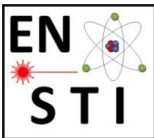




# Preparatory meeting: Dose rate quantification for Q4-assembly rotation

Marta Sabaté-Gilarte, Francesco Cerutti



**WP10**

Energy deposition & R2E

# Cumulated maximum dose in the MCBYs in MGy

Up to Run 3: 360\* fb<sup>-1</sup> → cumulated dose is ≤0.2 MGy

Horizontal Crossing	baseline	Q4-assembly rotated
250 μrad	1.1	0.7
190 μrad	1.0	0.6

Vertical Crossing			
250 μrad	up	2.4	0.6
	up/down	1.2	0.4
190 μrad	up	1.8	
	up/down	1.0	

Dose in MGy

**Run 4**  
561.3\* fb<sup>-1</sup>

\* <https://edms.cern.ch/document/2364638/1.2>

# 2D distribution of the dose at the MCBYs in MGy

Horizontal Crossing

Vertical Crossing

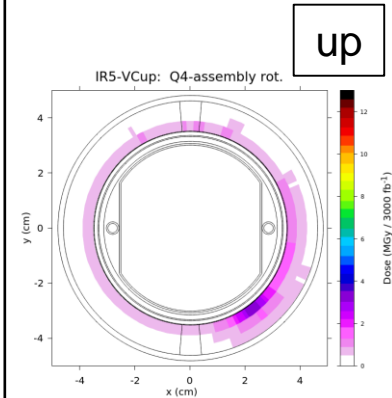
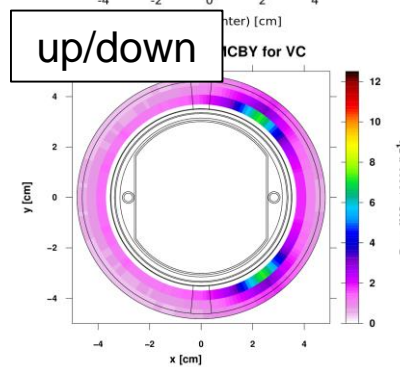
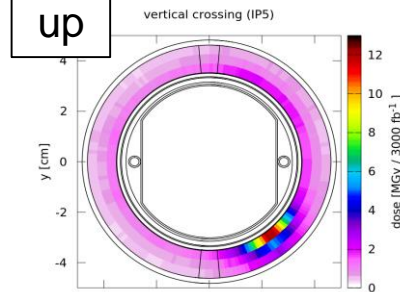
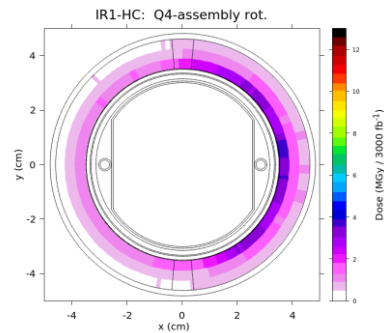
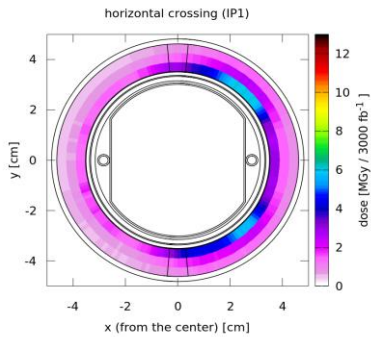
Baseline

Q4-assm. rotated

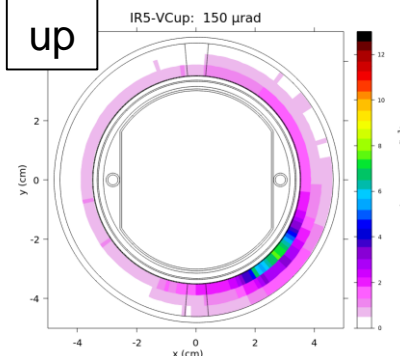
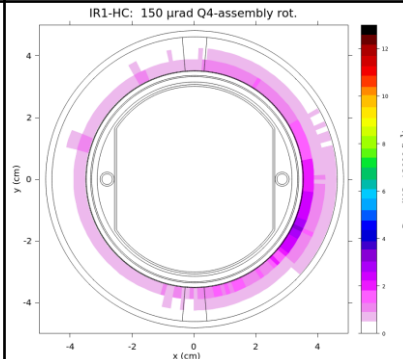
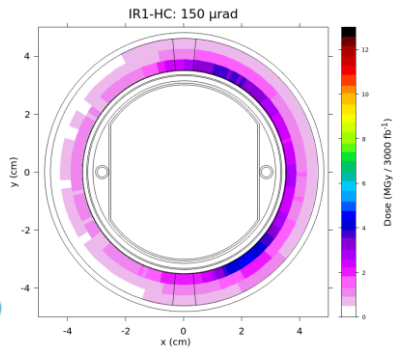
Baseline

