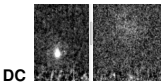
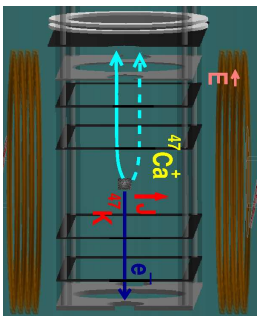
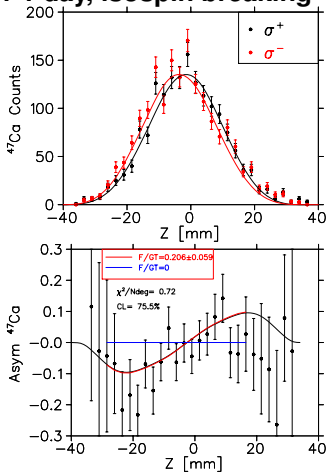
1000 atoms trapped for 1 day, isospin breaking ^{47}K Preliminary without weak mag



DC MOT then OP





- Nonzero ^{47}Ca asymmetry wrt spin $\Rightarrow$ a nonzero M_{Fermi}

M_F/M_{GT} =

0.21 $\pm$ 0.06 stat $\pm$? syst $\Rightarrow$

$\langle \bar{A}|V_{\text{Coulomb}}|A\rangle$ =

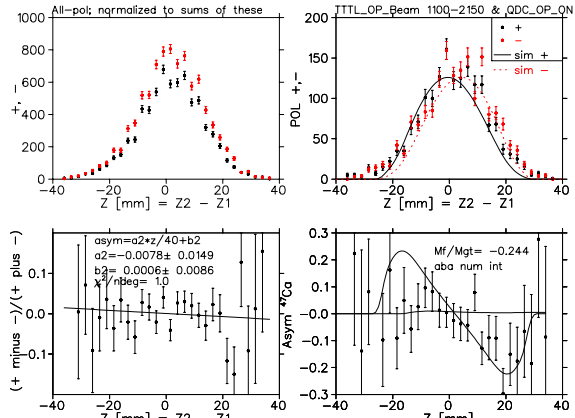
160 $\pm$ 50 stat $\pm$? syst keV

- A_{recoil} is damped at extreme Z by a $\sim$6% bkg from untrapped ^{47}K, measured by dedicated 'poof' tests
- Apparatus is symmetric: X projection flat at 1σ to 0.05; Unpolarized data has X, Z projections flat $\sim$ 0.01
- $\beta's$ fire the eMCP with $\sim$ 20% quantum efficiency– these we measure to be $\sim$ 0.002 correction

Z is wrong here. Z= Z2-Z1. This shifts the cloud Z from -2 to +2 mm.
That will make Mf $<$ 0.

Simulation of recoil asymmetry by numerical integration of all β's and ν's (just need to take dot product of their unit vectors to get $\cos\theta_{\beta\nu}$)
Checks recoil singles expressions ok, particularly the sign. We can also include a Fermi function.
A correction for the 20% non-mixed decay branch is fixed.

To do: γ needs to be put back in.
Trivial error computing A_β, B_ν
This will apparently lead to a similar answer, with reversed sign.



β-recoil

Fit to similar numerical integration, including pointlike β detector and a 2 MeV photon. Scaling with number of +,-; DSSSD XY strips; solid angle from Z shift of trap; 0.99 for $\langle \cos\theta_\beta \rangle$, all put into calculation, not data

There is an apparent change in the β decay asymmetry with radius, some combination of the acceptance in the other dimension and the γ-ray momentum forces some Ca^{+1} to miss.

Mf/Mgt = -0.082+-0.078
Uncertainties: polarization 0.96+-0.04 $\rightarrow$ uncertainty 0.022
If I arbitrarily scale Z by 0.9 to make the distribution fit better by eye, uncertainty $\rightarrow$ 0.027
Added in quadrature, answer is Mf/Mgt= -0.08 +-0.09

To do: Rerun code with A,B evaluation bug fixed, smaller Mf