Topic 1/ EURADOS

Improvement of occupational dosimetry

Challenge

The challenge is to provide reliable, accurate and on-line personal dosimetry for workers when exposed to ionizing radiation and in particular to neutrons. This requires monitoring the workers in real time for relevant limiting quantities (e.g., whole body, eye lens, extremities, brain, heart), and to provide input for the optimal application of the ALARA principle. Dosimetric research for personal dosimetry should deliver well characterized dosimeters, and good computational tools.

Scope

The EURADOS objective for the 2nd CONCERT call is to improve occupational dosimetry with particular emphasis on neutron applications; however, applications featuring other radiation qualities are also welcome.

Active dosimeters need to be developed for radiation fields relevant for occupational exposure. These dosimeters should be developed with the final goal that they can also be used for official dose records. Active sensors may also be developed to provide estimates of eye lens and extremity exposures. Improvement of active dosimeters is also needed so that the measured dose is visible to the operator on-line and that the results can be easily implemented in advanced staff databases. The inclusion of dosimetry of other potentially radiosensitive organs (brain, heart) might also be needed. In the medical field, there is the special problem of whole body dosimetry in case of lead shielding (lead apron, thyroid shield). This requires the development of the best method to monitor effective doses in case of inhomogeneous irradiation.

In particular, accurate active dosimeters for neutrons should be developed. External dosimetry for neutron radiation, which is inevitably accompanied by a photon component, still presents challenges despite many years of development of neutron personal dosimeters. Neutron sources are intentionally used and/or incidentally created in various scientific areas, and in technical and medical applications. Some of the fields represent particular challenges due to strongly pulsed radiation or due to an energy range of interest that might cover many orders of magnitude from thermal energies up to several 100 MeV. The simultaneous measurement of energy and directional distributions might be beneficial

The developed dosimeters should be user friendly and take into account work specifics of different users and their working environment. Changes in the behaviour of individuals using on-line dosimeters can be part of the research scope. A draft exploitation plan should be included.

Expected impact

The availability of reliable and on-line personal dosimetry for workers will increase the awareness of the workers and will improve the optimal application of the ALARA principle. Development of more accurate dosimeters will decrease the large uncertainties that still exist in personal dosimetry, especially for neutrons, and will thus be an important improvement in estimating the risk of working with ionising radiation.