Recent ICRU activities

Thomas Otto, ICRU and CERN

BIPM – 25th Meeting of the Consultative Committee for Units
ICRU Report 92 (2019)
Radiation Monitoring for Protection of the Public after Major Releases of Radionuclides to the Environment

- Major Radioactive Releases to the environment
- Monitoring Programs
- Monitoring Systems and Methods
- Quantities used in Radiation Protection
- Appendices - Examples
- Extensive list of references and bibliography
ICRU 92 – Monitoring Systems and Methods

- Overview of dosimeters, monitors and systems for
  - Early warning
  - Area monitoring
    - External radiation
    - Airborne radiation
    - Ground Contamination
  - Personal monitoring
    - External radiation
    - External contamination
    - Internal contamination

- with extensive references to original literature
ICRU Report 93
Prescribing, Recording and Reporting Light Ion Therapy

- Radiation biology
- Beam delivery
- Dosimetry
- Volumes in ion therapy
- Treatment planning
- Management of patient and organ motion
- Estimation of uncertainty
- Quality assurance
- Prescribing, recording and reporting treatment
ICRU 93 – Facilities and Treatment plans

- Comprehensive report on this cancer treatment modality
- Guideline for new centers
ICRU Report 94 (2019)
Methods for Initial-Phase Assessment of Individual Doses following Acute Exposure to ionizing Radiation

- Quantities
- Biodosimetry
- Physical Dosimetry
- Neutron Activation, Bioassay
- Radiation Field Mapping
- Applications
ICRU 94 – Bio- and Fortuitous Dosimeters

- EPR: Principle similar to NMR (RF resonance in B-field)
- Body Dosimeters: bone, teeth, nails
- Fortuitous Dosimeters: sugar, glass, cotton, plastic
- few Gy – 100s of Gy

- Luminescence: Principle similar to TLD or OSL: light emission after stimulation
- Fortuitous Dosimeters: Chip cards, Integrated Circuits, LCD display, Touchscreen, …
- 10s of mGy to 10s of Gy
ICRU Report 95 (2020)
Operational Quantities for External Radiation Exposure

- Previous quantities (ICRU 39 and 51)
- Operational Quantities for external exposure
- Conversion Coefficients
- Practical Consequences
- Appendices
  - Values of Conversion coefficients
  - Computer Codes
ICRU 95 – New Operational Quantities

- Definition of operational quantities with help of the same numerical phantoms as for protection quantities
  - $H^*$ - Ambient dose
  - $H_p$ – Personal dose
- Leads to simplification of the system and better coherence
- Also new definition of operational quantities for eye lens, skin and extremities

$H^*(10)$ Ambient dose equivalent

Change from ICRU sphere

$H^*$: Ambient Dose

Conversion coefficients on anthropomorph phantom for orientation of maximal effective dose
ICRU 95 – Conversion Coefficients

- By definition, conversion coefficients to the new quantities **fit the energy-dependence of the protection quantities**
- Conversion coefficients for many radiation types and extended energy range
  - $H^*$ up to 10 GeV
  - $H_p$ up to 1 GeV
Thank you for your Attention