



# Calibration sources

## EMPIR 19ENV01 traceRadon

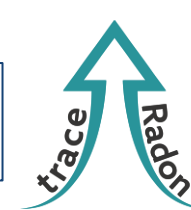
*This project 19ENV01 traceRadon has received funding from the EMPIR programme co-financed by the Participating States and from the European Union's Horizon 2020 research and innovation programme. 19ENV01 traceRadon denotes the EMPIR project reference.*

T.J. Ballé, M. Fuente

traceRadon – Scientific Workshop



# Methods for calibration



## Method 1

Reference  $^{222}\text{Rn}$  activity concentration created by  $^{222}\text{Rn}$  gas in a calibration volume. Primary method.

## Method 2

Reference instrument calibrated by another method.

## Method 3

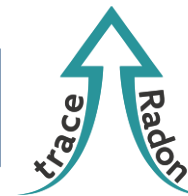
Constant reference atmosphere created in a closed volume by a  $^{226}\text{Ra}$  emanation source.

## Method 4

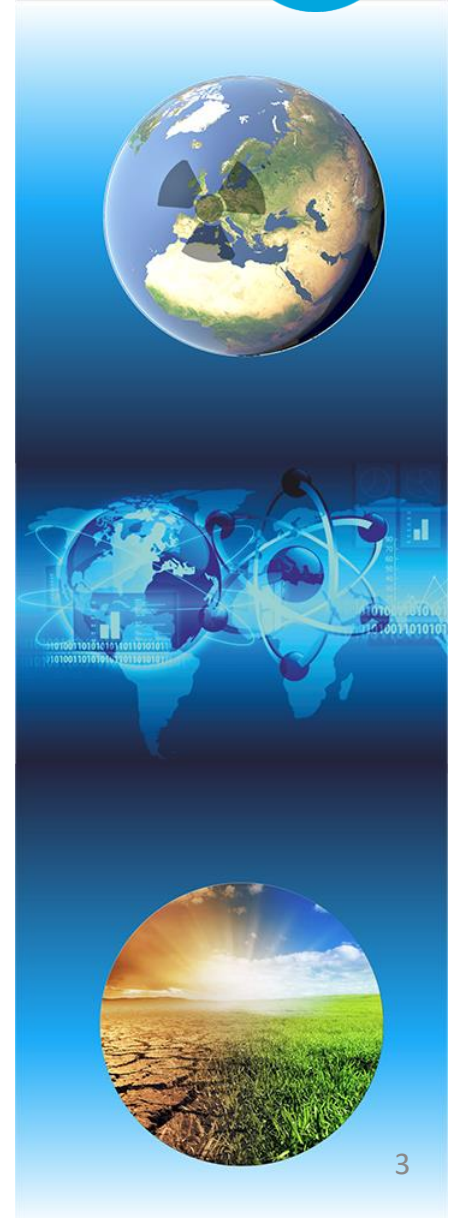
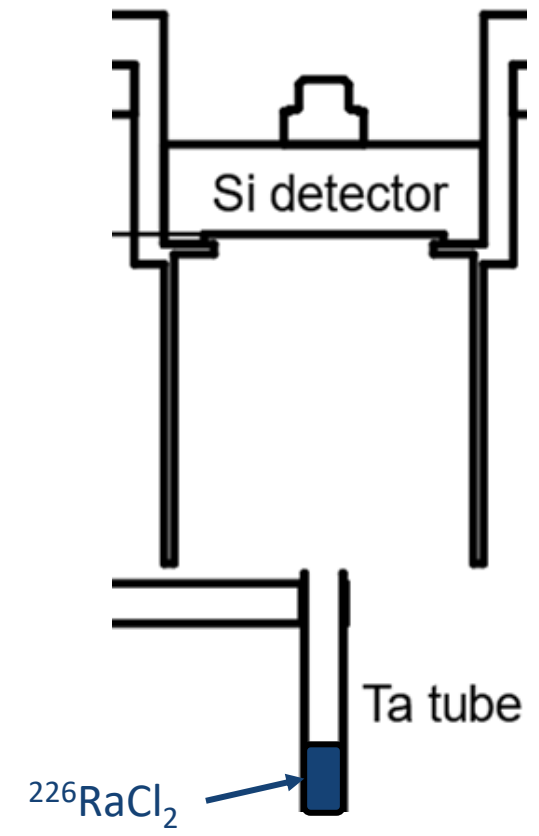
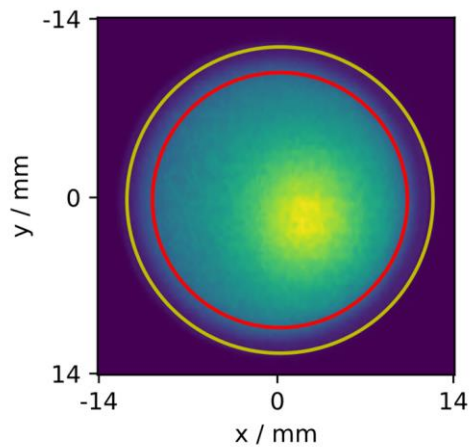
Non-constant reference atmosphere created in an open or closed volume by an Integrated Radon Source Detector System (IRSD).



