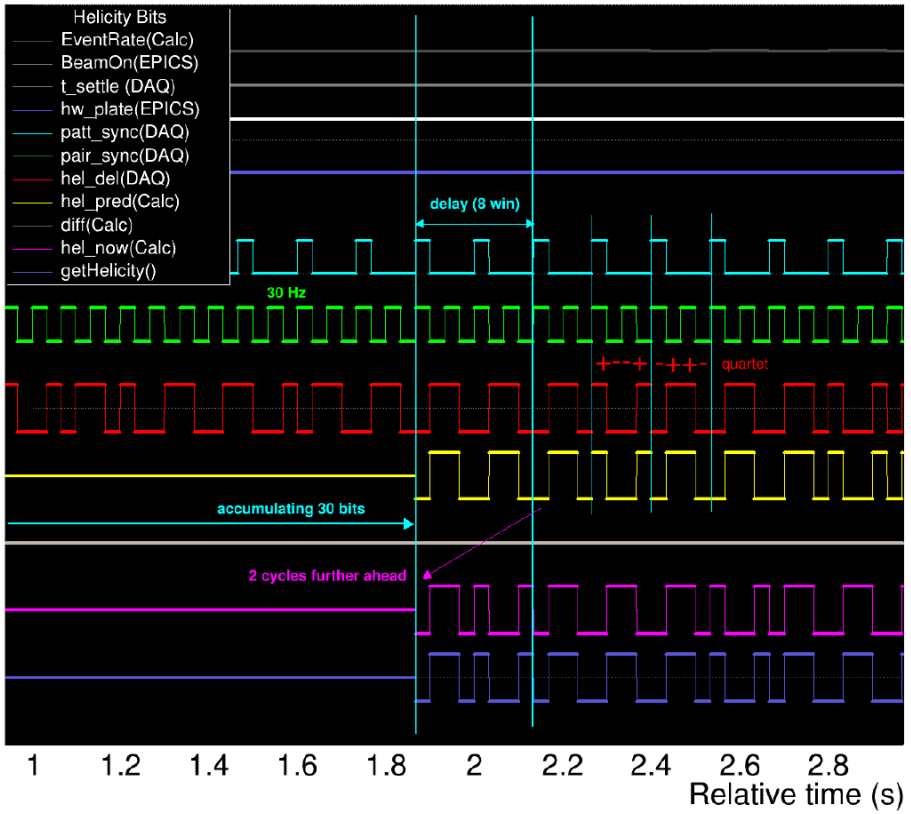
Tracking Helicity in Hall D, Ken Livingston, Feb 2024

```
>echo $seed | awk '{s=$1;b7=and(s,0x00000040)!=0;b28=and(s,0x08000000)!=0;b29=and(s,0x10000000)!=0;b30=and(s,0x20000000)
=0;res=xor(b7,b28);res=xor(res,b29);res=and(xor(res,b30),0x1);s=and(or(lshift(s,1),res),0x3FFFFFFF);printf"bit %d seed
%d\n",res, s}'
```

Helicity Information (sign, not magnitude) is in the GlueX data since early 2023 (M. Dalton).

Sign (+/-) set by pseudo random generator (30 bit linear feedback shift register). Here is it in an awk one-liner.

Delayed helicity reporting:
work out the bit pattern; confirm the past; predict the present
complicated due to multi-threaded analysis, multiple output files



