

**The xraylib library for X-ray matter interaction cross sections:
New developments and applications**

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X-ray based analytical techniques have seen a surge in popularity over the last decades. This had led to an increased interest in cross sections and atomic parameters, which are of fundamental importance in both quantitative and qualitative analysis. In X-ray fluorescence (XRF), for example, quantification using either the fundamental parameter method or Monte-Carlo simulations is only possible if accurate data of X-ray interactions with matter are available. Such data can be obtained in two ways: experimental and computational through quantummechanical calculations. Several authors have published databases and tabulations in the literature, but none of them are presented in the form of freely available library functions which can be easily included in software applications for X-ray techniques.

In an effort to solve the problem of interfacing the data to the user, Brunetti *et al.* designed a software package called *xraylib* based on a shared ANSI C language library. The physical data included in the package is a compilation of several popular datasets including for example photoionization-, Rayleigh-, and Compton cross sections as well as absorption edge energies, fluorescence line energies and fluorescence yields. In this work we will present not only the features of the original *xraylib* package, but also introduce some novelties that were recently added such as partial photoelectric effect cross sections and bindings with popular programming languages. As a practical application of the *xraylib* library, the fundamental parameter based quantification will be shown for XRF datasets obtained from cometary dust particles returned by NASA's Stardust mission.

The *xraylib* package can be downloaded from
<http://ftp.esrf.eu/pub/scisoft/xraylib/readme.html>