# Integrated Radon Source Detector System (IRSD) – Construction and setup

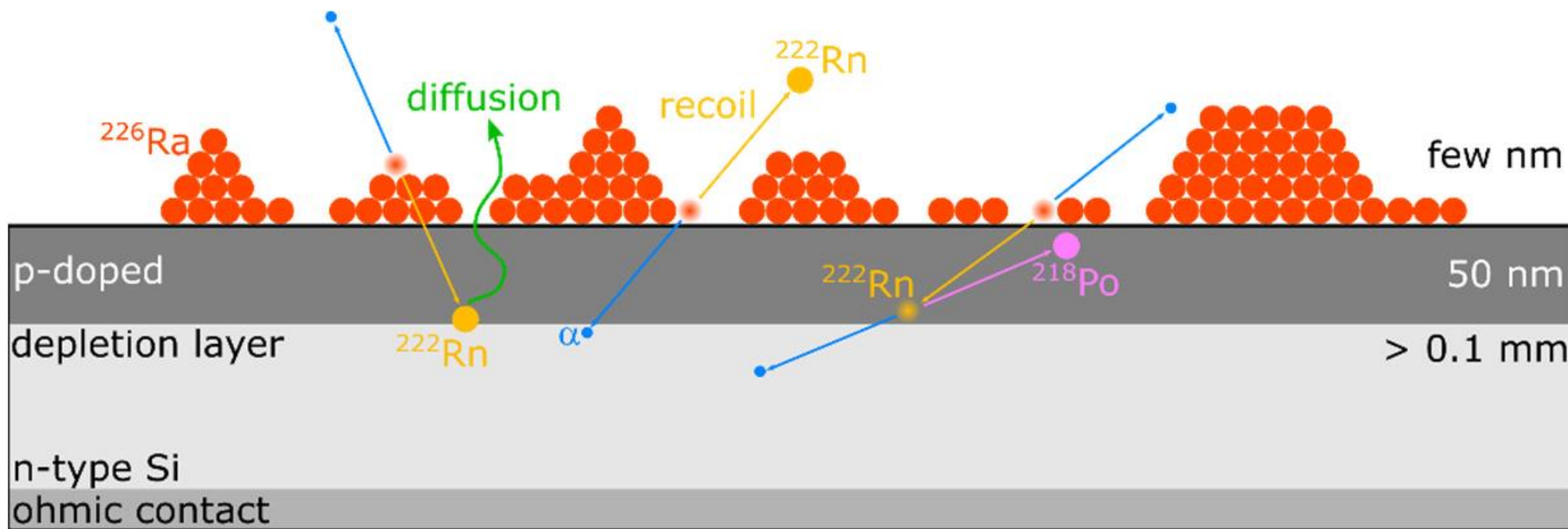
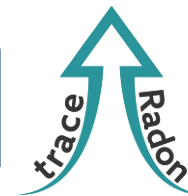


- $^{226}\text{RaCl}_2$  solution in Ta tube
- Heated in vacuum to  $1500^\circ\text{C}$
- Si detector with thin layer ( $\sim \text{nm}$ ) of  $^{226}\text{Ra}$



