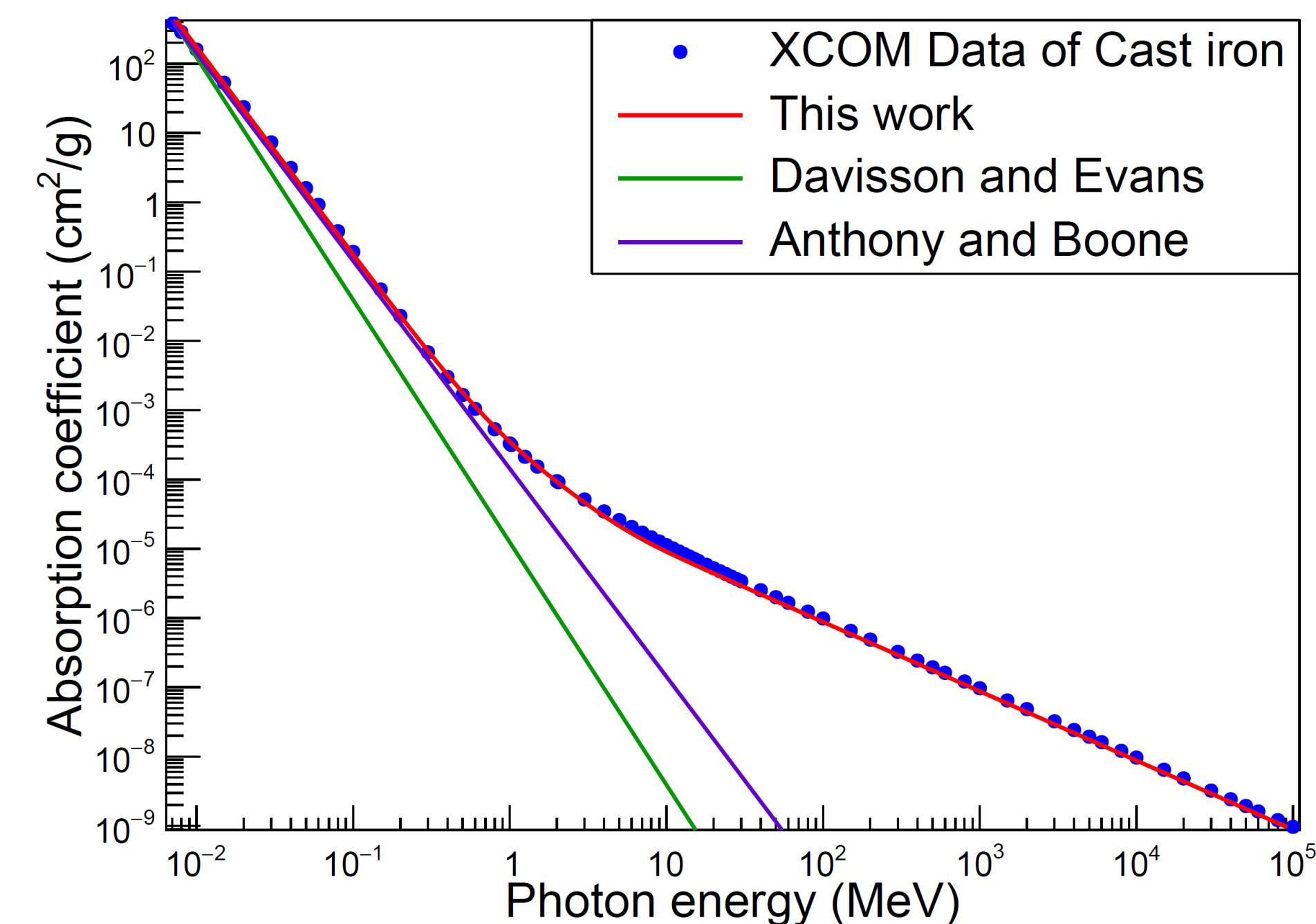
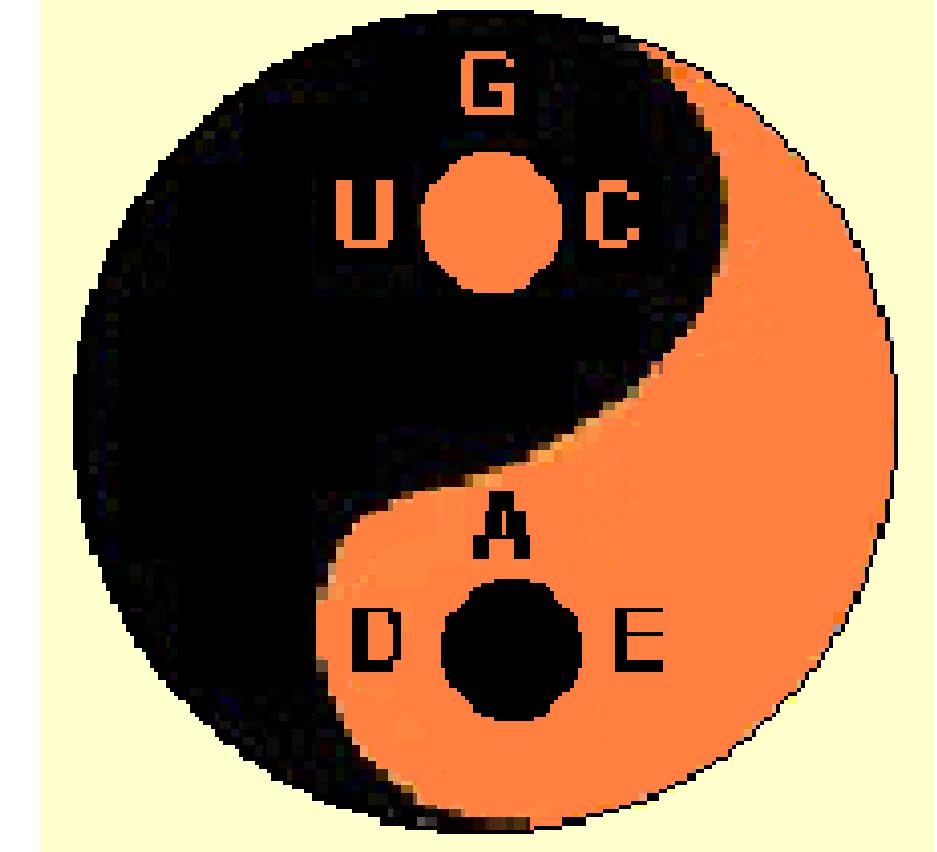


