PIXE and Deexcitation in Geant4

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G4 CWS 2012 – Chartres

PIXE in Geant4

Shells Cross Sections !

- 3 models – 6 implementations
  - ECPSSR – K, L_i, M_i (61<Z<92) shells
    - In-house analytical implementation
    - ECPSSR from Form Factors 0.1-100 MeV
  - Paul model - K shell
  - Orlic model - L_i shell
  - Universal function K, L_i, M_i shells 0.1-10 MeV

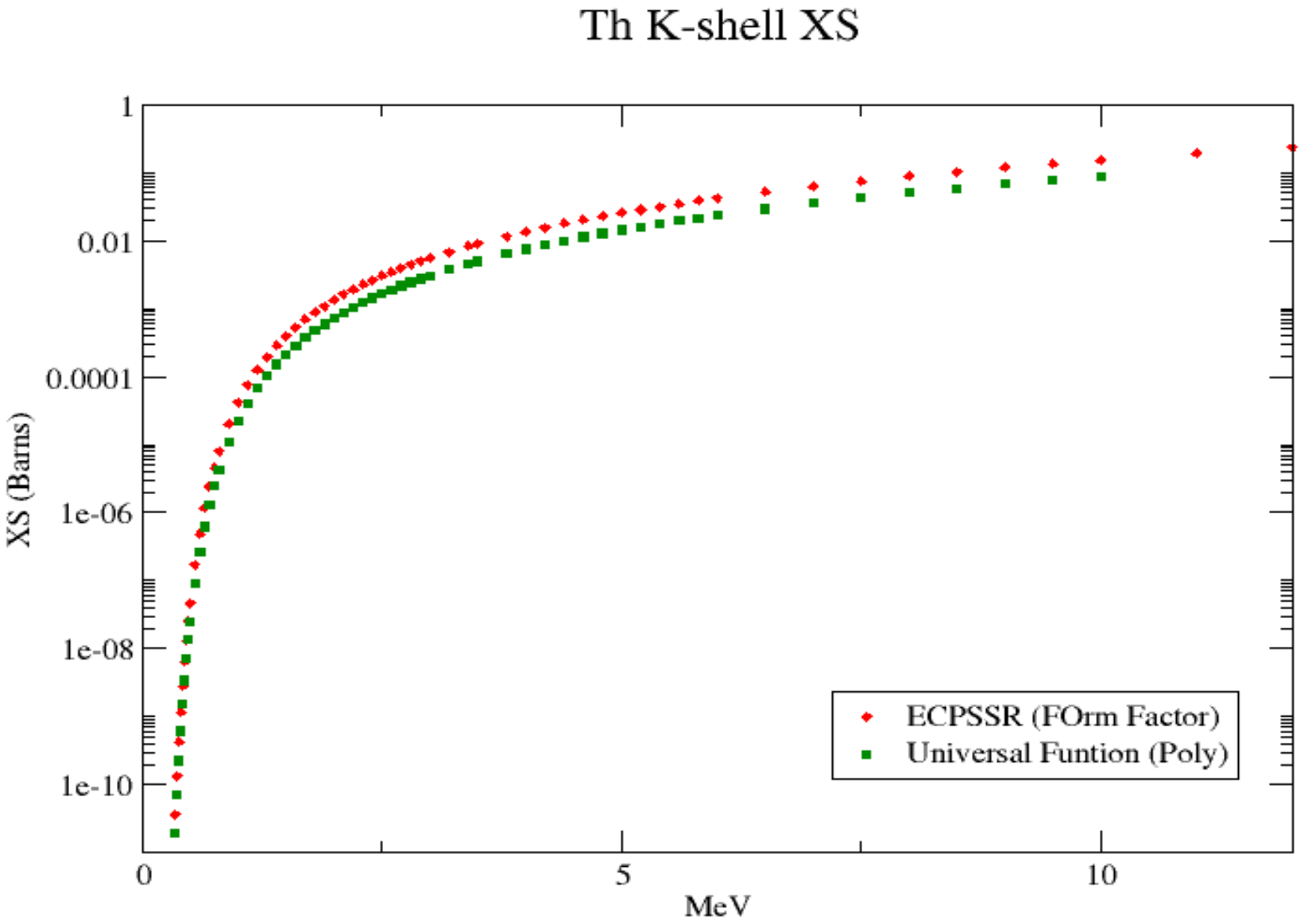
PIXE in Geant4

- ECPSSR Model
  - Theoretical model – good but nor perfect
  - *Ab initio* calculations extended to 100 MeV
  - Added M_i-shells for transitions with X-Rays > 1KeV

