



# XENON-123

## SUMMARY DATA

### GENERAL

#### CLASSIFICATION

Isotope: Xe-123  
Atomic number (Z): 54  
Mass number (A): 123  
Neutron number (N): 69

#### RADIOACTIVE DECAY

Decay modes:  $\beta^+$ , Electron capture  
Half-life: 2.08 [h]  
Decay constant:  $9.2568 \times 10^{-5}$  [1/s]  
Daughters: I-123 (100.0%)  
Radioactive daughters: I-123

#### DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]  
Mean electron energy: 0.18749 [MeV]  
Mean photon energy: 0.64106 [MeV]  
Air kerma rate constant,  $\Gamma_{10}$ :  $1.758 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Air kerma coefficient,  $K_{\text{air}}$ :  $2.632 \times 10^{-17}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Equilibrium dose constant for weakly-penetrating radiations ( $\alpha$  and/or electrons),  $\Delta_{\text{wp}}$ :  $3.004 \times 10^{-14}$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]  
Equilibrium dose constant for alphas,  $\Delta_{\alpha}$ : 0.000e+00 [Gy  $\cdot$  kg/Bq  $\cdot$  s]

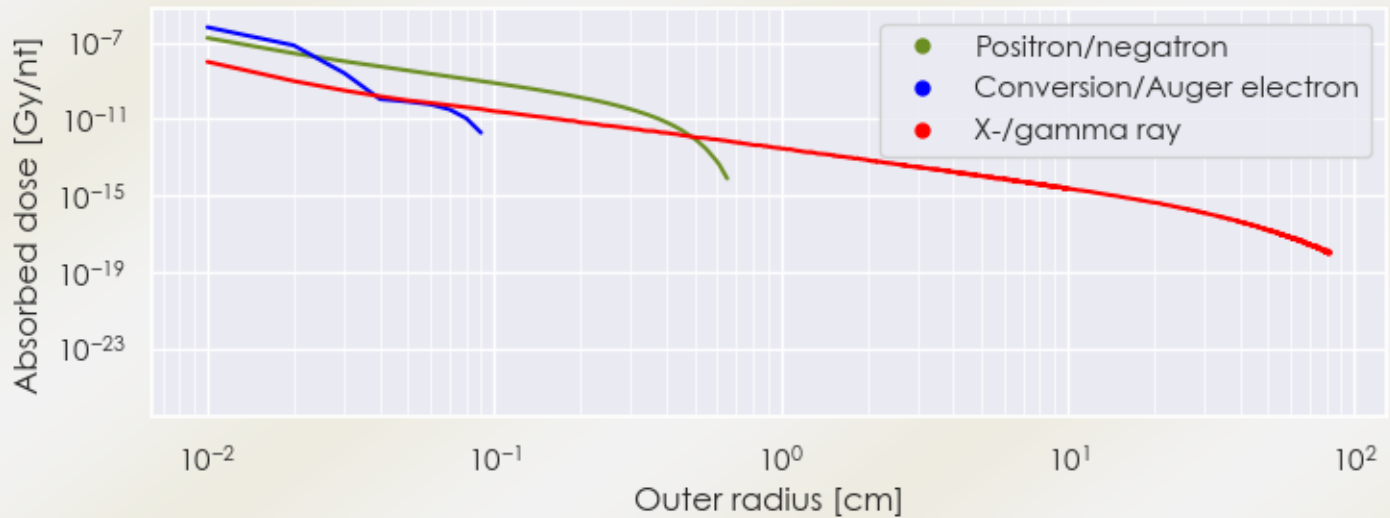
Equilibrium dose constant for betas/electrons,  $\Delta_{\beta,\beta^+,e^-}$ : 3.004e-14 [Gy·kg/Bq·s]

Equilibrium dose constant for photons,  $\Delta_p$ : 1.027e-13 [Gy·kg/Bq·s]

## DOSE POINT KERNELS (PLOT)

Dose point kernel source: **Graves, et al. Medical Physics. 2019 Nov.; 46(11):5284-5293.**

