

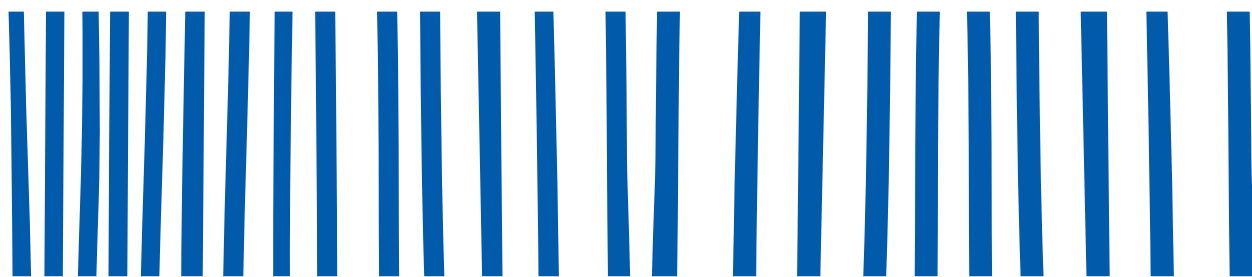


# RAP 2023

**INTERNATIONAL CONFERENCE  
ON RADIATION APPLICATIONS**

In Physics, Chemistry, Biology, Medical Sciences,  
Engineering and Environmental Sciences

# BOOK OF ABSTRACTS



May 29 - June 2, 2023 | Hellenic Centre of Marine Research | Anavyssos | Attica | Greece | [www.rap-conference.org](http://www.rap-conference.org)

## BOOK OF ABSTRACTS

INTERNATIONAL CONFERENCE ON RADIATION APPLICATIONS (RAP 2023)  
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## Traceability of solid state detectors used for Half Value Layer measurements in diagnostic radiology

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Quality Control (QC) measurements in diagnostic radiology are performed on a wide range of X-ray machines, used for different modalities such as radiography, fluoroscopy, mammography etc. Diagnostic radiology multimeters are in wide use in QC measurements [IAEA TRS 457, IAEA, 2007]. Many of these devices are based on several solid-state detectors positioned behind different filters, and values of different quantities can be calculated based on the signal from these detectors. Besides air kerma and X-ray tube high voltage, multimeters can often measure other special quantities, such as Half Value Layer (HVL), total filtration, irradiation time, product of current and time etc. Calibrations for these special quantities are very rarely available in Secondary Standards Dosimetry Laboratories (SSDL) or other calibration laboratories, so many end-users have problems to establish traceability.

Research is currently being undertaken in Vinca Institute SSDL with the aim to establish traceability for HVL calibrations. HVL is a quantity that is commonly measured in SSDs during internal QA/QC procedures, but there is no consensus on how to establish the traceability in SSDs. Furthermore, measurement uncertainty for HVL is rarely estimated. In this research, HVL measurement procedure will be updated and detailed evaluation of measurement uncertainty will be undertaken. Sources of uncertainty that will be considered are: energy dependence of ionization chamber, thickness of aluminum filters, statistics of current measurements (reference chamber and monitor chamber), temperature, pressure etc. Traceable results of HVL measurements will further be used to calibrate and test multimeters in reference fields. In this paper, first results are presented.

**Keywords:** Half Value Layer, diagnostic radiology, traceability, measurement uncertainty

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