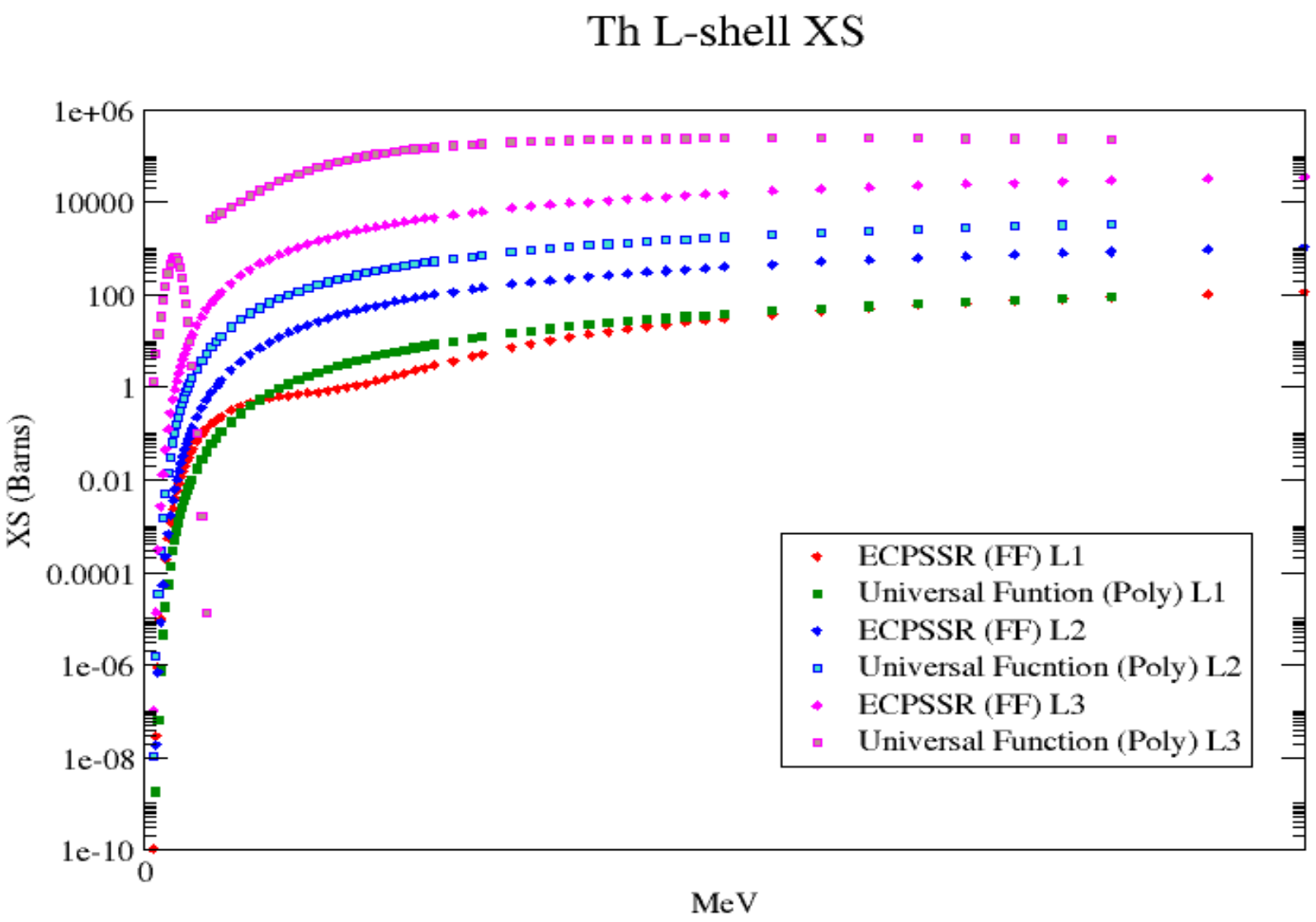
PIXE in Geant4

- Paul Model
  - Reference semi-empirical for K-Shell
- Orlic Model
  - Fit to exp data (not very accurate) for some L_i shells
- "Universal Function" by M. Reis
  - Polynomial fit by A.Taborda
  - Works for all K,L_i,M_i shells
  - Cutting-edge work in progress

