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Modelling of an Apex Microcollimator coupled with a Precise linear accelerator for radiosurgery treatments

Sophisticated devices are used in Stereotactic Radiosurgery (SRS) for delivering small radiation beams in specific geometries. Computer planning systems are customized with specific dosimetric data corresponding to the specific machine.
At Instituto Nacional de Oncologia y Radiobiologia, an Apex micro multileafs collimator was adopted together with an Elekta Precise linear accelerator for SRS treatments. The system's dosimetric characteristics were measured, according to the manufacturer's recommendations for modelling the beam in a Monaco Treatment Planning System (TPS). The beam production and delivery system is not usual and its measurements are also of interest for small fields dosimetry research.
Measurements were carried out with three dosimetric systems, generally considered as suitable for small fields dosimetry as found in SRS. A Pin Point ionization chamber, a diode and a diamond dosimeter, all from PTW, were used in combination with a 3D water phantom and Mephysto software, also from PTW.
Output Factors, depth dose curves and profiles were measured at different depths. In this work, measurements results and comparisons among them are presented. In order to conform the beam model, the data gathered with the diode was selected. For very small fields was, the chamber's results diverged from those of the other systems, as previously seen in other works.
With this work's results, the Apex radiation beam model could be modeled and the Monaco TPS will have the capacity to calculate SRS treatments. Besides, results from these measurements contribute to the international research project related to small beam dosimetry.

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