

# Small Field Dosimetry comparison of 6 MV beams profiles acquired with DiodeSRS vs TPS calculated profiles



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## Purpose:

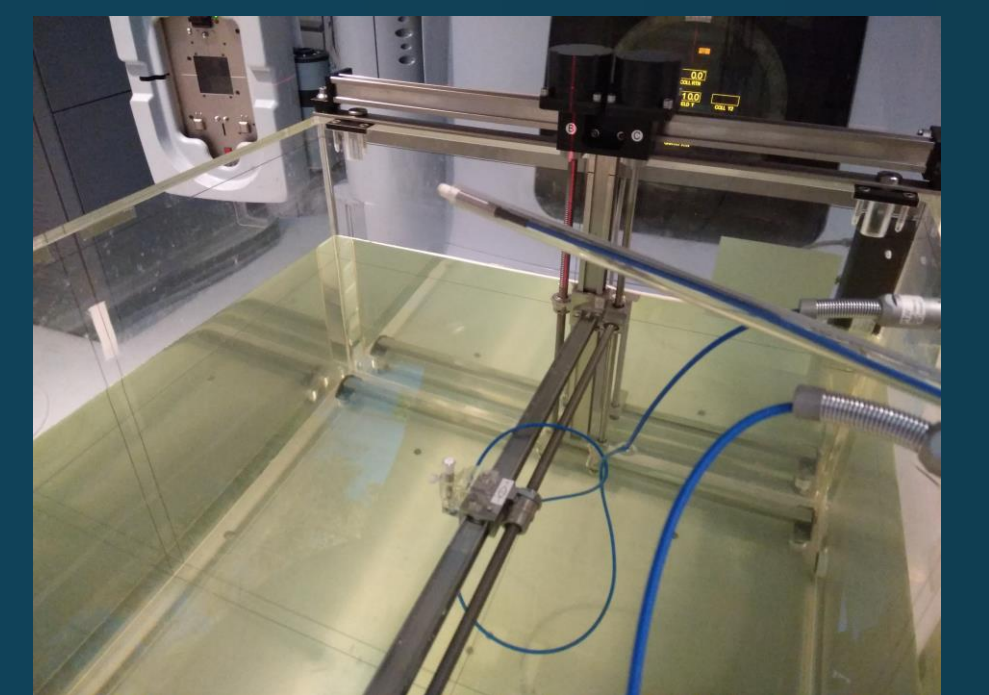
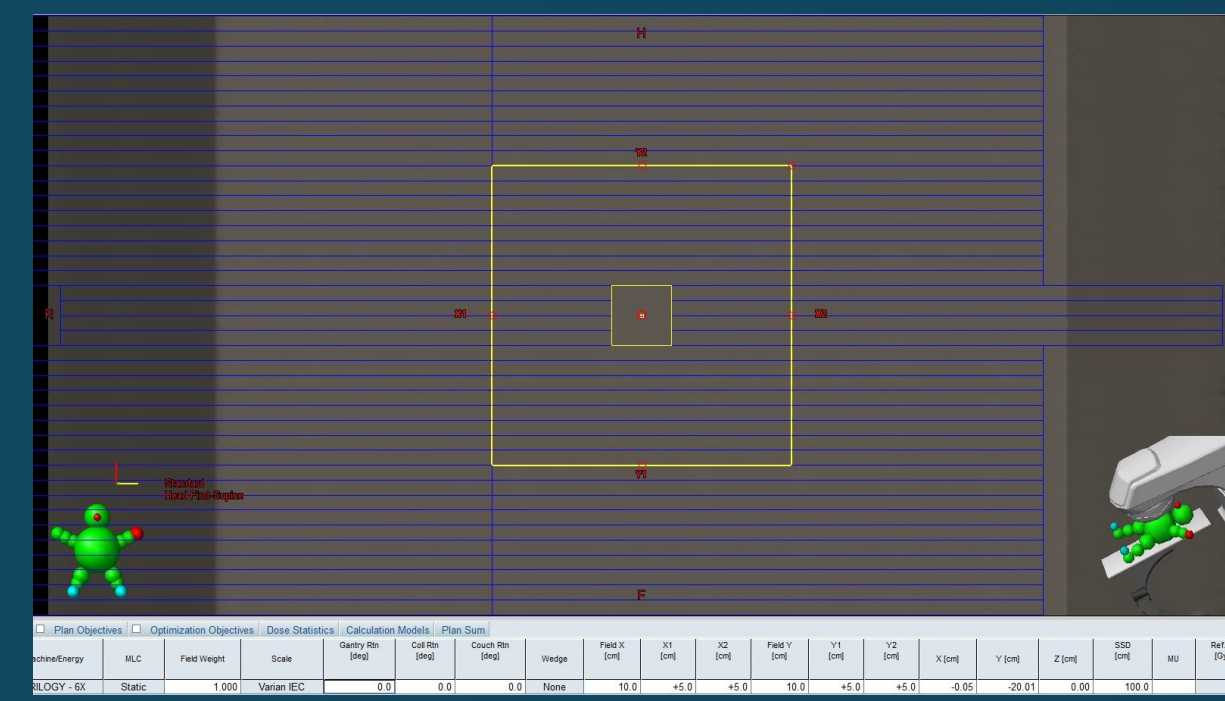
Compare TPS calculated profiles based on 0.125cc ionization chamber measurements for linac commissioning with beam profiles acquired using IAEA small beam recommendations with DiodeSRS