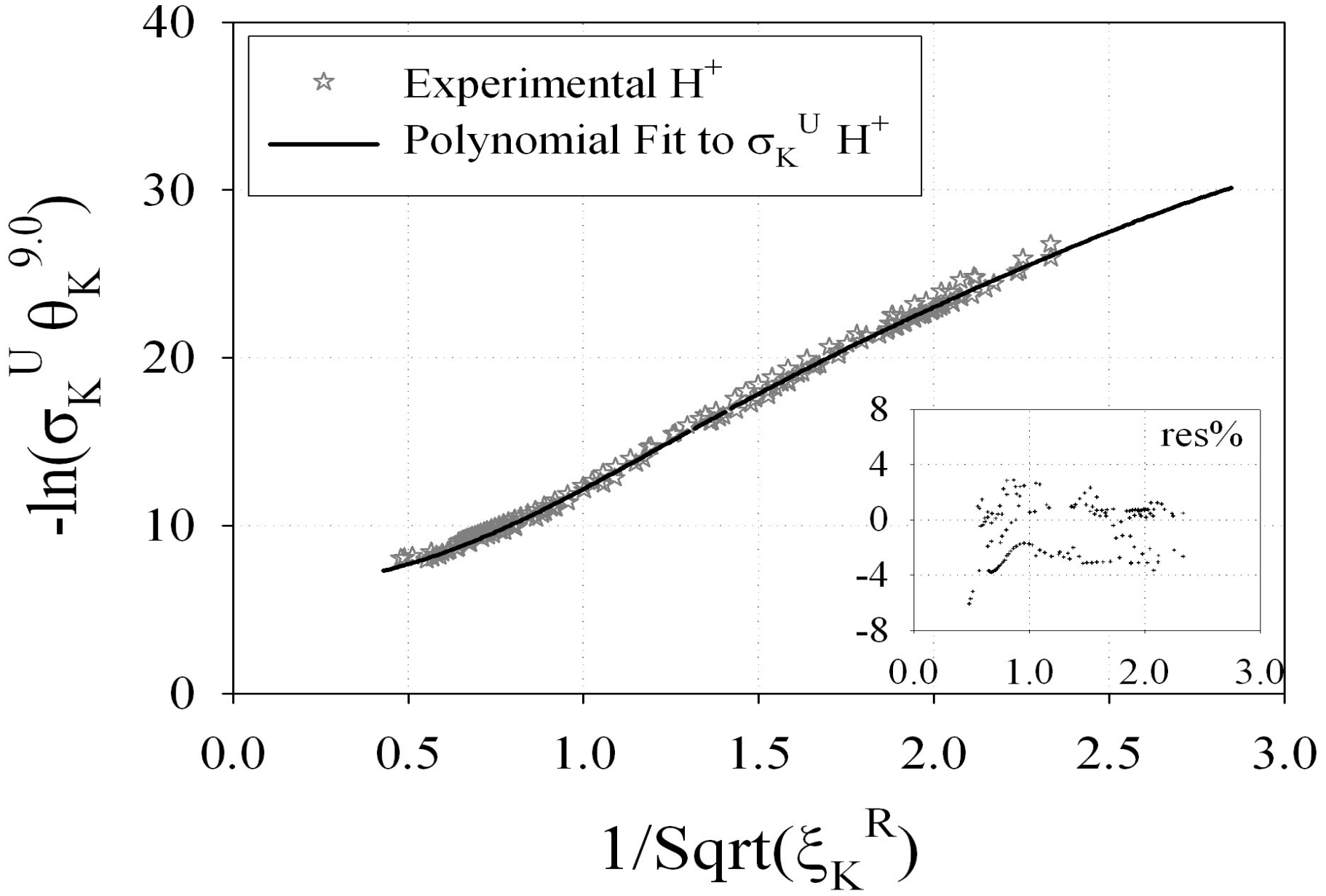
ECPSSR vs UF (K-shell)



