

# True Coincidence Correction Action

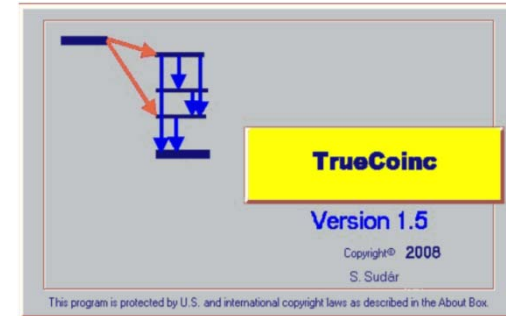
## Konstantinos Karfopoulos

Mechanical Engineer, PhD  
Environmental Radioactivity Monitoring Department  
E-mail: [Konstantinos.karfopoulos@eeae.gr](mailto:Konstantinos.karfopoulos@eeae.gr)

# Software TrueCoinc

Input:

- Total efficiency
  - Total-to-peak efficiency curve
- Peak efficiency
  - In 2 energy regions
- Isotope data (ENSDF database)



Total efficiency /peak efficiency ratio

$R = \exp(a_0 + a_1 \ln(E) + a_2 \ln(E)^2)$

Detector Description

a0  a3

a1  a4

a2  a5

OK Cancel

Parameters for Ln(E) power series in the exponent

Detector description

$Eff = \exp(a_0 + a_1 \ln(E) + a_2 \ln(E)^2 + a_3 \ln(E)^3)$

First energy range  $E_{min} < E < E_2$

$E_{min}$    $E_2$

a0  a1  a2  a3

Second energy range  $E_2 < E$

$E_2$    $E$

a0  a1  a2  a3

OK Cancel

# Software TrueCoinc

Total efficiency: TC ICRM Configuration A\_30keV  
 Full energy peak efficiency: TC ICRM Configuration A\_30 keV  
 Parent radioactive isotope, decay mode and half-life  
 $^{60}\text{Co}$  B- 5.2714 Y

No	E[keV]	Rel.Int	err[%]	TrueCc	Eff	TotEff	TrueCi	TrueCg	Parent Isotope
1	346.9	7.6E-3	6.57	0.812	7.42E-2	0.135	0.812	1.00	60Co B- 5.27 Y g
2	826.2	7.6E-3	10.53	0.866	3.57E-2	0.108	0.866	1.00	60Co B- 5.27 Y g
3	1173.2	100.00	7.E-4	0.897	2.68E-2	0.104	0.897	1.00	60Co B- 5.27 Y g
4	1332.5	100.00	4.E-4	0.896	2.41E-2	0.103	0.896	1.00	60Co B- 5.27 Y g
5	1679.5	5.91E-4	0.0	1.00	1.98E-2	0.101	1.00	1.00	alias
6	2158.8	1.11E-3	16.22	1.342	1.58E-2	0.101	0.965	1.39	60Co B- 5.27 Y g
7	2505.0	2.0E-6	20.0	2.29E+	1.38E-2	0.10	1.00	2.29E+	60Co B- 5.27 Y g

No uncertainty is estimated for the TCC.

# Uncertainty calculations

- Parameters taken into account
  - Uncertainty of fitting (RMS of total efficiencies and peak efficiencies)
  - Uncertainty of simulated efficiencies (were ignored)
- For each parameter a max and min curve are estimated.
- For each curve TCC factors are calculated
- Orthogonal distribution is applied

$$s_i = \frac{TCC_{\max} - TCC_{\min}}{2 \cdot \sqrt{3}}$$

