some properties of the MLL Q3D spectrograph

solid angle: ≈ 14 msr
Δx: ± 60 mrad
Δy: ± 70 mrad

mean bending radius 1.00 m

average dispersion along focal plane: $\Delta x / (\Delta E/E) \approx 10$ cm / %

ion optical energy resolution: $\Delta E/E \approx 2 \times 10^{-4}$

horizontal magnification: x 2 => 1mm target spot adds 2×10^{-4} to resolution

maximum field: 1.5 T

maximum mean rigidity: $B\rho = p/q < 1.50$ Tm = 450 MeV/c or $A\ E/q^2 < 108$ MeV

kinematic correction: up to 3rd order

focal plane detectors: (for heavy ions)
a) Ionization chamber + 2 position wires
length: 1.10 m => $\Delta E/E = 11\%$
b) 128 PIN diodes + 1 position wire
length: 1.30 m => $\Delta E/E = 13\%$

focal plane detectors: (for light ions)
c) scintillator + prop. counter with cathode strips
length: 0.9 m => $\Delta E/E = 9\%$