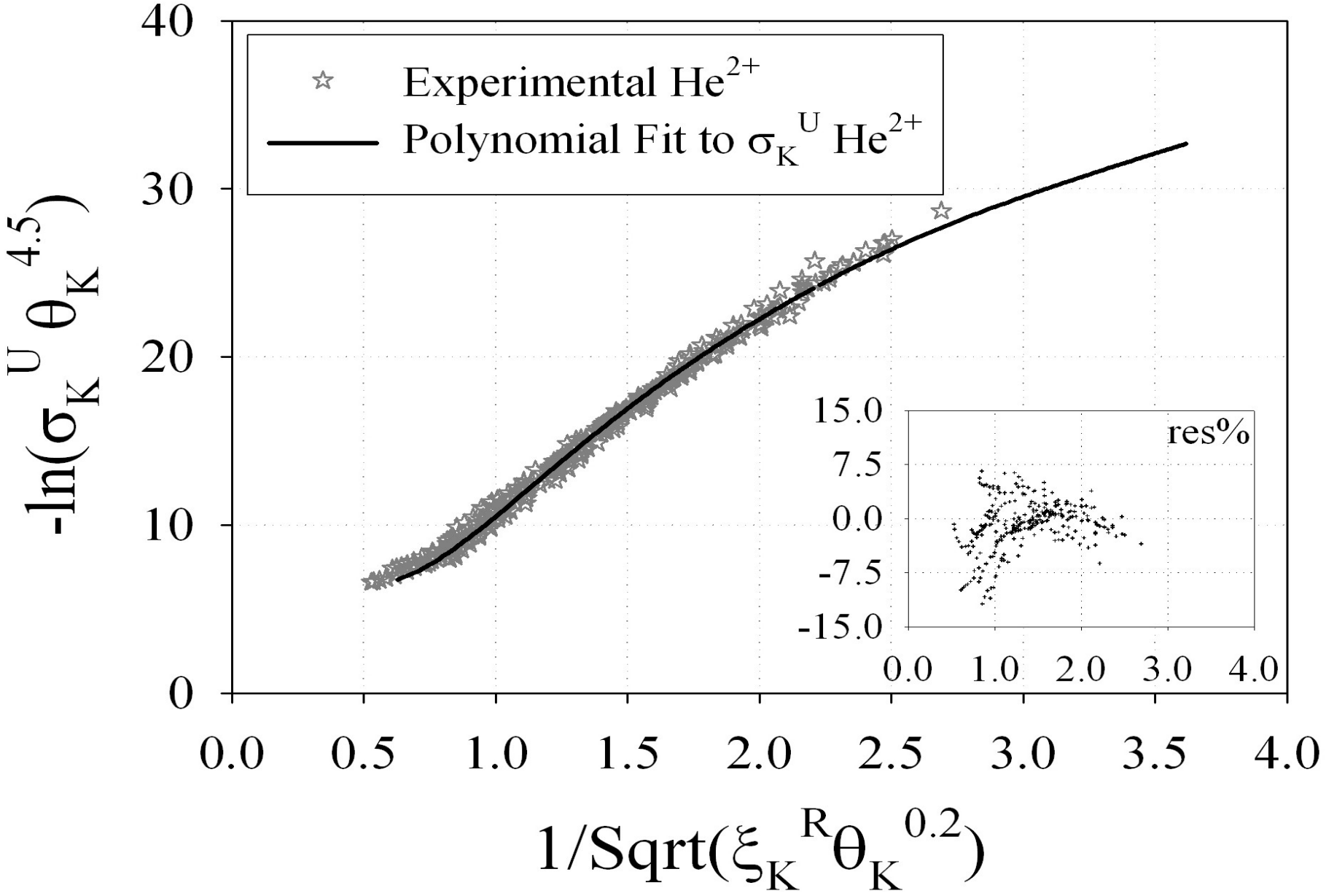
Universal Function - L-shells



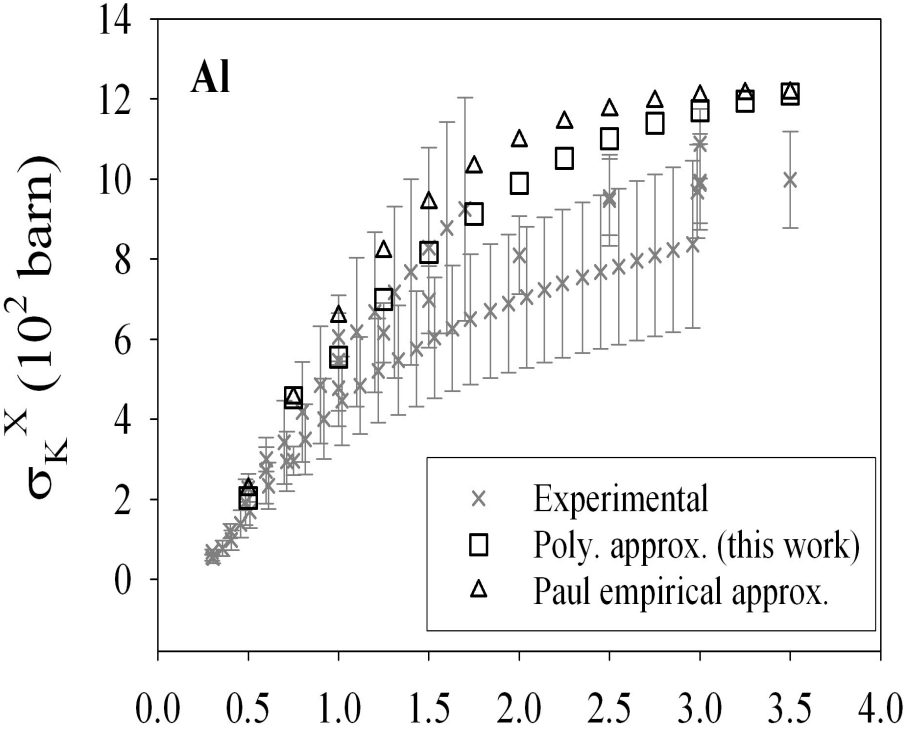
