EXL

Feasibility studies of the EXL setup for FAIR using the GSI storage ring (ESR)

FAIR

F. Aksouh, K. Beckert, P. Beller, K. Boretzky, A. Chatillon, P. Egelhof, H. Emling, G. Ickert, S. Ilieva, J. Jourdan, O. Kiselev, C. Kozhuharov, T. Le Bleis, C. Le Xuan, Y. Litvinov, K. Mahata, J. P. Meier, H. Moeni, F. Nolden, S. Pascalis, U. Popp, D. Rohe, H. Simon, M. Steck, T. Stöhlker, H. Weick, D. Werthmüller, A. Zalite and the EXL-collaboration*

First Feasibility Demonstration at the Present ESR Facility

experimental conditions:

- ^{136}Xe beam, E = 350 MeV/u
- 10^9 circulating ions in ring $\Rightarrow$ L $\approx 6 \bullet 10^{27}$ cm^{-2} sec^{-1}

experimental setup:

H_2 gas jet target: 6 x 10^{12} cm^{-2}

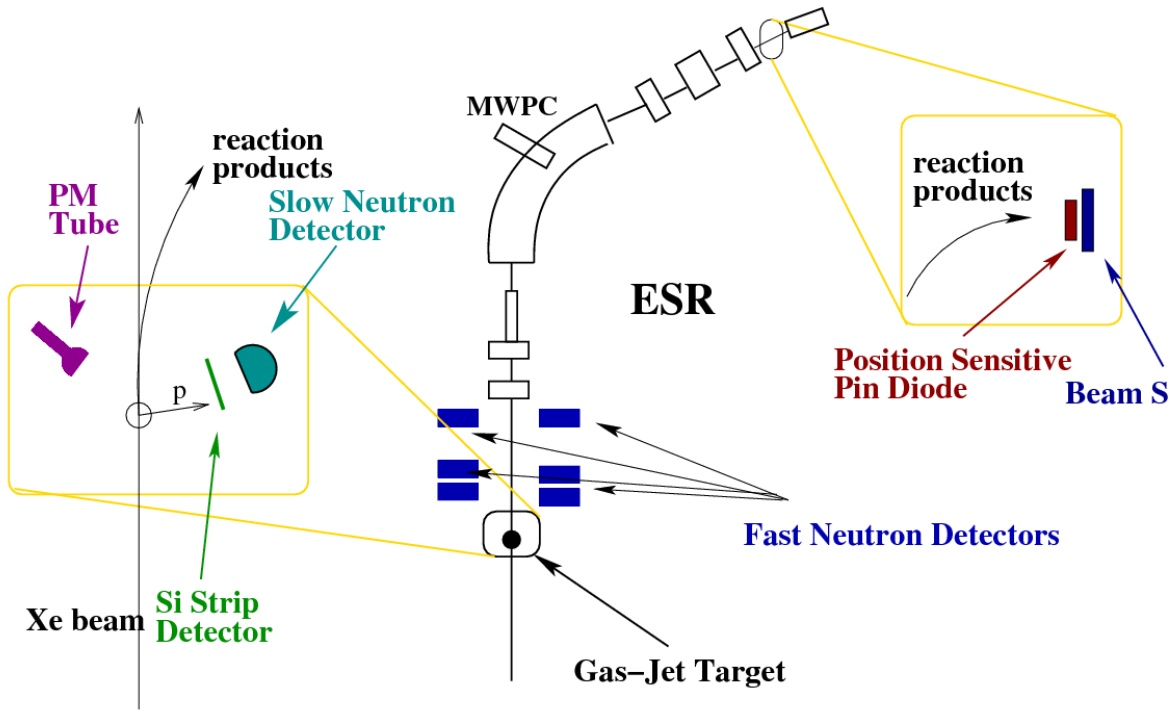
Si strip recoil detector in UHV

detector for slow neutrons

detectors for fast neutrons and protons

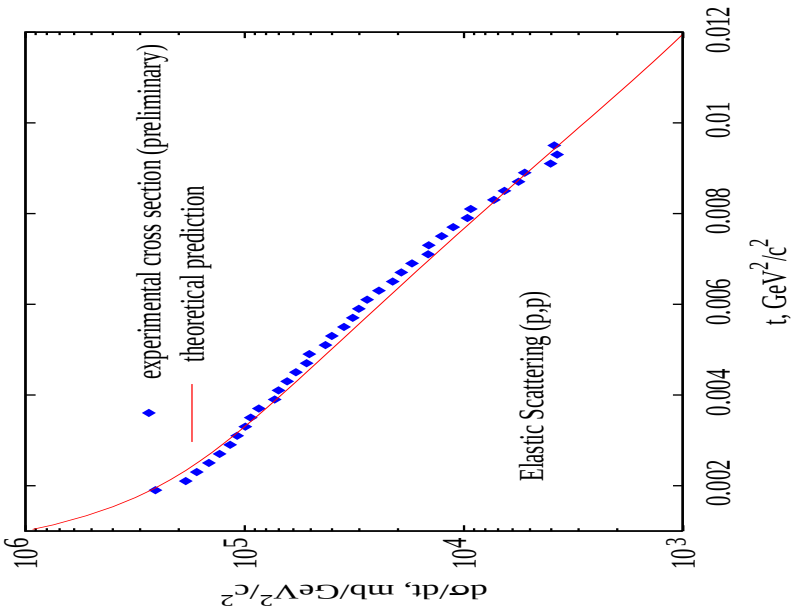
forward heavy-ion detector

3 different luminosity monitors

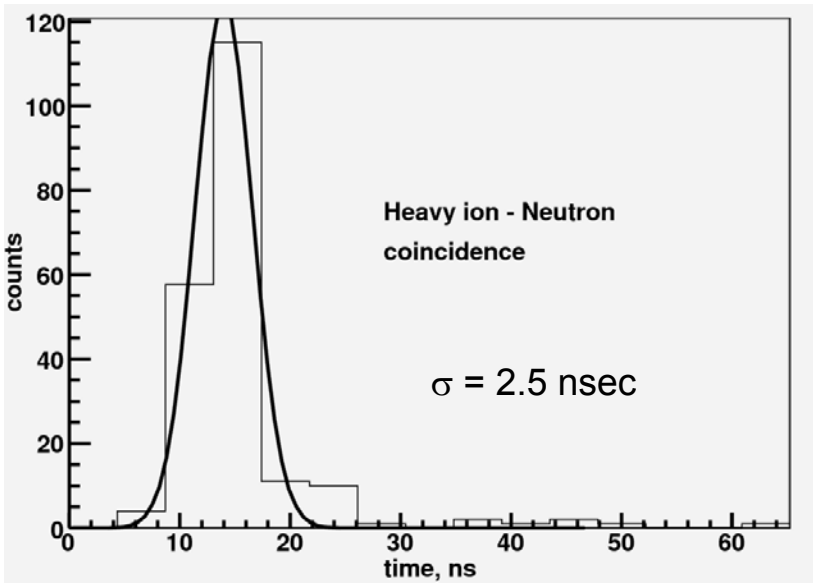


Selected Results

absolute differential ^{136}Xe(p,p) cross section,
energy threshold ≈ 500 keV ⇒ $\Theta_{cm} \approx 0.2°$



time correlation between neutrons and heavy ions
(reaction channel: one-neutron removal from ^{136}Xe)



