



# RAPTURE

## Trusted One-D Coupled Photon-Electron Transport Calculations

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### User Friendly Interface

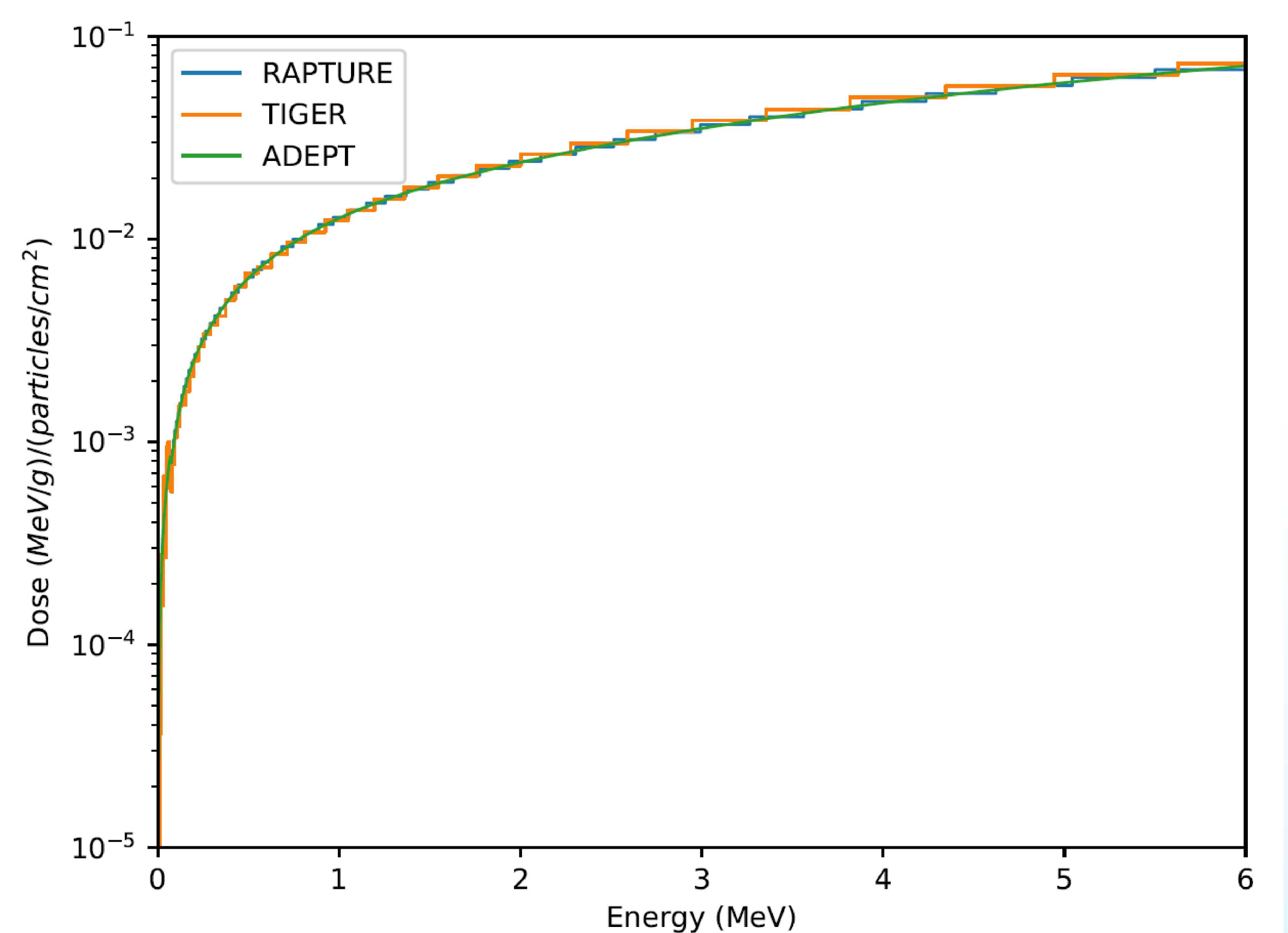
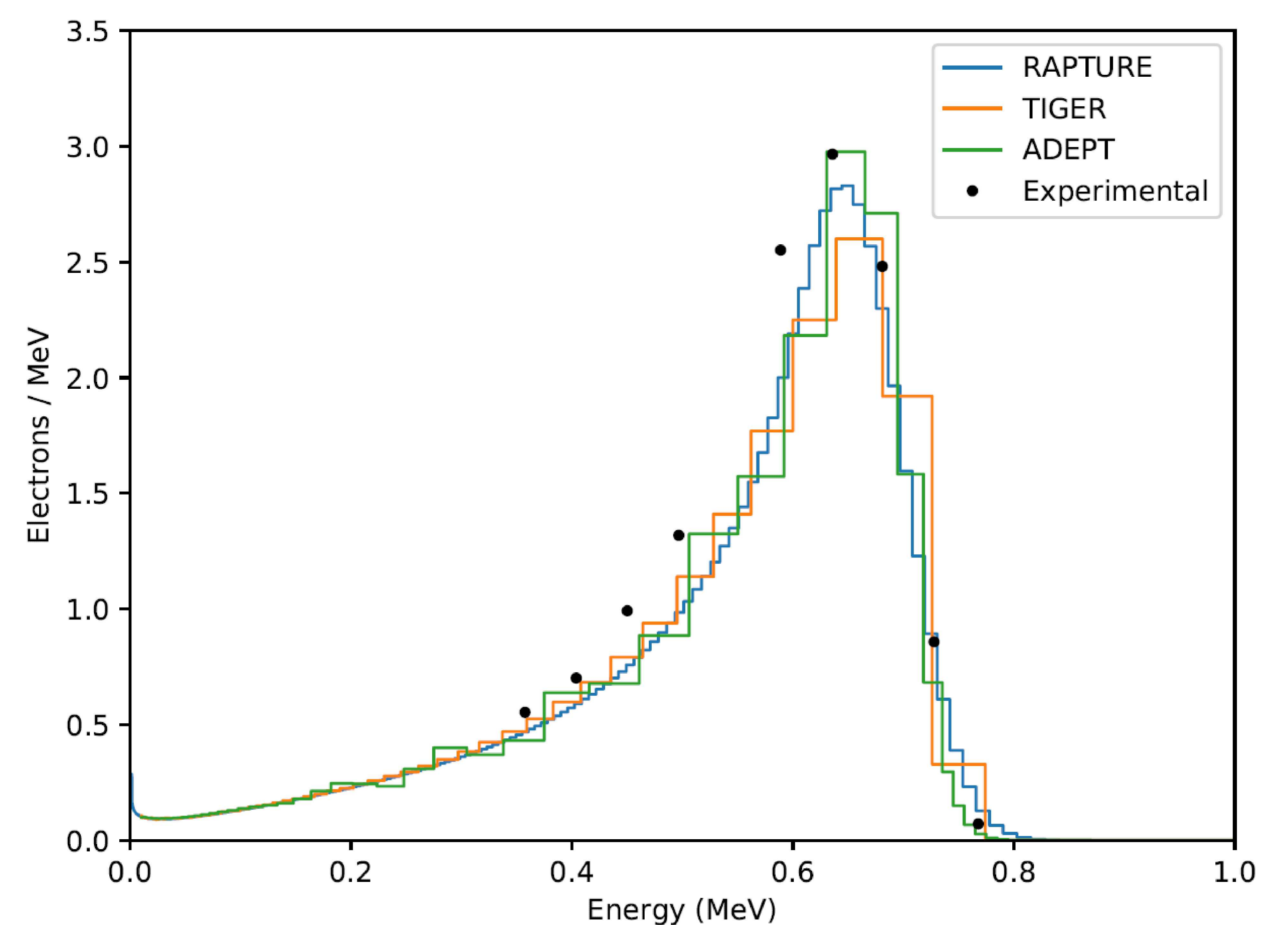
- **Problem-Focused Input**
  - Mandatory input: materials, geometry, source, quantities of interest in regions of interest
  - Optional input: spatial mesh file, custom energy discretization
- **Graphical User Interface for Problem Setup**
  - Enforced consistency via populating drop-down menus
- **Error and Consistency Checking**
  - Extensive error checking of input file before calculation
  - Verbose error messages
- **Portable**
  - Windows, Linux, and Mac compatible via **Docker Container**
  - Linux compilation for super users