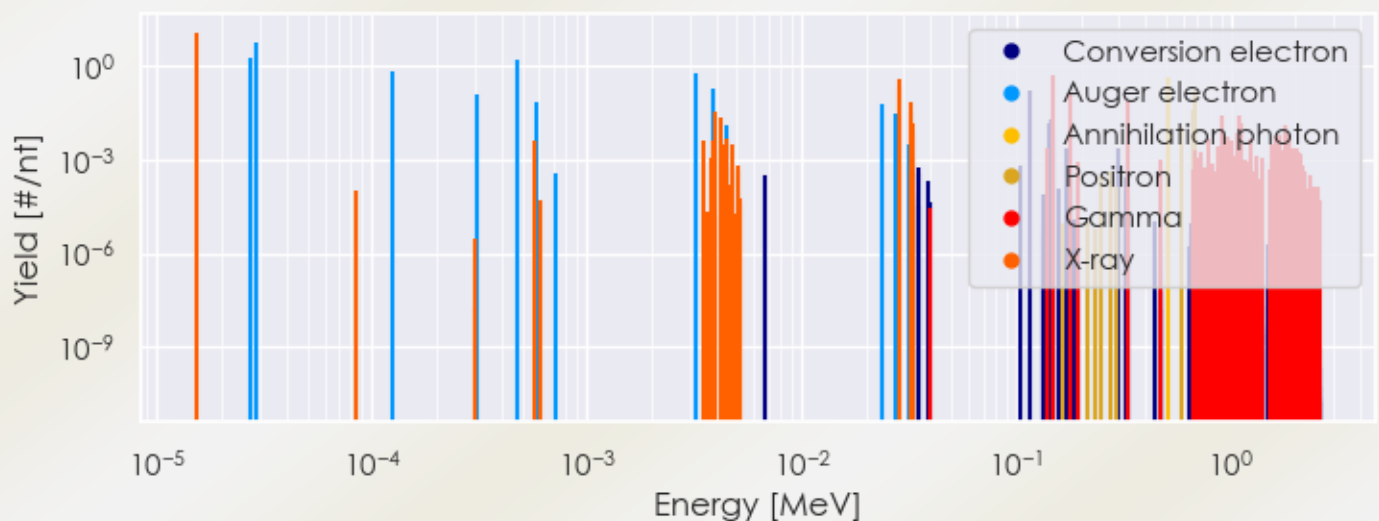
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: [www.mirdsoft.org/products/MIRDspecs/Xe-123 DPK.csv](http://www.mirdsoft.org/products/MIRDspecs/Xe-123 DPK.csv)

## SUMMARY SPECTRA (PLOT)

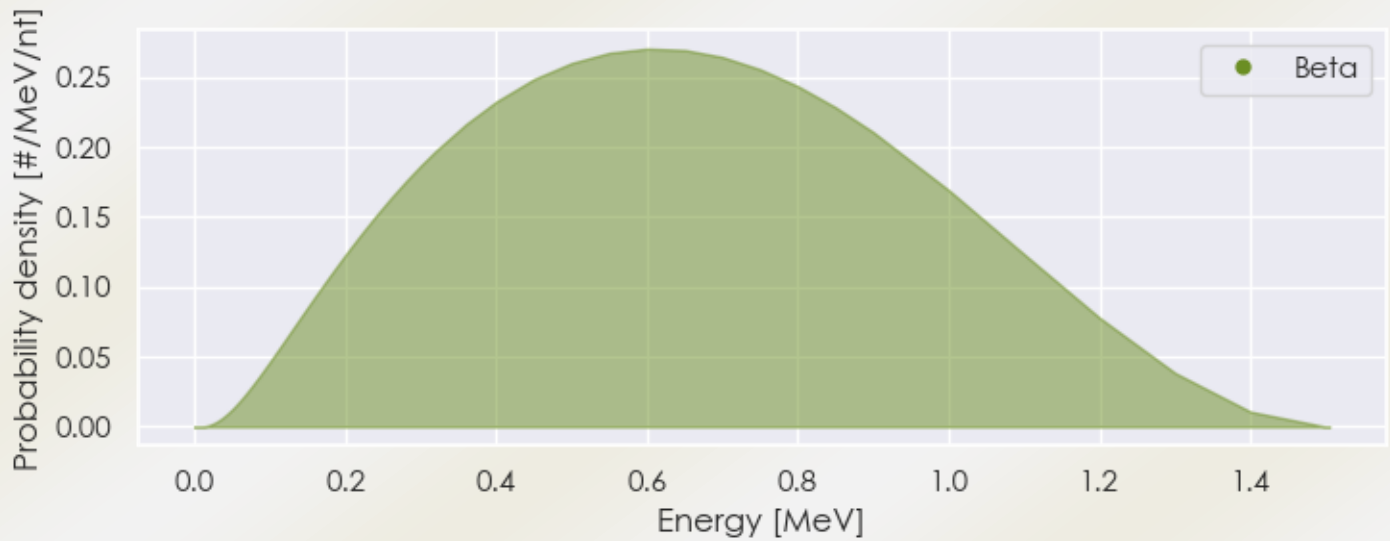
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Xe-123 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Xe-123 Summary Spectrum.csv)