Universal Function - K-shells

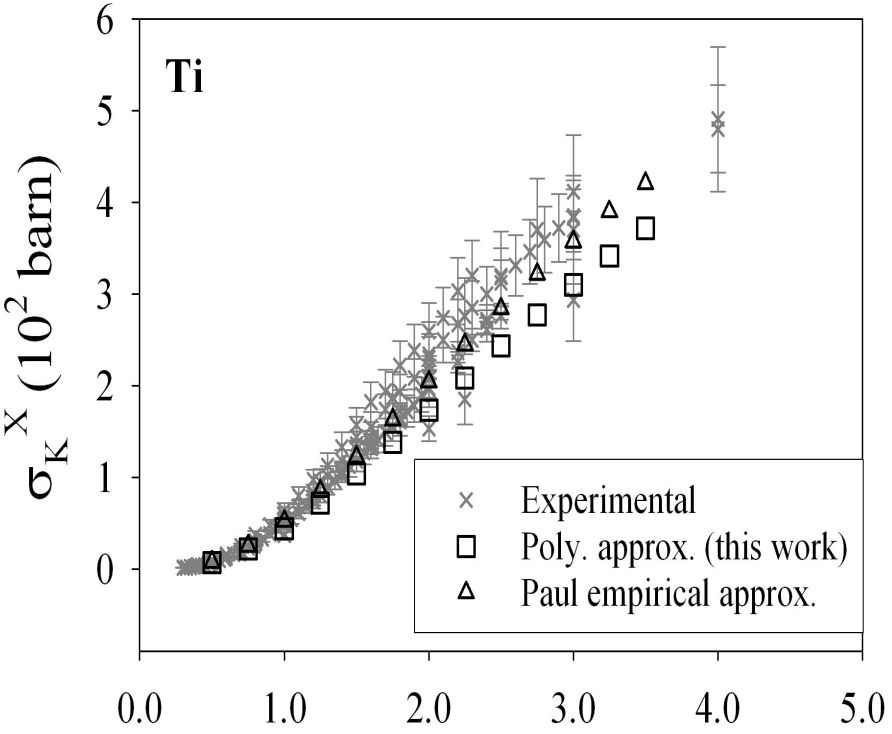


Universal Function - K-shells