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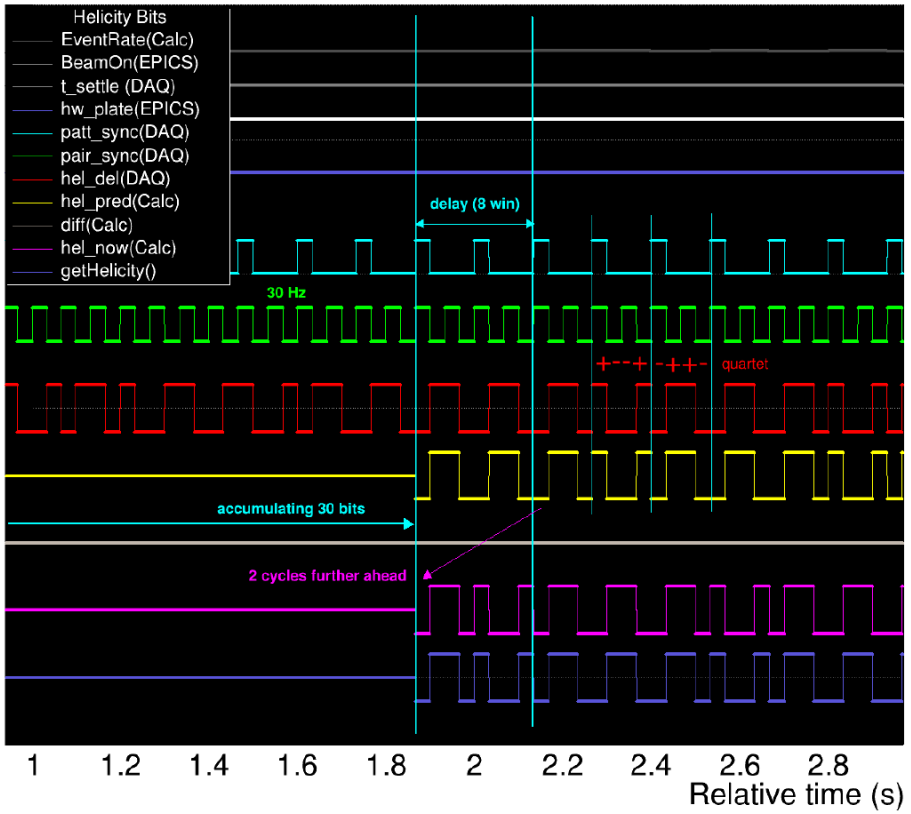
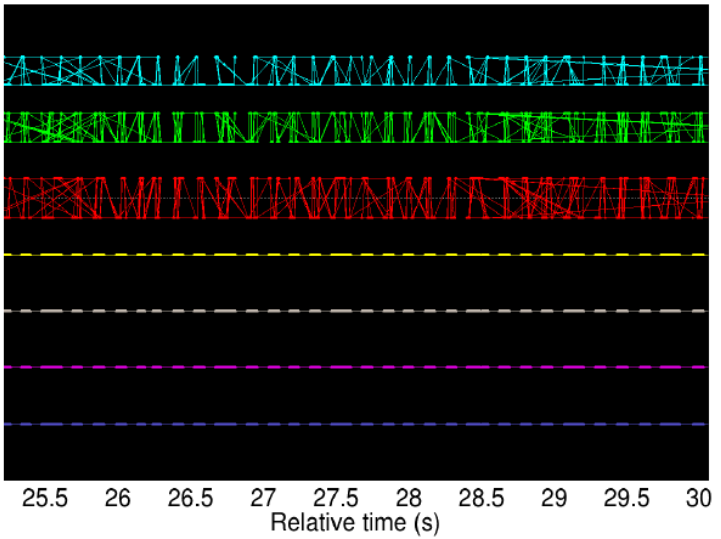


Easy to lose track over beam trips or low rates



Good news
A decoder module is on the way … maybe.

For now
Helicity lookup tables available for some 2023 data.

Runs 120395 – 120438
More available on demand.

