

SAFETY

R&D APPLICATIONS



CALIBRATION OF RADIATION SURVEY METERS WITHOUT RADIOACTIVE SOURCE

2 MeV X-rays

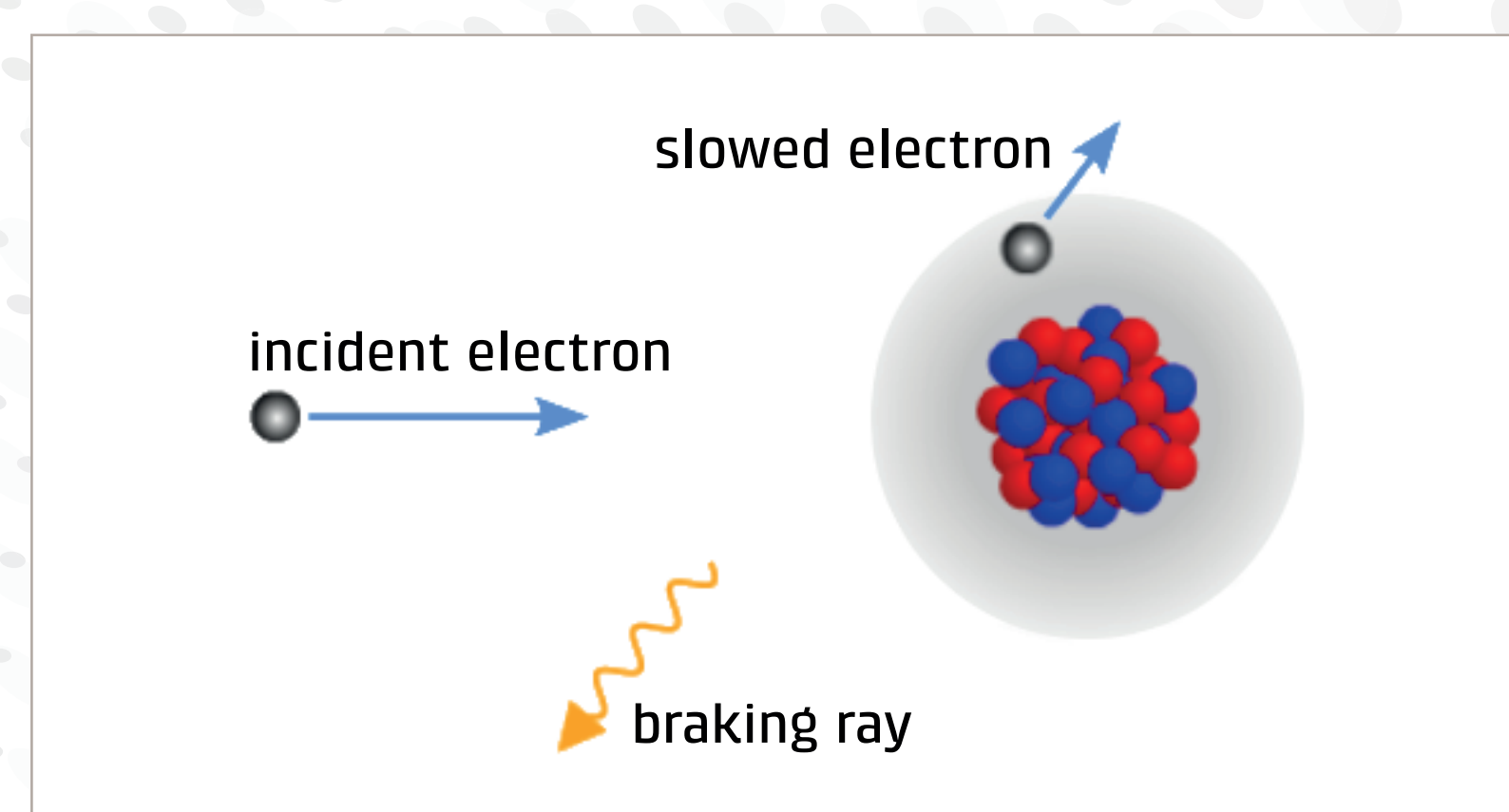
0.1 $\mu\text{Sv/h}$ - 100 Sv/h

ACCURACY - STABILITY - REPRODUCIBILITY

A NEW METHOD OF CALIBRATION

Braking rays of an electron beam allow calibration of radiation survey meters through wide energy and dose rate ranges. The method proposed here is furthermore safer for workers and for environment as it avoids the use of high activity radioactive sources.

The approach presented by ATRON involves using an electrons' accelerator to produce up to 3.5 MeV electrons. Electrons are then slowed using a conversion target in order to produce braking radiation.



Since braking rays stemmed from accelerated electrons consist in a new calibration source, it is qualified by the french national metrology laboratory (CEA/LNE-LNHB) to ensure the transfer to national radioactive standards.

Additional detectors are provided by another nuclear research laboratory (CNRS/LPC Caen) to control flatness and stability of the field.