## BETA SPECTRA (PLOT)

Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated beta spectra file here: [www.mirdsoft.org/products/MIRDspecs/Xe-123 Beta Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Xe-123 Beta Spectrum.csv)

## TABULATED DATA

### SUMMARY SPECTRA (TABLE)

Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**

Note: Radiations with yield < 0.01 are excluded from the table, but are available in the linked \*.csv data.

Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Xe-123 Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Xe-123 Summary Spectrum.csv)

| Energy [MeV] | Yield [# / nt] if > 0.01 | Radiation type |
|--------------|--------------------------|----------------|
| 1.52658e-05  | 1.242e+01                | X-ray          |
| 3.92520e-03  | 3.627e-02                | X-ray          |
| 4.21605e-03  | 2.125e-02                | X-ray          |
| 2.83065e-02  | 2.149e-01                | X-ray          |
| 2.86096e-02  | 3.990e-01                | X-ray          |
| 3.22368e-02  | 3.711e-02                | X-ray          |
| 3.22942e-02  | 7.196e-02                | X-ray          |
| 3.30298e-02  | 1.514e-02                | X-ray          |
| 1.48900e-01  | 4.890e-01                | Gamma          |
| 1.78100e-01  | 1.491e-01                | Gamma          |

|             |           |                     |
|-------------|-----------|---------------------|
| 3.30200e-01 | 8.557e-02 | Gamma               |
| 5.11000e-01 | 4.517e-01 | Annihilation photon |
| 8.99600e-01 | 2.445e-02 | Gamma               |
| 1.09340e+00 | 2.787e-02 | Gamma               |
| 1.11310e+00 | 1.565e-02 | Gamma               |
| 1.80730e+00 | 1.247e-02 | Gamma               |
| 5.93331e-01 | 1.099e-02 | Positron            |
| 6.61317e-01 | 3.997e-02 | Positron            |
| 6.74348e-01 | 1.739e-01 | Positron            |
| 2.70196e-05 | 1.861e+00 | Auger electron      |
| 2.89513e-05 | 5.984e+00 | Auger electron      |
| 1.25058e-04 | 6.866e-01 | Auger electron      |
| 3.05676e-04 | 1.312e-01 | Auger electron      |
| 4.76979e-04 | 1.594e+00 | Auger electron      |
| 5.78503e-04 | 7.587e-02 | Auger electron      |
| 3.20492e-03 | 6.251e-01 | Auger electron      |
| 3.83959e-03 | 1.847e-01 | Auger electron      |
| 4.49780e-03 | 1.345e-02 | Auger electron      |
| 2.35598e-02 | 6.452e-02 | Auger electron      |
| 2.75866e-02 | 2.889e-02 | Auger electron      |
| 1.15736e-01 | 1.608e-01 | Conversion electron |
| 1.43738e-01 | 1.571e-02 | Conversion electron |
| 1.44043e-01 | 1.229e-02 | Conversion electron |
| 1.44346e-01 | 1.283e-02 | Conversion electron |
| 1.44936e-01 | 1.953e-02 | Conversion electron |

## USEFUL LINKS

Isotope decay characteristics are periodically updated as better measurements can be made - changes that may not be reflected on this page. Please see useful links:

National Nuclear Data Center (NNDC): <https://www.nndc.bnl.gov/nudat3/mird/>

International Atomic Energy Agency (IAEA) Livechart: <https://www-nds.iaea.org/relnsd/vcharthtml/VChartHTML.html>

## REFERENCE LINKS

ICRP Report 107: <https://www.icrp.org/publication.asp?id=ICRP%20Publication%20107>

Graves et al. Dose Point Kernels: <https://doi.org/10.1002/mp.13789>

MIRD Decay Schemes 2nd Edition: [https://sites.snmmi.org/SNMML-MAIN/iCore/Store/StoreLayouts/Item\\_Detail.aspx?iProductCode=0-932004-80-6](https://sites.snmmi.org/SNMML-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6)