## Methods

At Eclipse™ 11.0 we calculated dose distribution for 20x20mm, 30x30mm and 40x40mm MLC collimated fields at 100cm SSD with AAA algorithm based on data acquired with 0.125cc PTW ionization chamber and using TPS dose profile tool, we exported the dose values at 10cm depth.

20x20mm, 30x30mm and 40x40mm MLC collimated field profiles with SSD=100cm at 10cm depth, were acquired following IAEA Technical Reports Series Nº 483 in water phantom using Diode SRS TM60018 PTW and Mephysto™ mc<sup>2</sup> PTW.

All extension of the transverse beam profiles were compared.

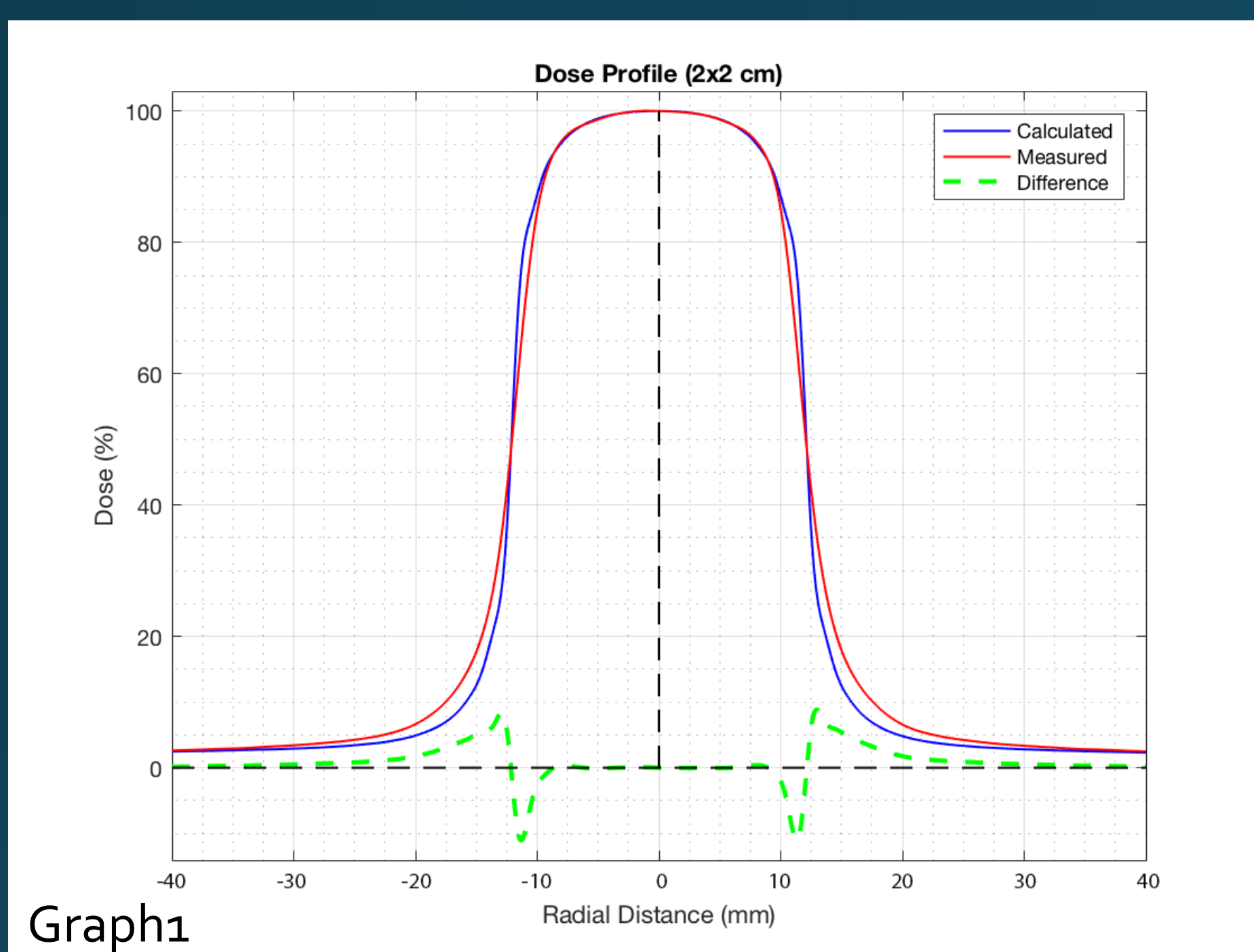


## Results and Discussion

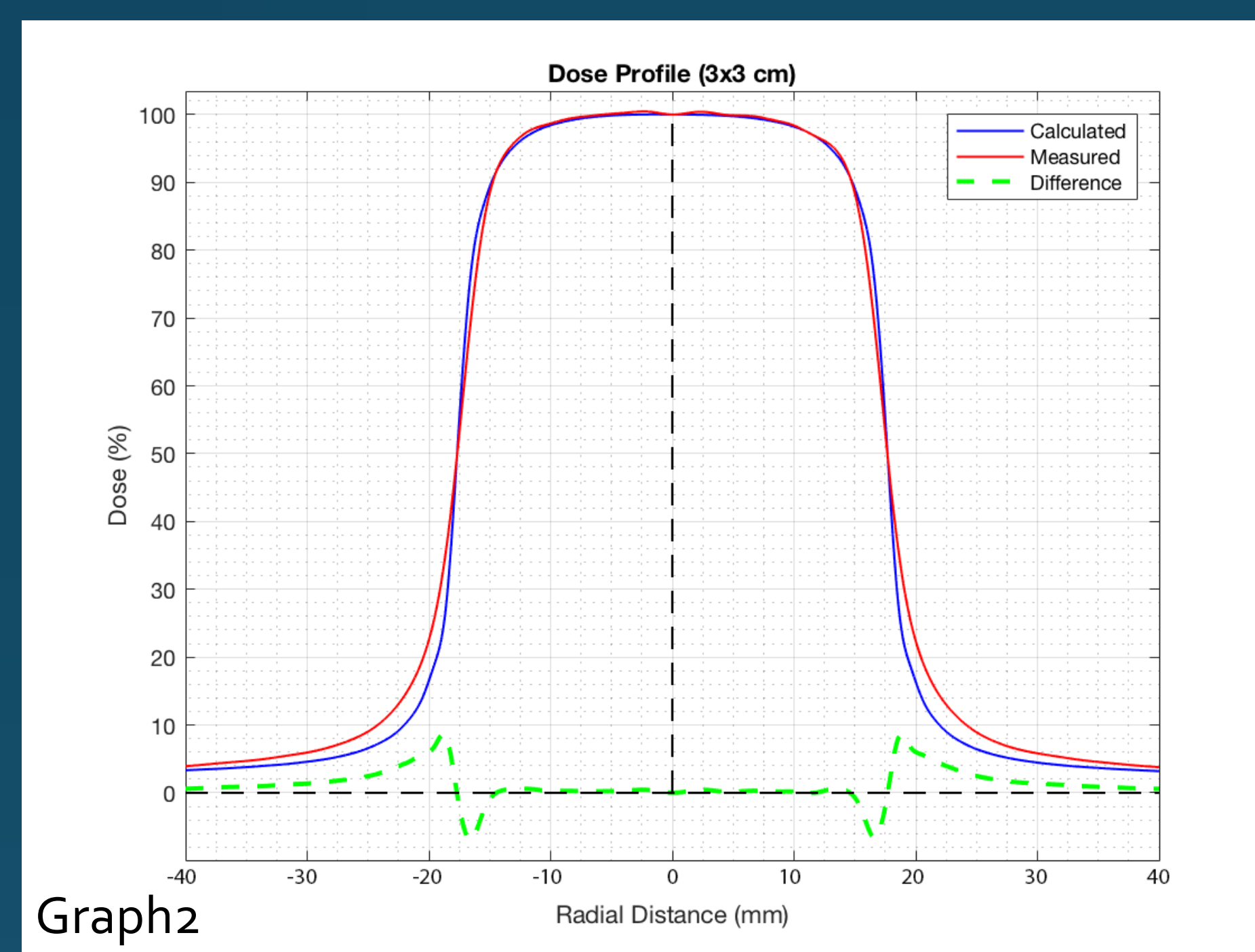
Analysis was made using MatLab R2017B to compare Measured (Meas) and Calculated (Cal) data.

Graphs 1, 2 and 3 represent the Dose beam profiles comparison for three small fields.