Q4-assm. rotated

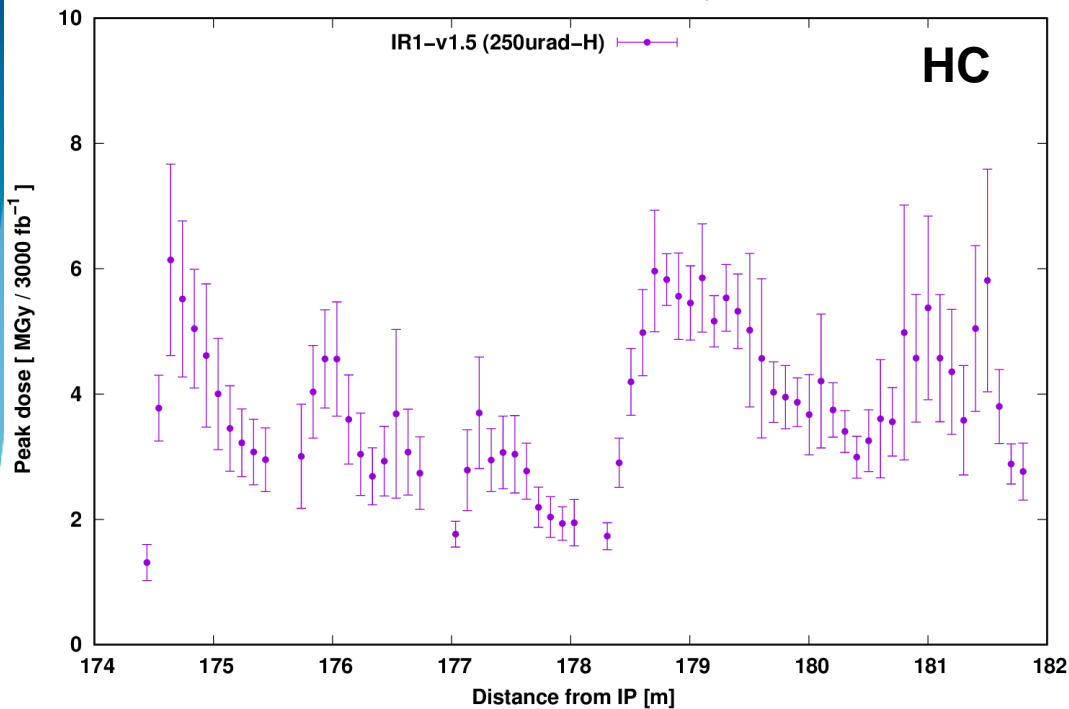
250  $\mu$ rad



150  $\mu$ rad

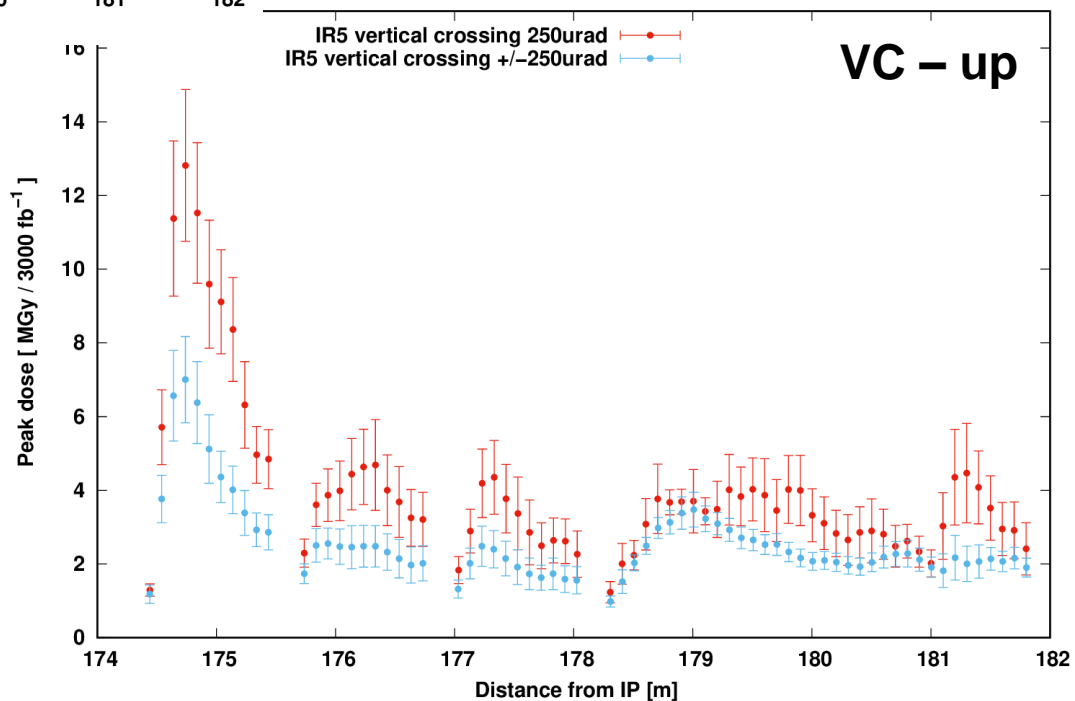


Peak dose profile in the inner coils ( $L_{int} = 