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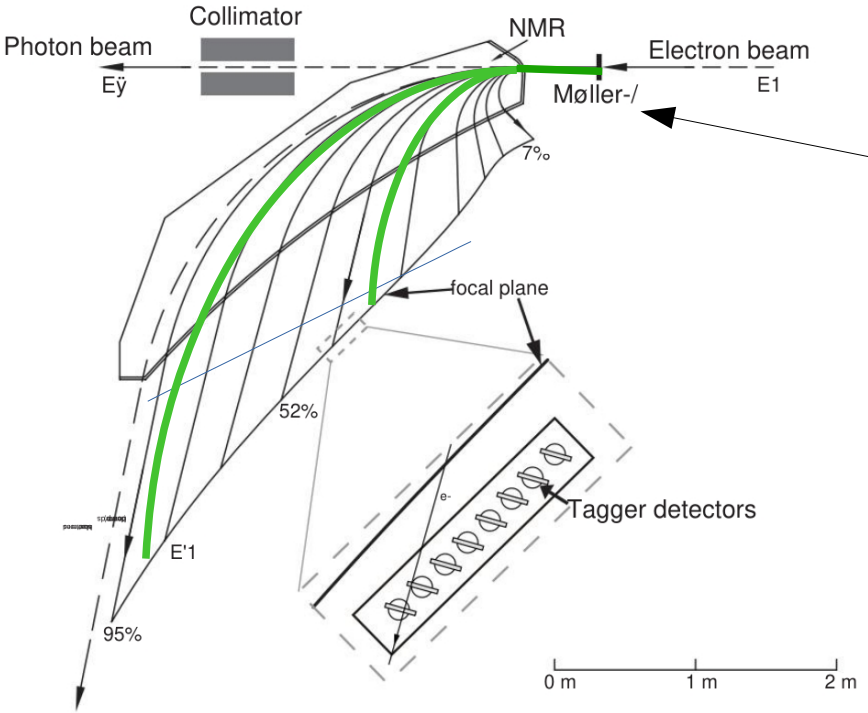
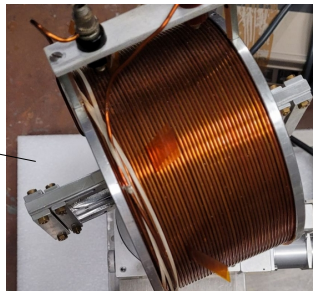
Moeller polarimetry using the Tagger Focal Plane (Example from A2, MAMI, Mainz – Peter Otte's Diplom Thesis)



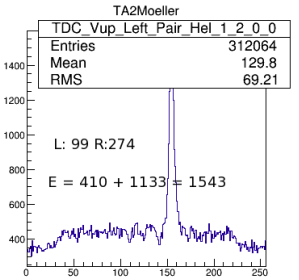


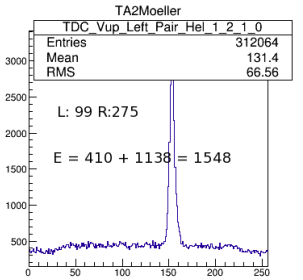
Moeller foil + solenoid

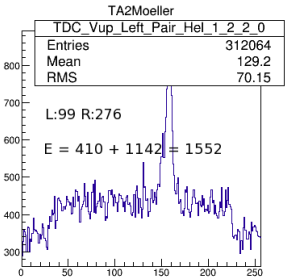
In GONI Chamber

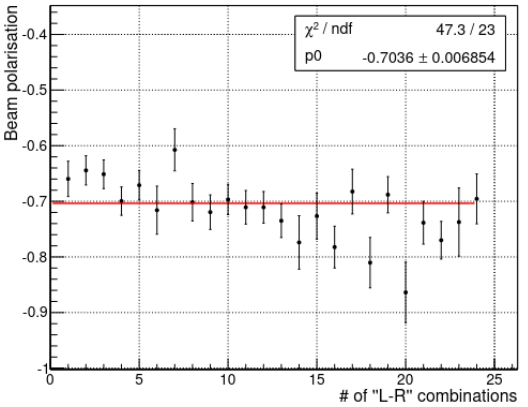
P_t = 0.08 (Main sys. error)

Angle = 25 deg









3% systematic error.
(From foil polarization).

