

libdEdx - a Stopping Power Library

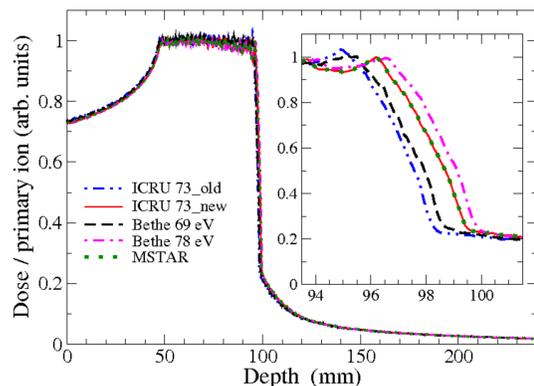
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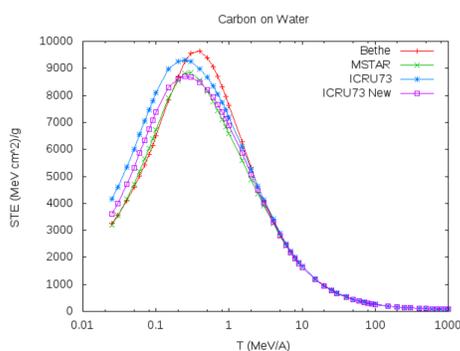
libdEdx – Motivation

A number of different programs and tables are available which **provide stopping-power** data. However, there are two main issues. First, the provided stopping-power data differ among each other and second, nearly all of them are hard to access directly from a coding project.



A SHIELD-HIT spread out Bragg peak for oxygen ions on water. Calculated using different stopping power tables and Bethe formula.

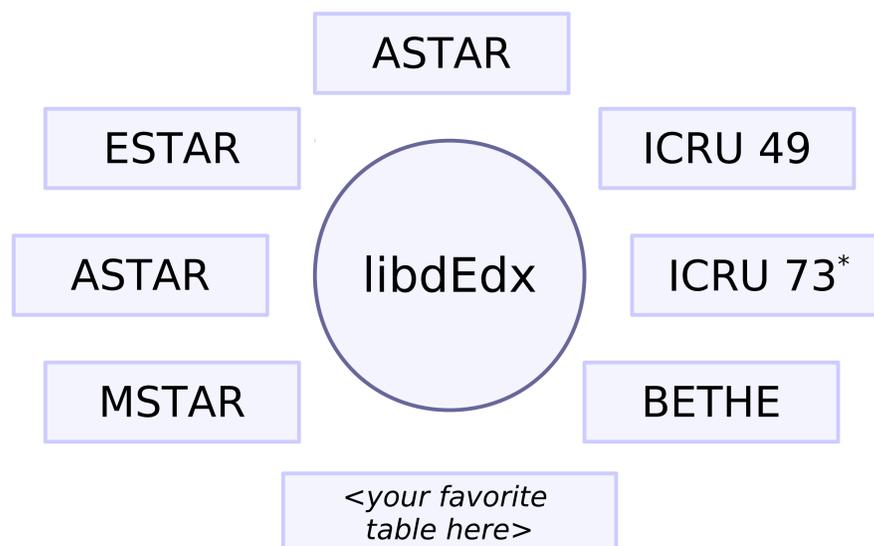
For every coding project which depends on stopping-power data a **dedicated routine** has to be written or external programs have to be accessed **if they are available** all on your platform. Accordingly, it would be desirable to have all data sets easily available bundled in a freely accessible, **platform-independent** computer library.



Different tables and the Bethe formula for carbon ions on water. Obviously, the data sets are not consistent.

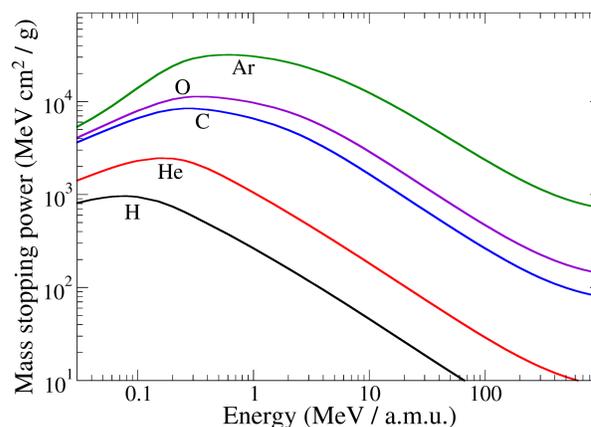
libdEdx – Stopping Power Data

By now, libdEdx contains already several data tables including those recommended by ICRU and according programs. However, the library is **easy to extend** and the idea is to **implement further data** tables and method for the calculation of stopping-power data.



* ICRU 73 includes both the old and the new data set from the errata.

libdEdx – Target Materials



Stopping power for the ions H, He, C, O, and Ar on Soft Tissue (ICRU). Calculated in libdEdx with MSTAR data and Bragg rule.

PSTAR, ASTAR and MSTAR have **less extensive material composition** data available. With libdEdx all compounds from ESTAR are included, and therefore also available for PSTAR, ASTAR and MSTAR routines via **Bragg's additivity rule**. The figure above shows the MSTAR mass stopping power calculated for **ICRU soft tissue**, which is not by default available in MSTAR.

libdEdx – List of Features

- completely **open source** library
- written in C; **platform-independent** code
- **PSTAR, ASTAR, MSTAR, and ESTAR** stopping-power tables
- **ICRU 49** and **73** stopping-power tables
- **Bethe** stopping formula with **Lindhard-Scharff extension**
- ICRU material composition data including **250+materials (!)**
- 2 different modes provided:
 - **easy to use**, convenient default settings (black box)
 - **fast look-up tables**, can be called from MC codes
- comprehensive **documentation**

The people behind APTG



libdEdx – Current Development

The library will have its first release in November 2010. Feel free to download and work with it.



It can be found on Sourceforge.net <http://sourceforge.net/projects/libdedx/>

It is open source licensed under **GPL**, so you are more than welcome to **contribute** to the library libdedx. The library is **easy to extend** with new data sets, so feel free to add your favorite data sets or contact us.

Acknowledgments

This work is supported by the Danish Cancer Society www.cancer.dk, and the Lundbeck Foundation Centre for Interventional Research in Radiation Oncology www.cirro.dk.