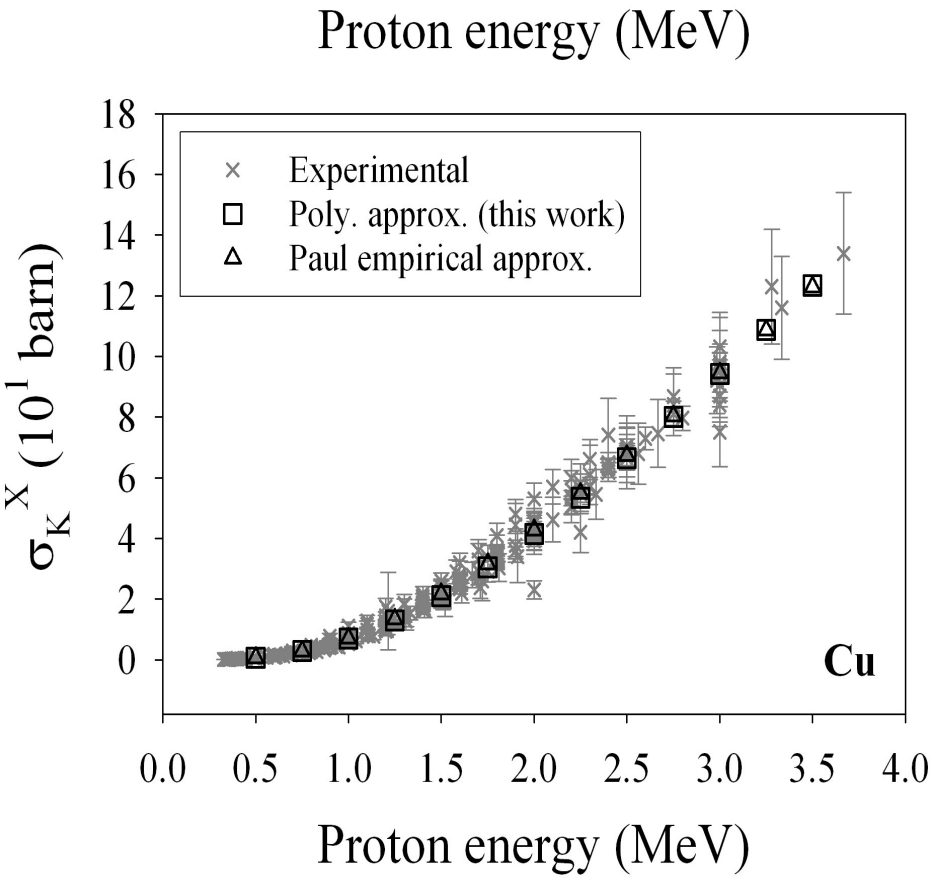


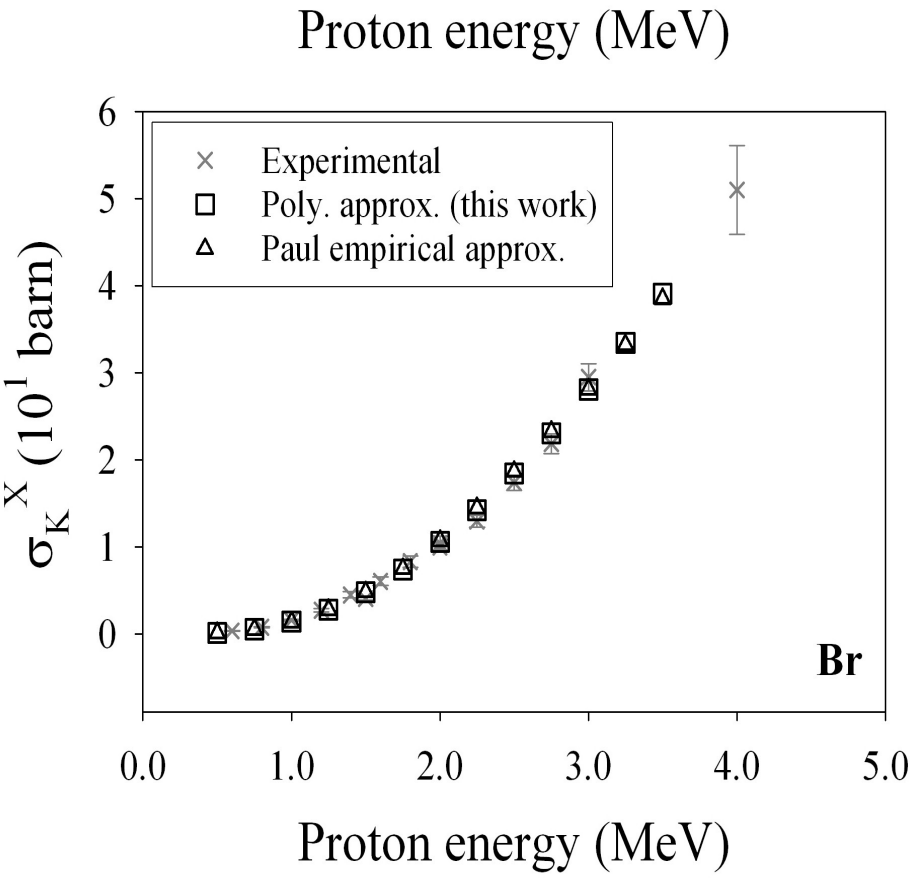
Universal Function - K-shells



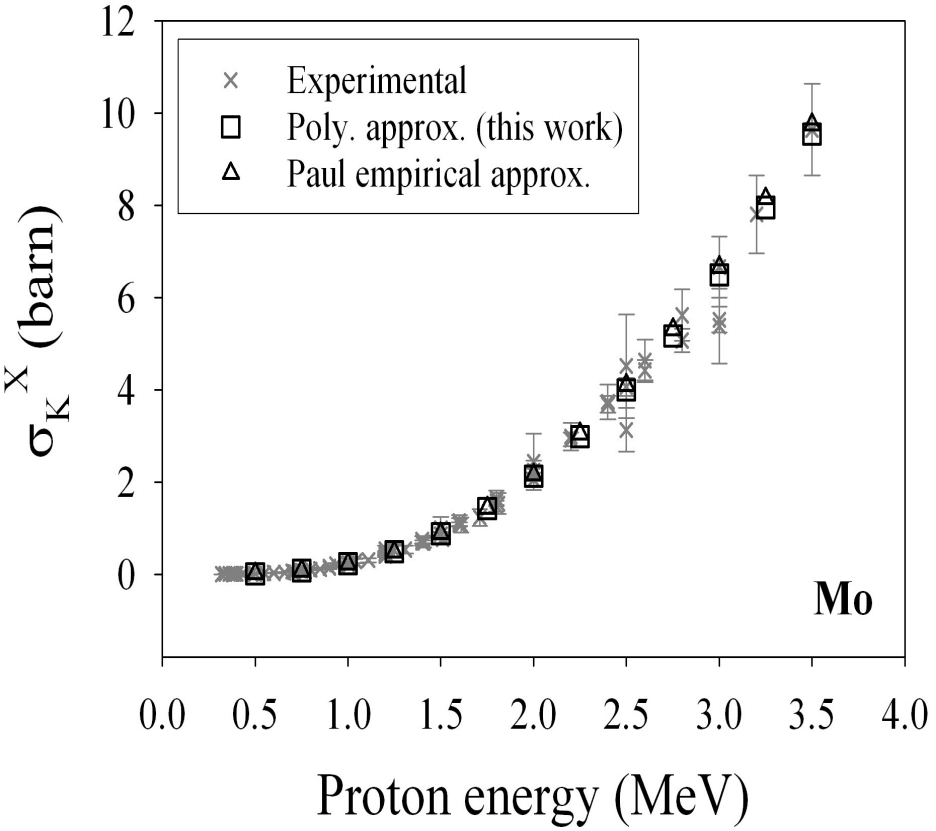