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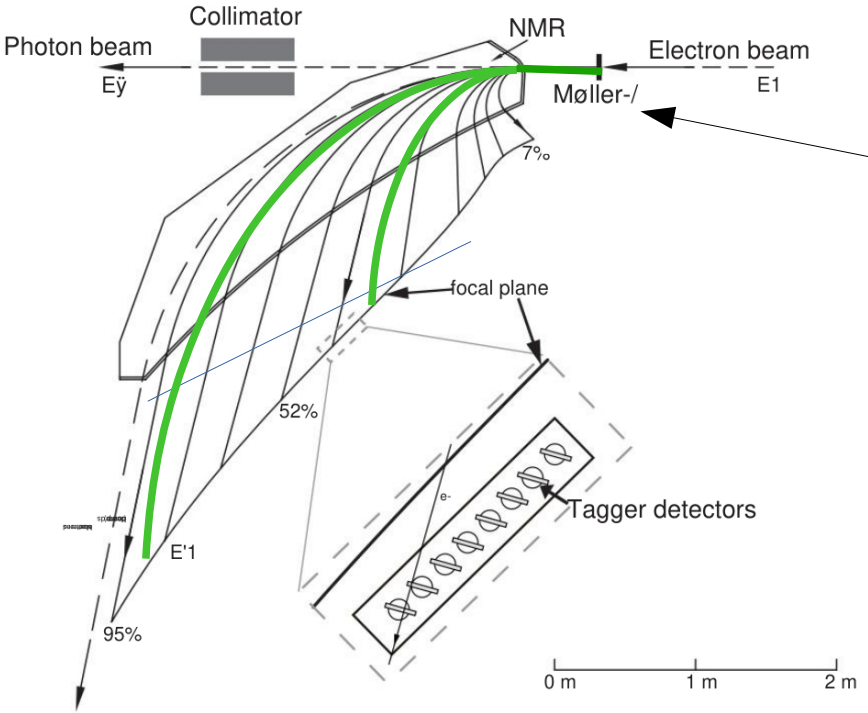

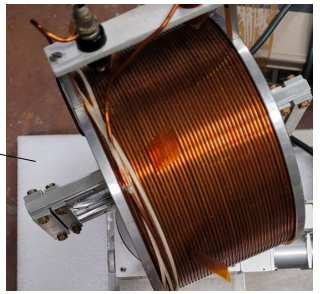

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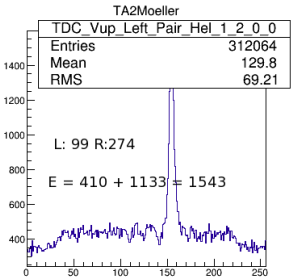

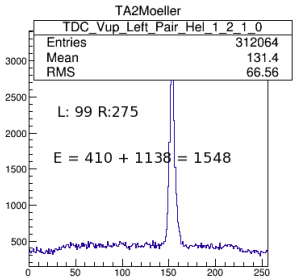

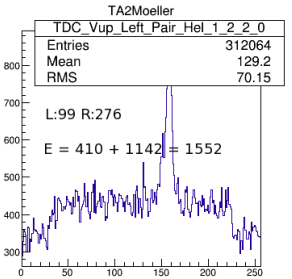

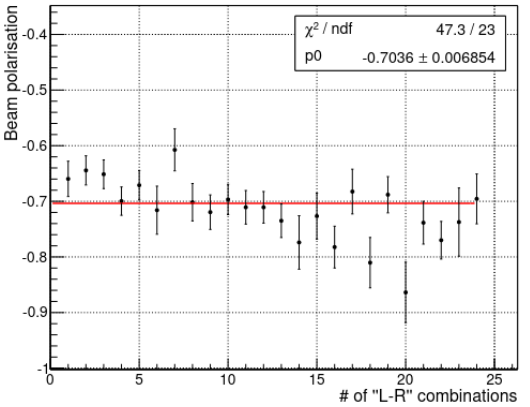

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(From foil polarization).

Would it work in GlueX ?

Not with foil in Goni chamber!
electron angles too big (R. Jones)

But potentially with a foil closer to the tagger.