3000 \text{ fb}^{-1}$ )

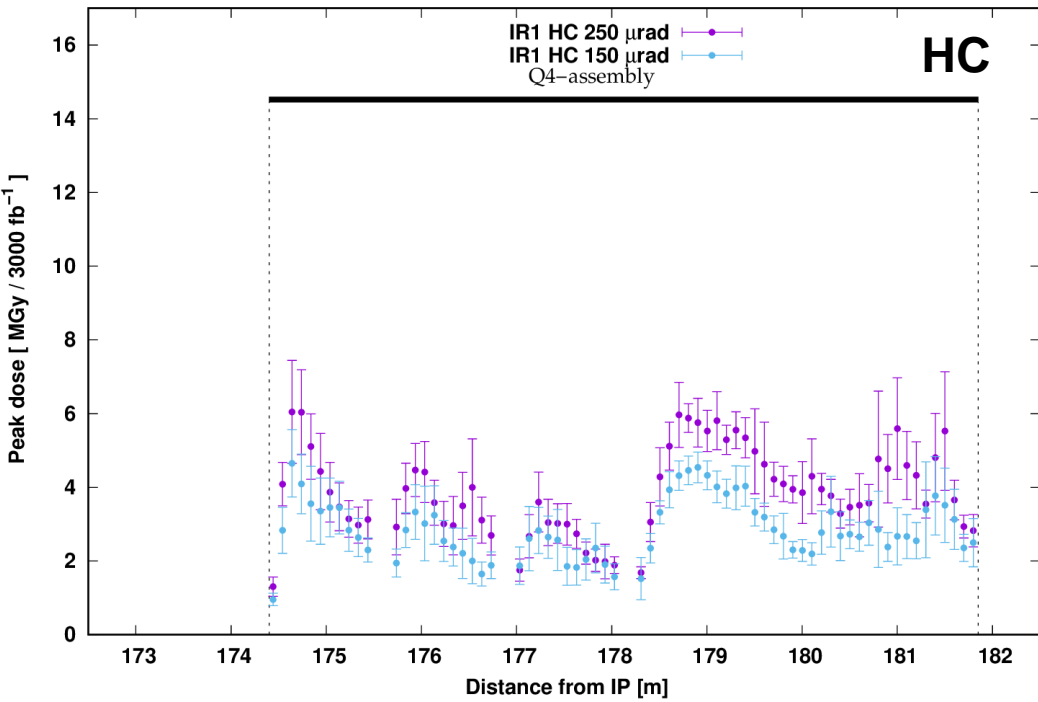


## Peak dose distribution: baseline

Peak dose profile in the inner coils ( $L_{int} = 3000 \text{ fb}^{-1}$ )

