

Joint Research Centre (JRC)

Calculation of correction factors for effects of true coincidence summing (TCS)



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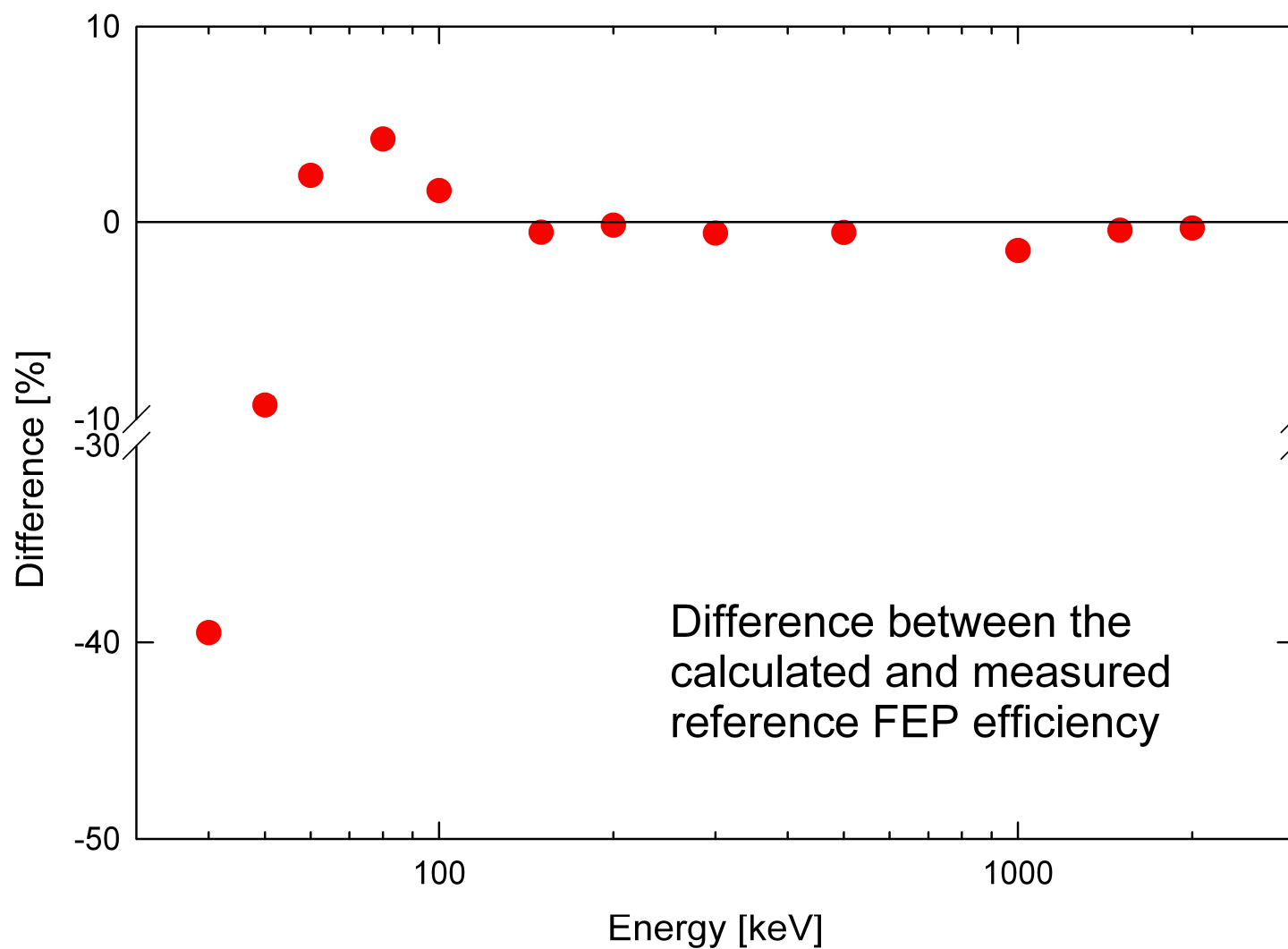
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- 1. GEANT 3.21 was used to calculate the full-energy-peak (FEP) efficiencies at the reference source position**
- 2. The detector model was optimized to match the respective measured values**
- 3. With the optimized detector model the FEP and total efficiencies were calculated for other source positions**
- 4. The calculated efficiencies were used as input to a recently developed algorithm for the calculation of TCS correction factors**
- 5. The KORDATEN decay scheme data were used in the calculation**
- 6. The 40 keV X-ray of Eu-152 was taken into account**

- **Manufacturer's data and the drawing were initially used, but not trusted**
- **The shield and the source holder were modeled according to the photos – important for total efficiency**
- **The radiograph data were considered the most reliable ones**
- **The rounding of the crystal edge was modeled as a straight cut**
- **Holder was not modeled, the thickness of the housing was increased instead**
- **The parameters adapted to match the measured efficiencies were the crystal diameter (49.3 mm), the core dimensions and the rounding**



- **Deterministic algorithm**
- **Recursive descent through the decay scheme**
- **Multiplication of FEP registration probabilities**
- **No symbolic manipulation**
- **Easy inclusion of X-rays**
- **Compact code**
- **Equivalent to other established algorithms,**
- **only better 😊**
- **Two publications submitted to ARI**

Alternative approaches were tried:

- **Calculation with the experimental efficiency curve (polynomial) for the reference geometry**
- **Efficiency transfer (ET) with non-optimized detector model to other geometries**
- **Total efficiencies from the EFFTRAN ET code**

- **Reproducing the measured total efficiencies**
- **Proper uncertainty estimation (decay data)**
- **Finite spectrum resolution (e.g., Eu-152 1085 keV line)**

Thank you.