ADVANTAGES OF THE CALIBRATION USING THE BRAKING RAYS OF AN ELECTRON BEAM

Calibration of radiation survey meters using braking rays of an electron beam presents many advantages, among which :

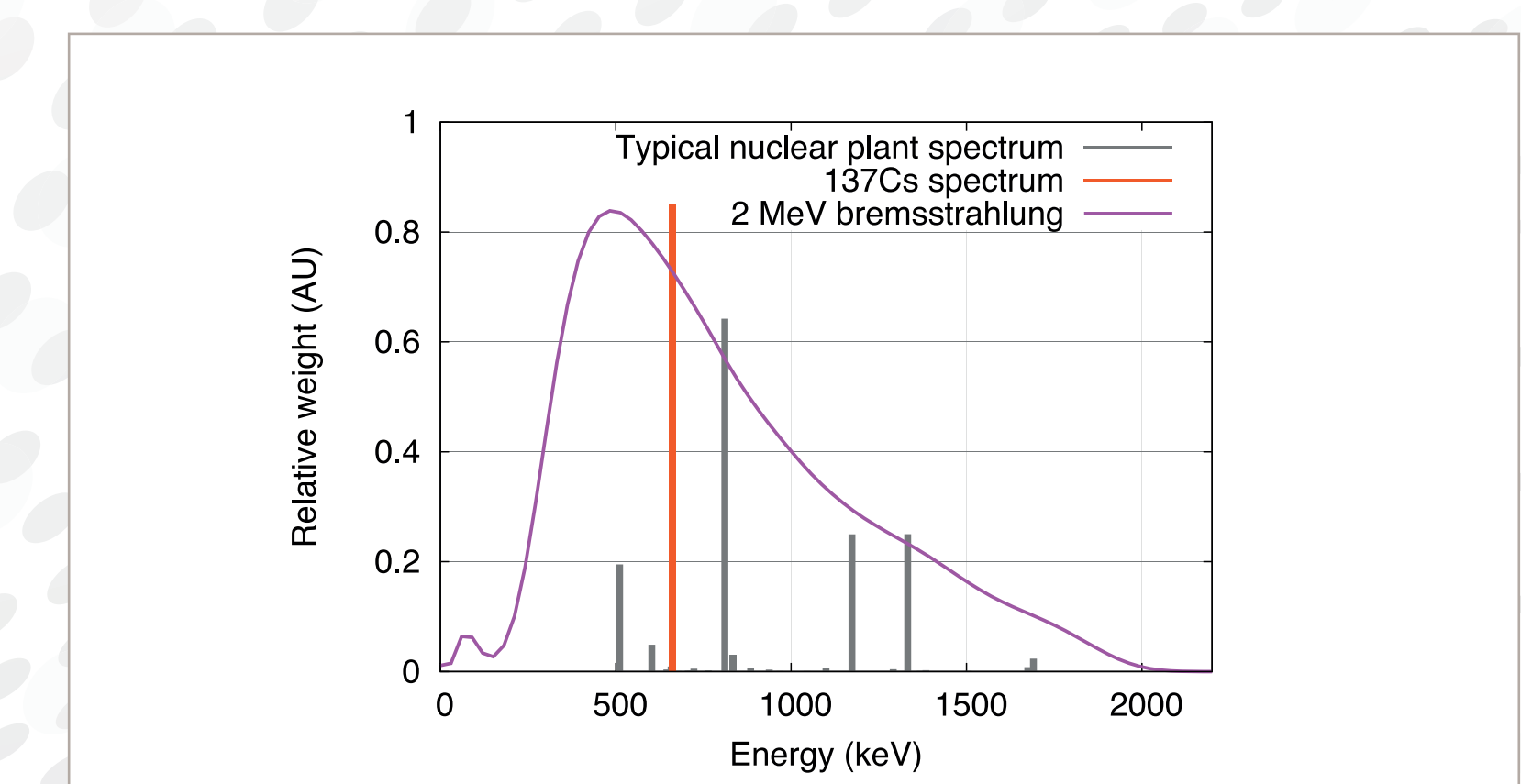
- the calibration spectrum is much more realistic of the typical one encountered in nuclear power plants
- productivity is increased since process can be automated because of the ability to change dose rate levels, without any shift of radiation survey meters
- as no high activity radioactive source is used, it is much safer for workers and for environment
- finally, due to a large irradiation area, several radiation survey meters are calibrated simultaneously

Then, the X-target is removable, allowing the use of a direct e-beam or of secondary X-rays for other applications under irradiation, like materials' aging, R&D studies on polymers, electronics, thin film...

ELECTRONS' ACCELERATOR

An electrostatic electrons' accelerator is used for this purpose. It presents a broad dynamic in intensity, going from some pA to mA in order to cover a wide dose rate range.

Energies up to 3.5 MeV can be reached where only 2 MeV electrons are needed to obtain mean energy of the X-ray spectrum of about 700 keV (representative of a typical nuclear plant spectrum). it presents, moreover, high stability both in current and voltage.



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