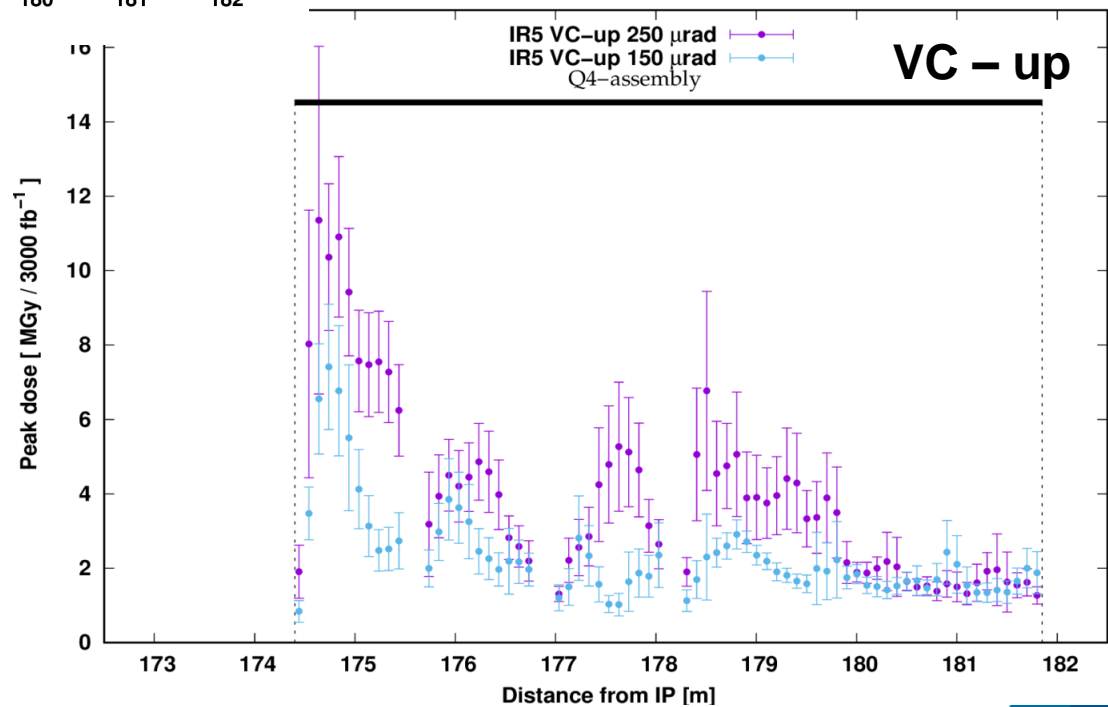


Peak dose profile in the inner coils ( $L_{int} = 3000 \text{ fb}^{-1}$ )

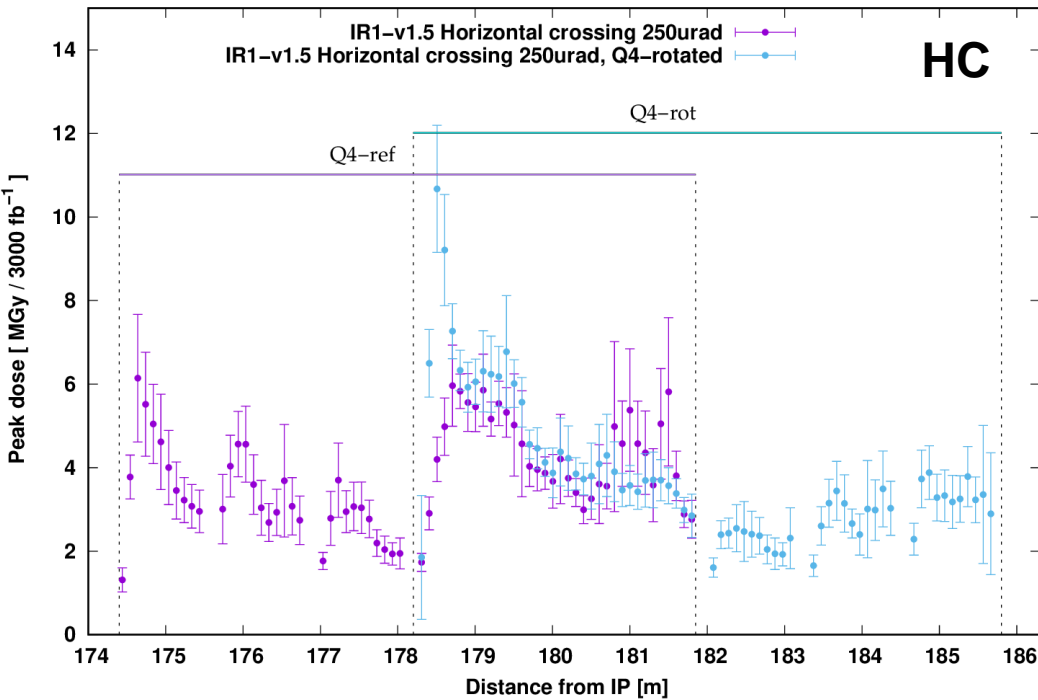


## Peak dose distribution: 150 vs. 250 μrad

Peak dose profile in the inner coils ( $L_{int} = 3000 \text{ fb}^{-1}$ )