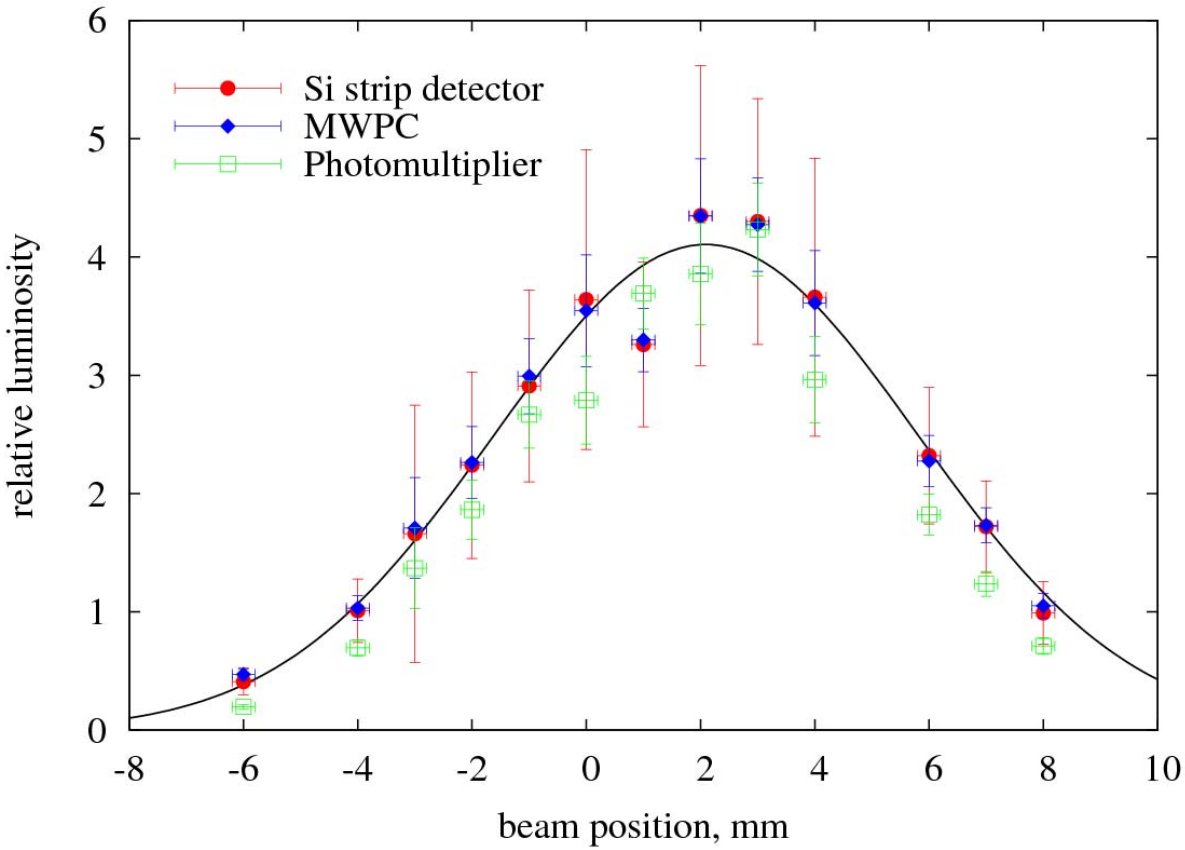
deduced nuclear matter radius: R_m=5.79(15) fm

(expected value: R_m=5.75 fm)

Selected Results

absolute luminosity measured with Si Strip Recoil Detector

deduced luminosity $\Rightarrow L = (6 \pm 2) \bullet 10^{27}\ cm^{-2}\ sec^{-1}$

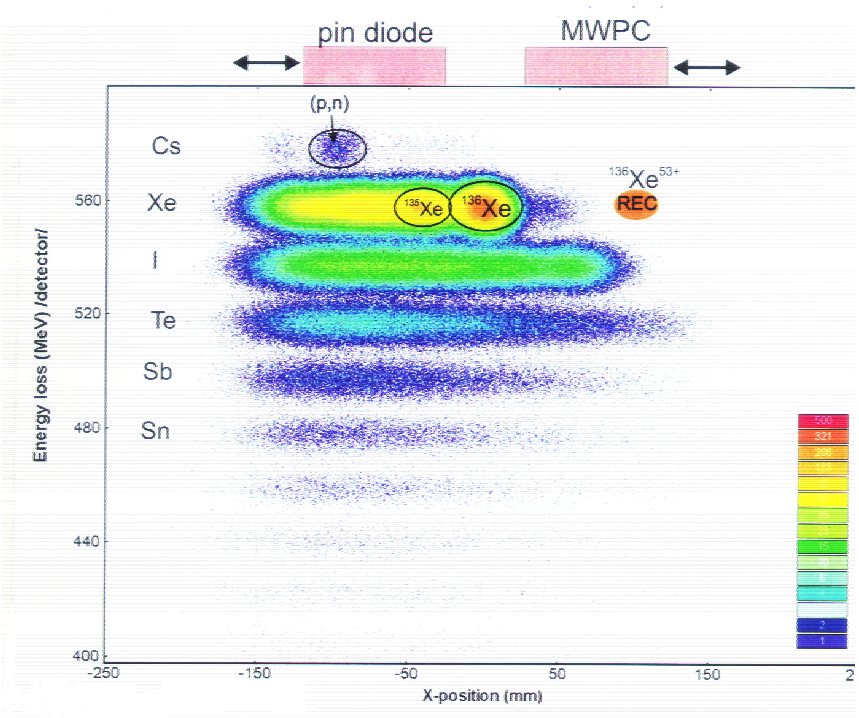


size of gas jet:

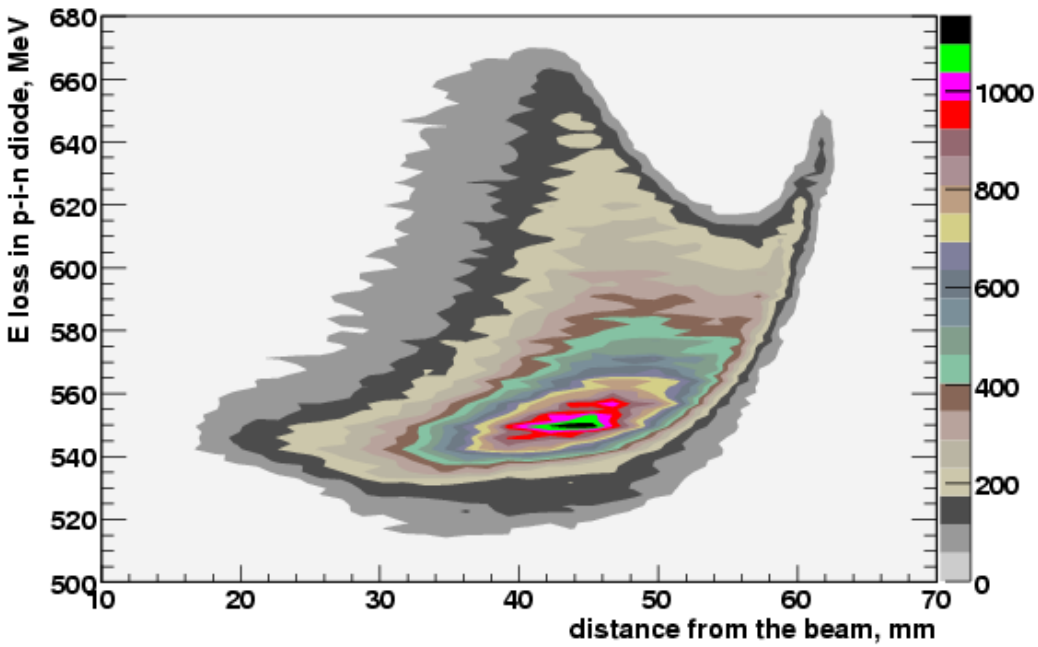
7.0 (2) mm

Energy Loss versus Position in PIN-Diode

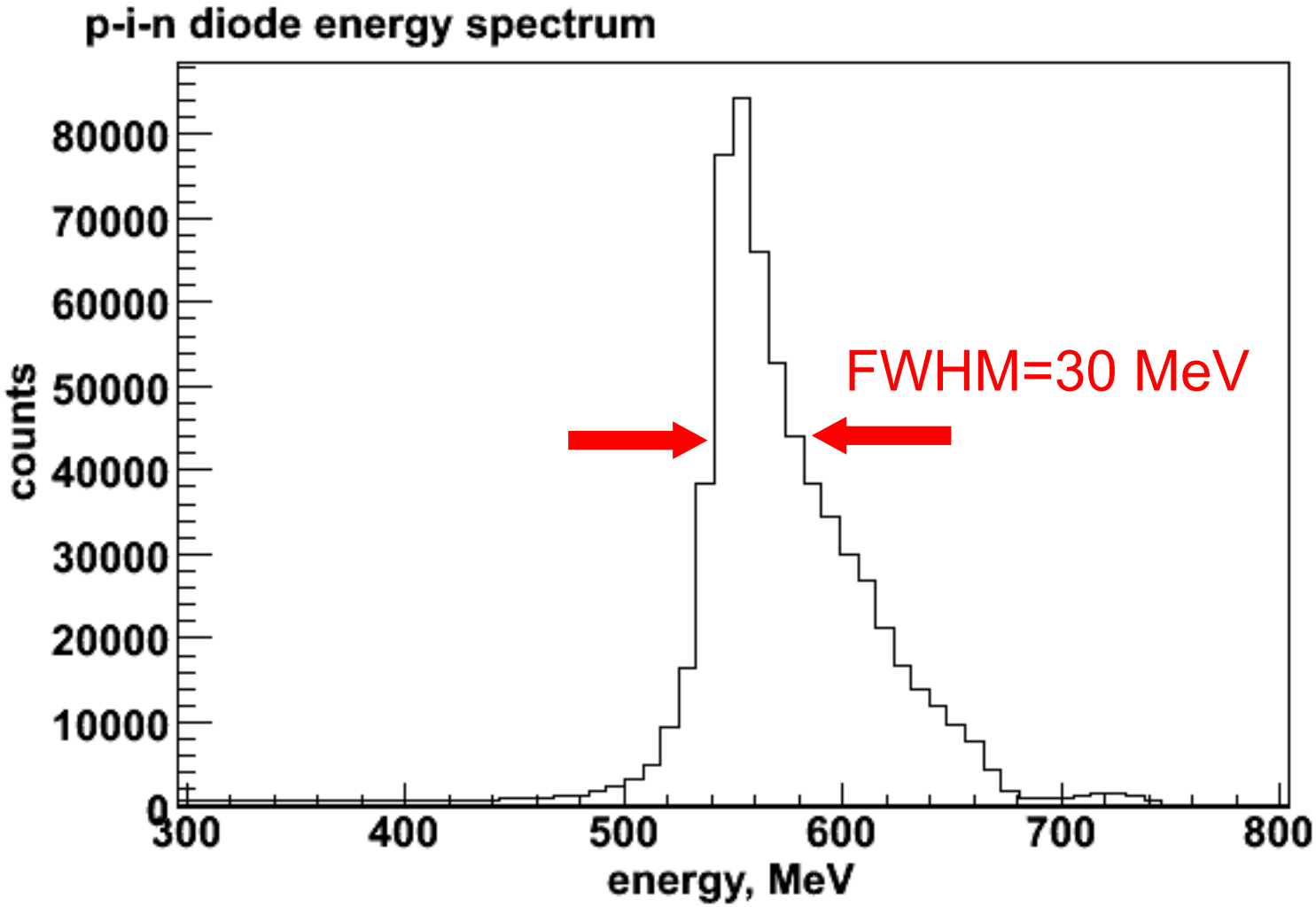
Simulation



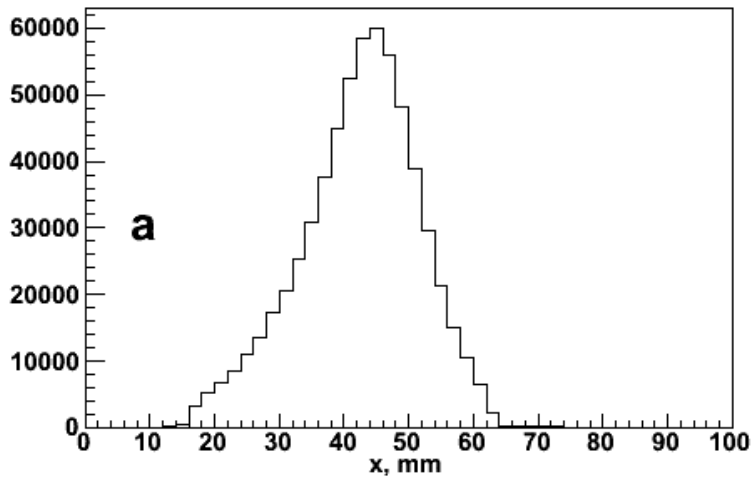
