

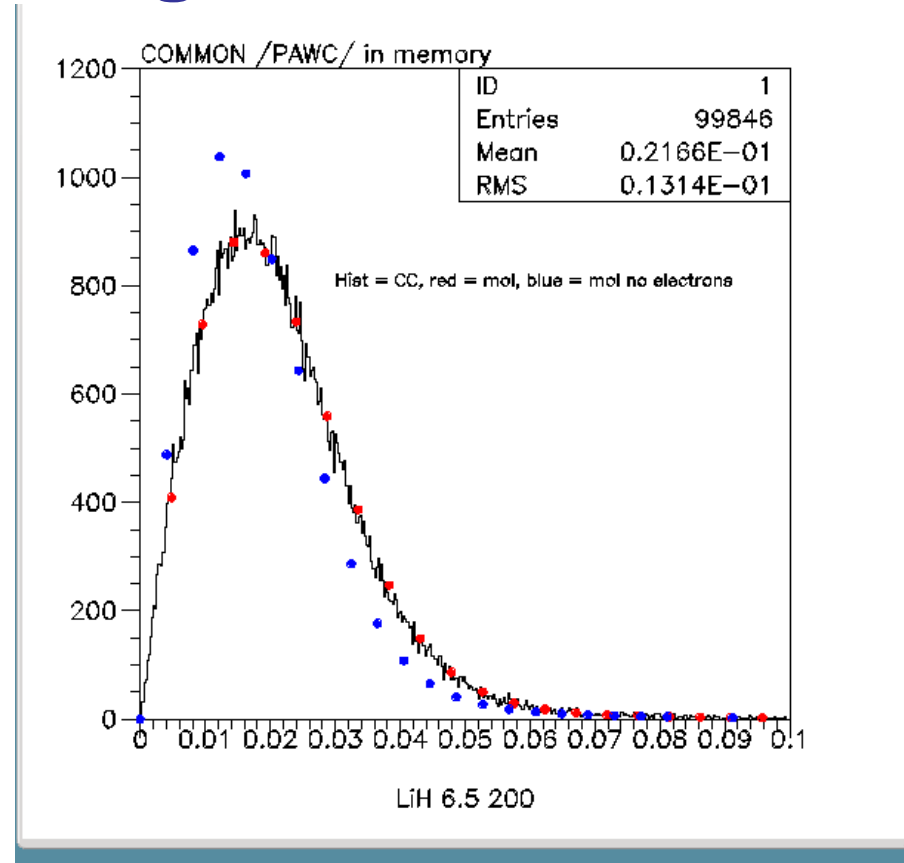
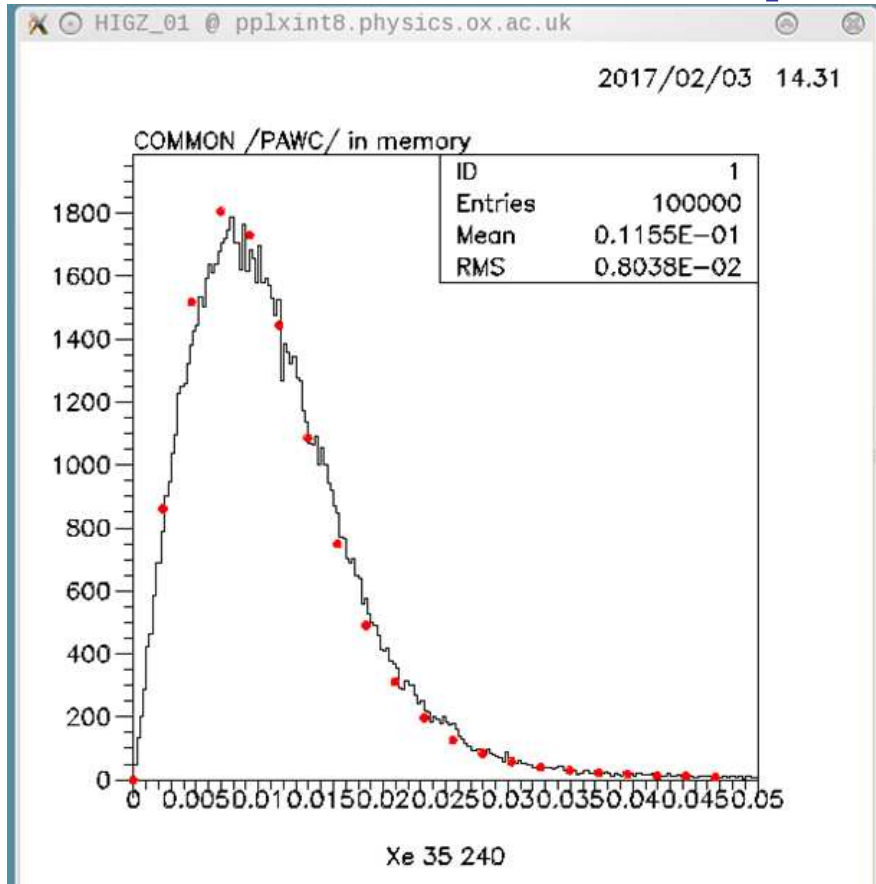
- **MICE is measuring Multiple Scattering**
 - Xe, LiH, LH2
 - and Neon?
 - If LH2 absorber tested with Ne in the Hall, perhaps ??
 - would be another point on a curve
- **Should compare measurements with theory or calculations**
 - All theories fundamentally the same
- **Elements are:**
 - **Single scattering cross-section from**
 - **Screened nucleus (+ atomic electrons)**
 - Using Thomas – Fermi model of atom
 - **Multiple 2D convolution of single scatters**

MOLIÈRE DISTRIBUTION

- Has nothing to do with original PDG expression!
- Circa 1947 / 1948
- Convolution done semi-analytically + numerical integration
- Universal distribution
 - in terms of ~ “scaled” angle and ‘B’
 - Depending on material & thickness
 - Sum of 3 functions of angle
 - First term is Gaussian
- Electrons ignored
- Conveniently tabulated in English (!!) by Bethe
 - Suggests $Z^{*2} \rightarrow Z(Z+1)$ for electrons
- Fano gives better correction to Moliere for electrons
- Digestible recipe / description by Gottschalk
- Implemented and compared with CC ‘bottom up’ MC

- **CC model uses same cross-section as Moliere for nucleus**
 - **Similar cross-section for electrons but hard cut-off at maximum scattering angle (~5 mr for 200 MeV/c muons)**
 - **Rather brutal approximation**
- **Fano's correction to Moliere's method seems to include kinematic limit correctly but is otherwise somewhat mysterious**
- **Have used Bethe's tables → discrete set of points**
- **Compare LiH and Xe**

Comparison CC / Moliere 3D space angles



Looks good for LiH, not quite so good for Xe
Need to check – all very recent