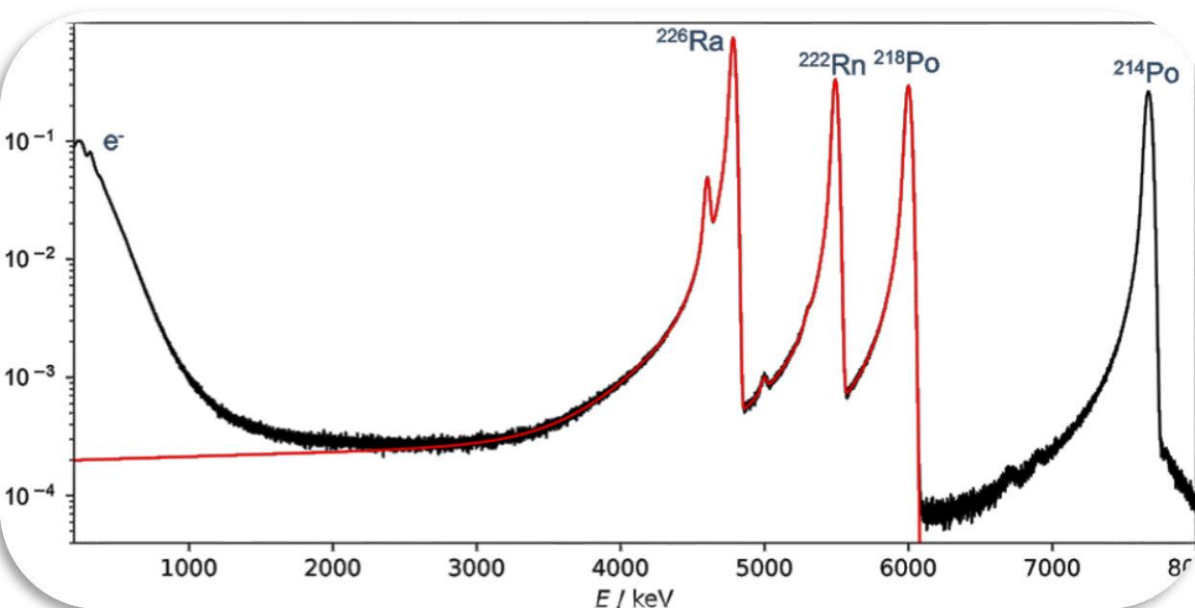
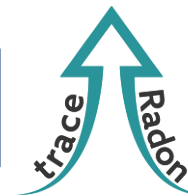
*Int. J. Environ. Res. Public Health* **19** (2022) 840

# Integrated Radon Source Detector System (IRSD) – Construction and setup



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# Integrated Radon Source Detector System (IRSD) – Function



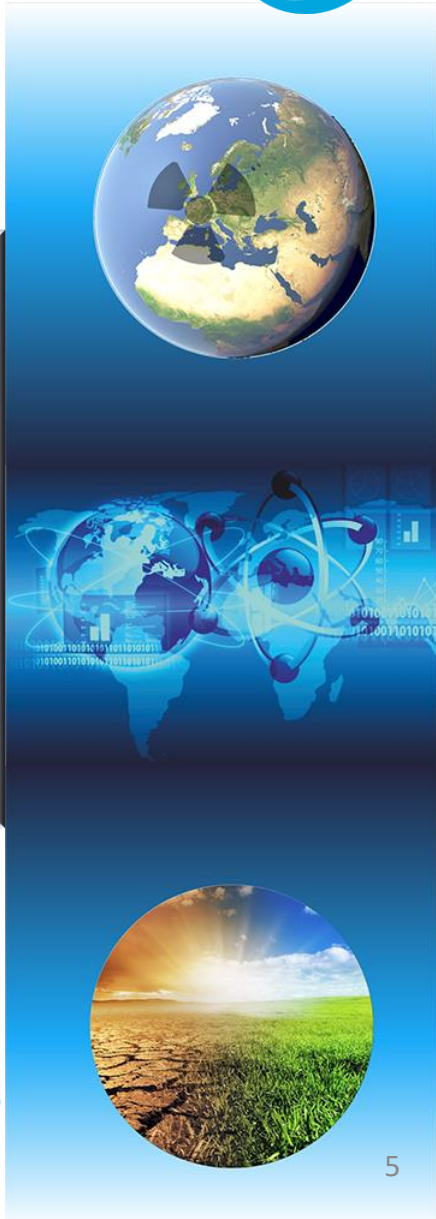
$$A_{Ra}^S = A_{Rn}^S + A_{Rn}^V$$

Change of  $A_{Rn}^S$  :

$$\frac{dA_{Rn}^S}{dt} = \lambda_{Rn} A_{Ra}^S - \lambda_{Rn} A_{Rn}^S - \lambda_{Rn} \eta(t)$$

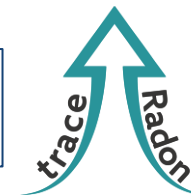
Steady-state (Method 3):

$$\frac{dA_{Rn}^S}{dt} = 0$$



Further details: *Int. J. Environ. Res. Public Health* **19** (2022) 840  
*Meas. Sci. Technol.* **32** (2021) 124008

Next



CMI-source  
Measurements with both sources at SUJCHBO  
(Petr Otahal)