Experimental results

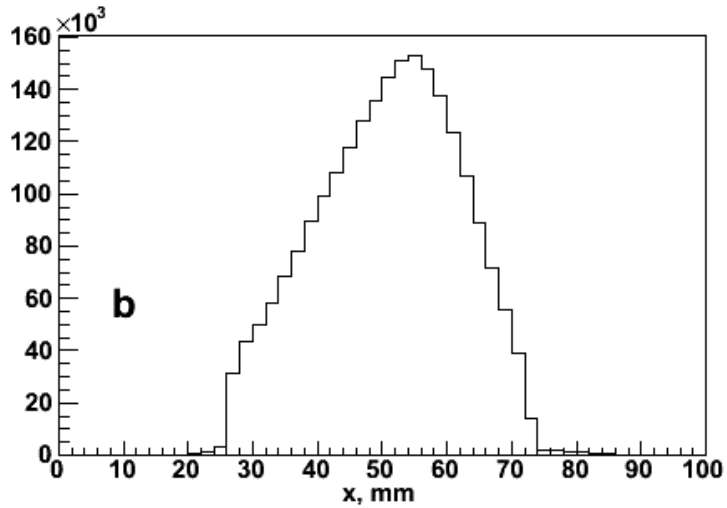


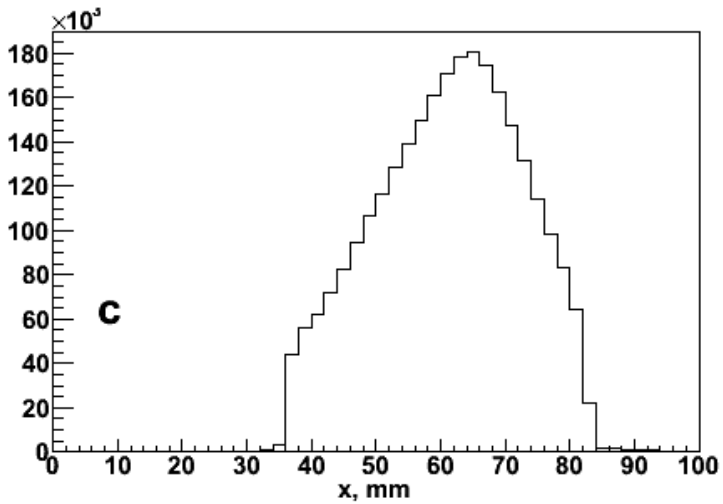
Energy Loss in PIN-Diode

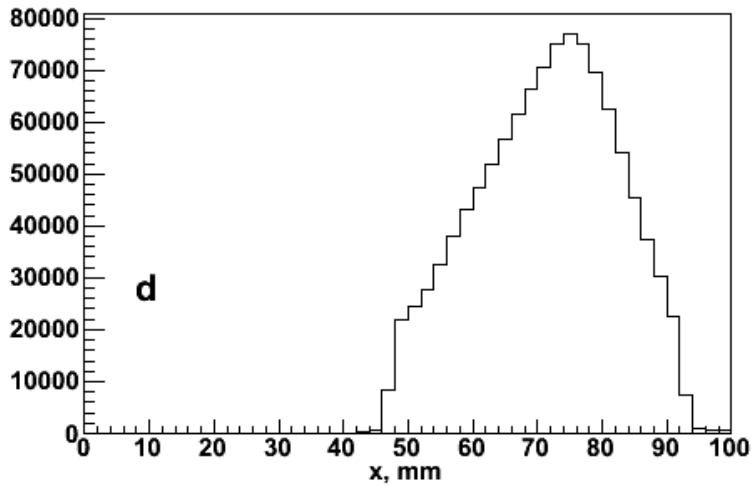