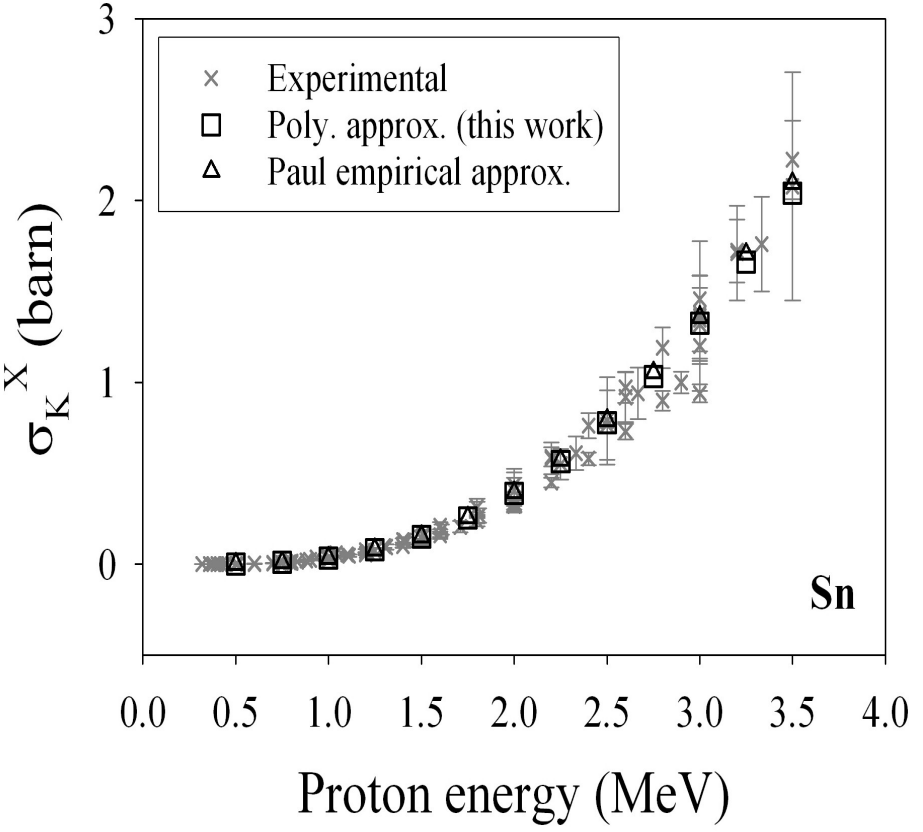
Universal Function - K-shells



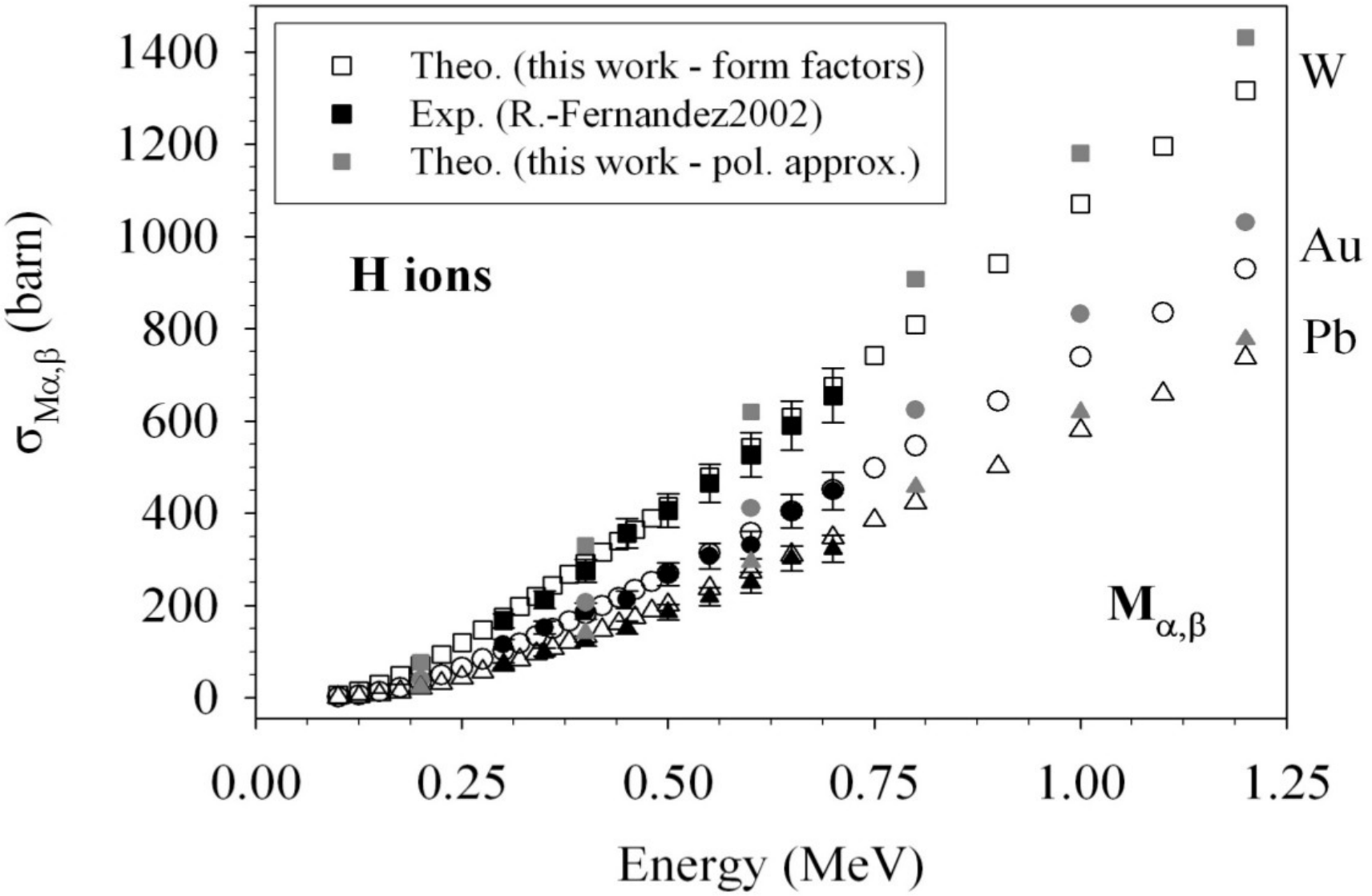


Universal Function - K-shells





Universal Function - M$_i$-shells



Universal Function - M_i-shells