A Universal Algorithm for Calculating the Probability of Photoelectric Absorption

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probability of photoelectric absorption is of significance in multiple contexts such as in the simulation exercise of detector response, designing of gamma-ray shielding, development of new shielding materials

analytical equations available in the literature for the photoelectric absorption, such as

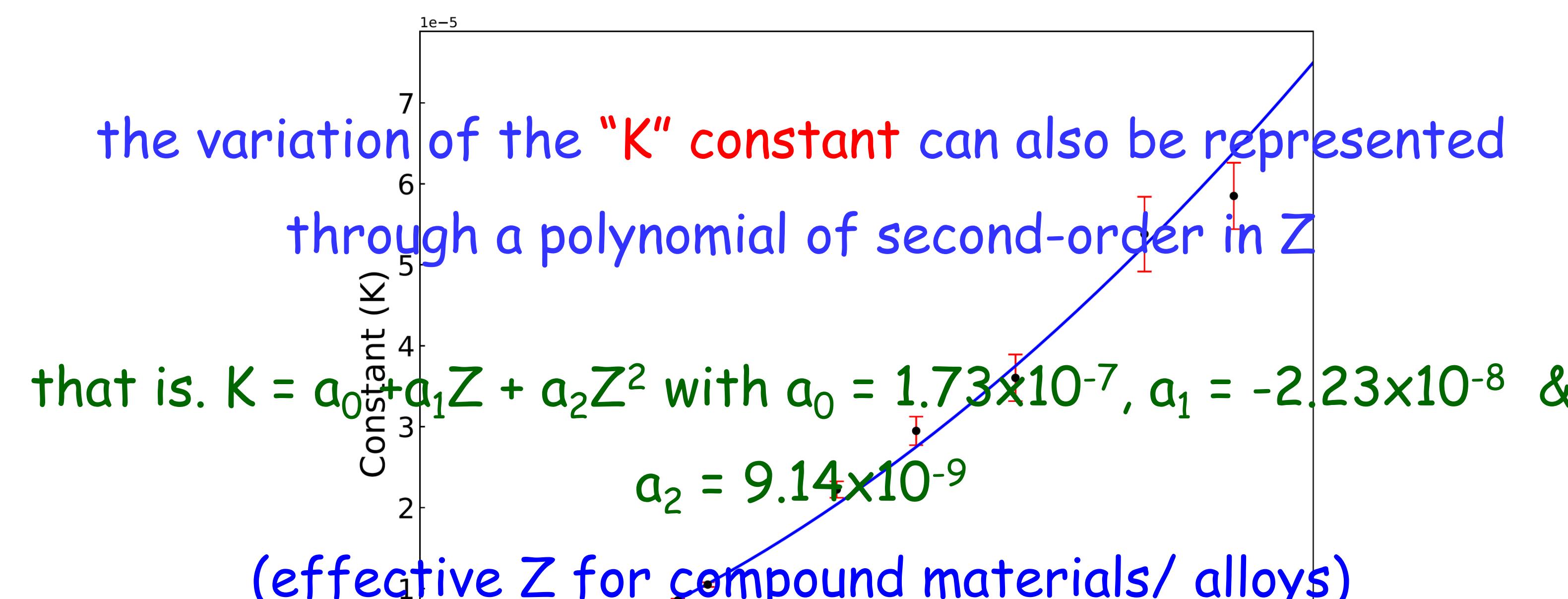
$$\frac{Z^n}{E_\gamma^{3.5}} \text{ [Davisson & Evans (1952)] or } \frac{Z^3}{E_\gamma^3} \text{ [Anthony & Boone (2005)]}$$

are of limited use in the representation of the photoelectric absorption cross-section data as available from the XCOM database (physics.nist.gov/PhysRefData/Xcom/html/xcom1.html)

this work proposes the following equation for the probability of photoelectric absorption based on the mass absorption coefficient data from XCOM

$$KZ\left(\frac{1}{E_\gamma^3} + \frac{e^{-(E_\gamma-1)/2}}{2E_\gamma}\right)$$

the simplistic equation facilitates a global representation of the photoelectric absorption cross-sections across all elements & materials, and for the widest range of gamma-ray energies



prospective applications in simulation frameworks