Position Spectra in PIN-Diode

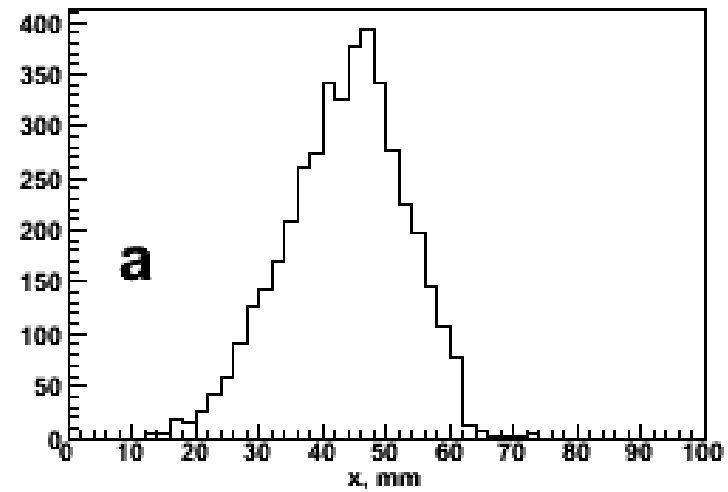


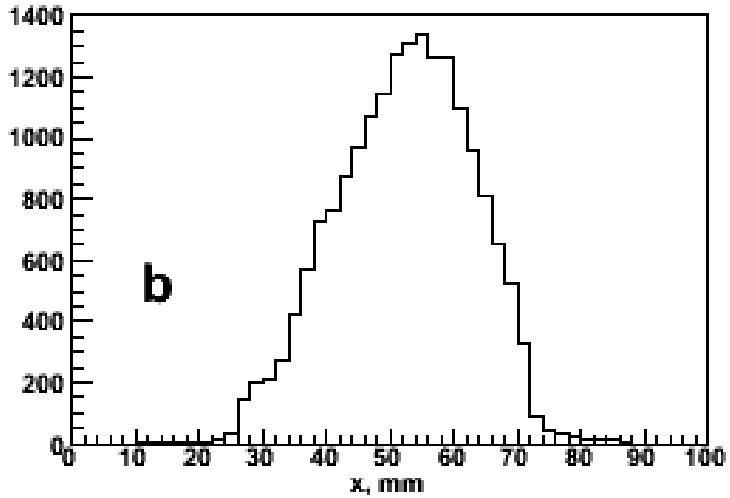


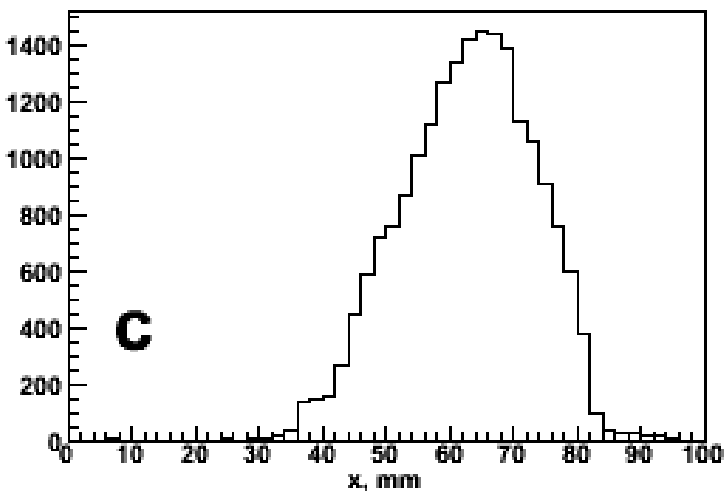


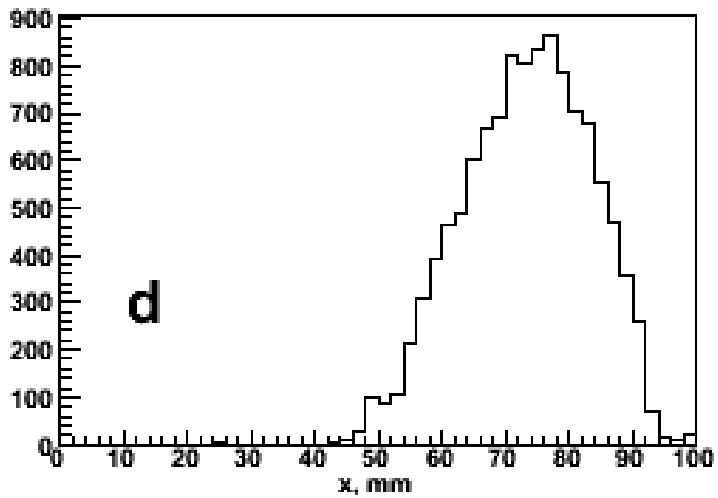


Position Spectra in PIN-Diode with Coincident Fast Ejectile









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