AbstractID: 4402 Title: In’s and out’s of non-equilibrium dosimetry

Typical procedures for clinical dosimetry are well established for measurements in charged particle equilibrium situations. These situations only form a subset of the measurement challenges of a clinical physicist. Dose measurements in regions of charged particle disequilibrium require special considerations before the measurement can be assumed accurate. These disequilibrium conditions occur in association with measurements performed for standard clinical treatment techniques as well as for special treatment techniques. In the symposium we identified four major areas that complicate accurate clinical dosimetry: (1) the photon build-up region, (2) narrow photon beams, (3) measurements in heterogeneous phantoms and (4) modulated fields and dynamic measurements.

In the present lecture we describe the principles of accurate dose measurements in general in equilibrium and non-equilibrium situations. Principles of detector response, energy dependence and characteristics of practical detectors are described with emphasis on the understanding of detector behaviour in non-equilibrium conditions. By way of introduction, practical examples will be provided of non-equilibrium measurements in the build-up region, narrow beams, heterogeneous phantoms and IMRT beams. The lecture will provide general guidelines about detector suitability for commercially available devices for the discussed areas of application. Finally, uncertainties of the procedures in a clinical context will be discussed.

Educational objectives:

1. To understand the fundamental complications of non-equilibrium measurements
2. To understand the impact of detector properties on measurement accuracy in non-equilibrium situations
3. To place measurement uncertainties in non-equilibrium conditions in a clinical perspective.