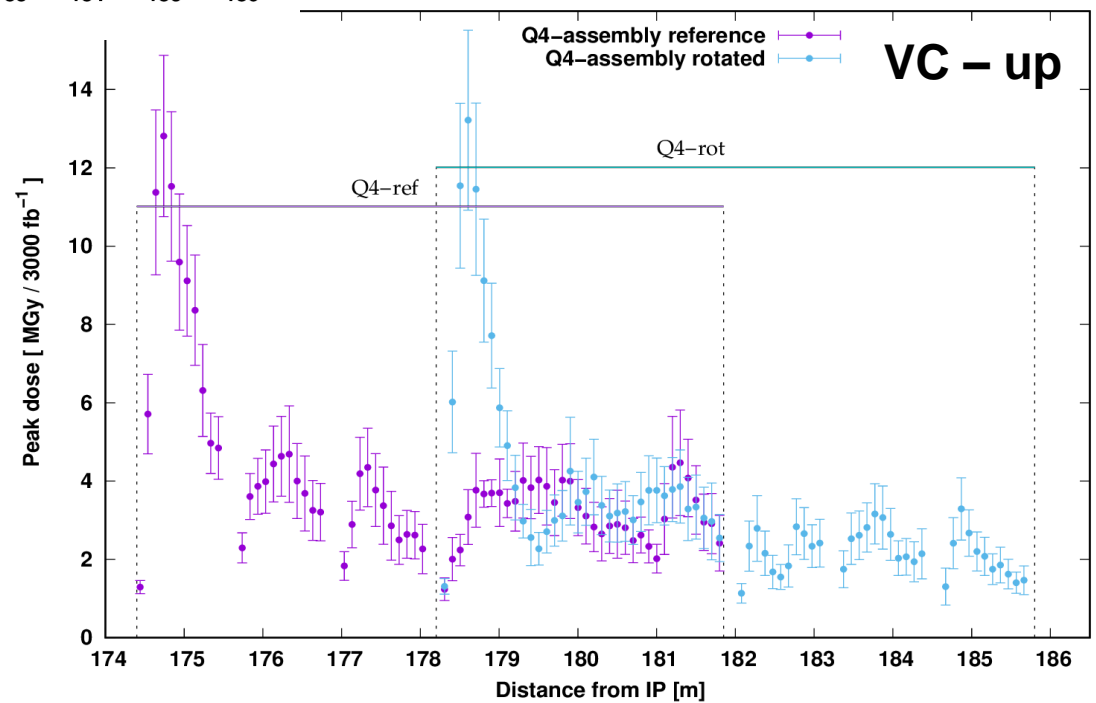


Peak dose profile in the inner coils ( $L_{int} = 3000 \text{ fb}^{-1}$ )



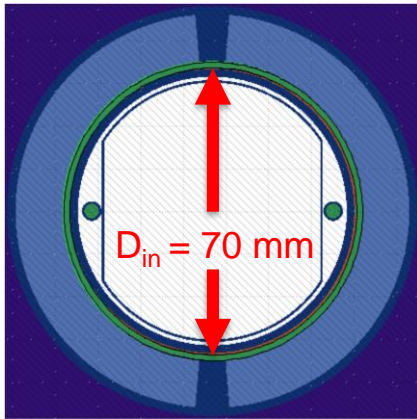
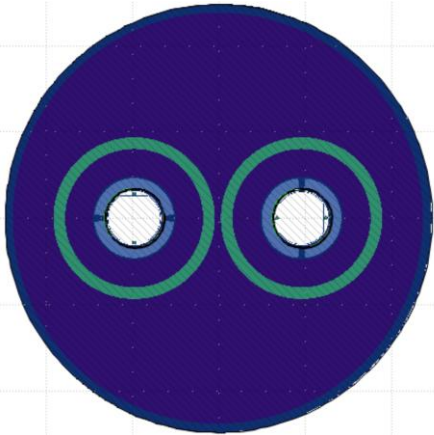
# Peak dose distribution: Q4-rotation

Peak dose profile in the inner coils ( $L_{int} = 3000 \text{ fb}^{-1}$ )



# MCBC correctors

MCBY model



When replacing the MCBC in the DS by a MCBY, the gap between 56 and 70 mm in diameter can be filled with inermet in order to protect the coils.

The heat load in this inermet layer, in the most exposed region of the DS (half-cell 9), becomes  $\sim 1 \text{ W}$  for ultimate operation, i.e.,  $7.5 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$  instantaneous luminosity.

*Important note:* in half cell 9 the total heat load is  $> 60 \text{ W}$ . 25 W of which is delivered in the first dipole of the half cell and 30 W in the second one.

MCBC model