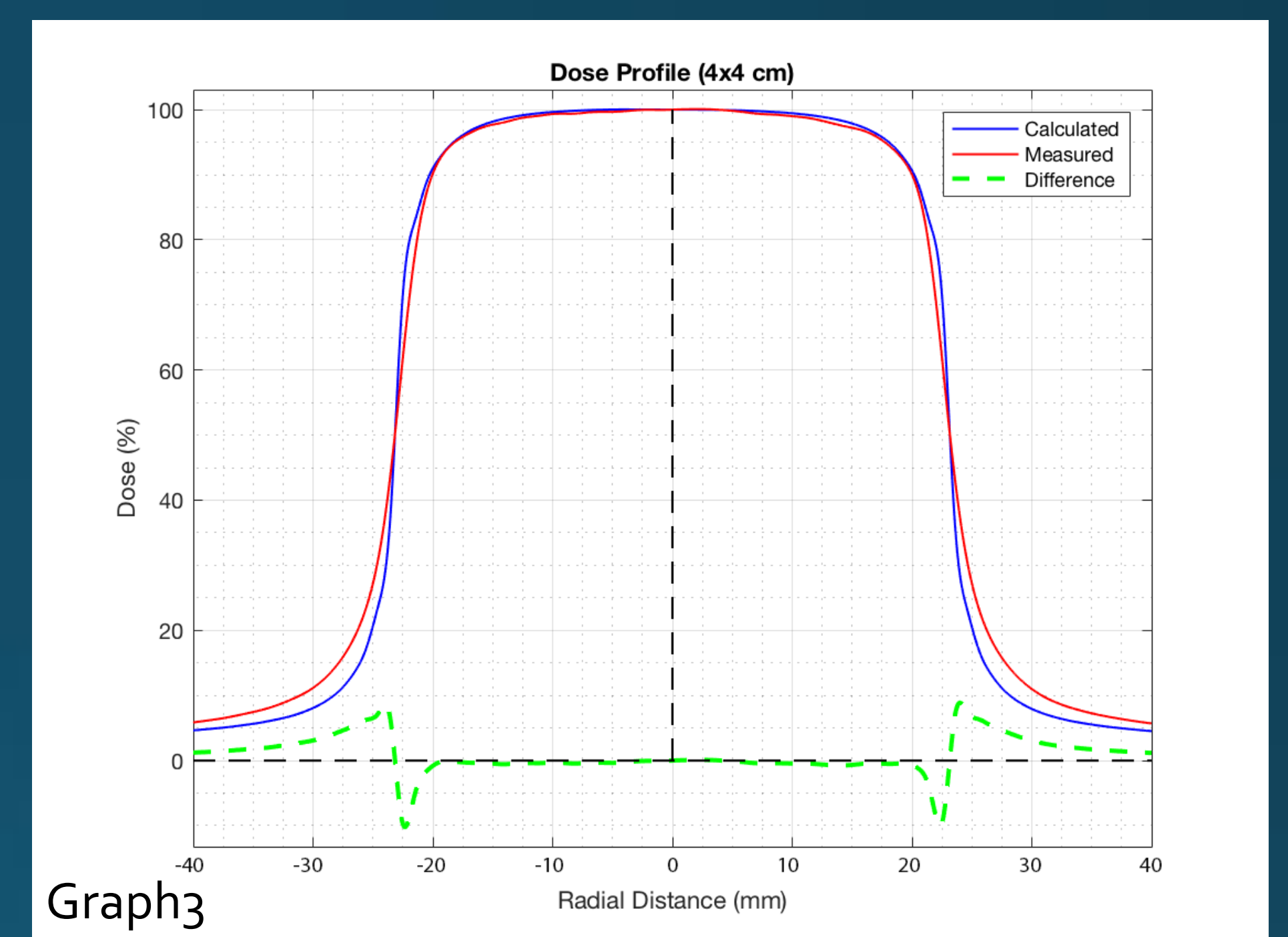
We analysed differences in Field Size (mm) – FWHM –, Penumbra(mm) – 80%-20% – and Maximum dose deviations between measured and calculated values.



Graph1



Graph2



Graph3

Field Size (mm)	Cal	Meas
20 X 20	24,22	24,13
30 X 30	35,36	35,34
40 X 40	46,32	46,33

Penumbra (mm)	Cal	Meas	≠ (mm)
20 X 20	2,70	4,18	1,48
30 X 30	3,03	4,58	1,55
40 X 40	3,17	4,94	1,77

Curve analysis	Cal<Meas Major ≠	Cal>Meas Major ≠
20 X 20	11,08%	8,84%
30 X 30	6,94%	8,64%
40 X 40	10,23%	8,89%

There was a good agreement in field size. Measured Penumbra is always wider than Calculated.

Analysing dose, we find differences between 11,08% and 6,94%. Inside field, no relevant differences were found. Calculated doses were higher than Measured in the region 80%-50% and lower in region 50%-5%.

AAA algorithm based on data acquired with 0.125cc PTW ionization chamber for jaws collimated fields, may be underestimating the MLC leaves transmission (differences found in region 50%-5%) and the active volume of the chamber can influence measured values (explaining differences in region 80%-50%).

## Conclusions

Using the IAEA protocol for small field measurements we found that DiodeSRS detectors are more accurate measuring small field relative dosimetry. We intend to recommission our linac small fields according to IAEA report and evaluate the impact on our IMRT/VMAT plans quality assurance.

### Bibliography

IAEA Technical Reports Series Nº 483  
IEC 60976