### Trusted Solutions

- **Mature Code Base**
  - SCEPTRE deterministic radiation transport
  - CEPXS cross-section generation
- **Automatic Discretization**
  - Physics-informed initial discretization (ADEPT-like)
  - Space, angle, and energy mesh convergence study for QoIs
- **Responsive and Extensible**
  - Bug and feature requests to rapture-support@sandia.gov
  - Regular updates planned as part of SCEPTRE release
  - SKEPTXS, a planned CEPXS replacement, will include **sub-1.0-keV** cross sections and **finite-element-in-energy** and **finite-element-in-angle** cross sections for SCEPTRE.

### Relevant Capabilities

- **One-Dimensional Transport**
  - Useful to scope calculations for complex geometries
  - Spatial meshes produced by RAPTURE may inform requirements for 2-D and 3-D meshes
  - Energy mesh produced by RAPTURE may be directly applicable for more complex problems
- **Multiple Responses**
  - Energy and kerma deposition
  - Charge deposition
  - Transmitted and reflected spectra
  - Response functions for energy or kerma deposition
- **Multiple Output Formats**
  - Tabular data; tabular step-function data for plotting
  - Plots in PDF and PNG formats
- **Reproducible and Reusable Output**
  - CEPXS input for cross-section generation
  - EXODUS spatial mesh
  - SCEPTRE input deck
  - SCEPTRE post-processor input deck
  - User may specify spatial mesh or energy discretization given RAPTURE output for a representative problem (UQ study)



### Release

- Released by Sandia National Laboratories under a commercial license as part of the SCEPTRE package (v2.1 and newer)