Simulated radiation doses at the MBW's of IR7

FLUKA team

Geometry and binning

- 40 X 45 X 100 cmc block of steel
- 10 cm distance from the MBW
- Inner radius: from 2 to 4 cm
- 1 cmc binning

- Corrections:
  - Drift space chambers: 4 cm radius
  - Beam pipe inside the MBW:

    H:2.95 cm X V:2.2 cm semi-axes ellipse

Dose distribution

- Horizontal loss scenario 40% worse than vertical
- Top and bottom coils: similar dose distribution
- Thin layer of epoxy wrapping the pipe:
  - the dose is higher than in the coils

Total power in the MBW

	TCL	MBW
No absorber		32 kW
40 mm radius	5.3 kW	29 kW
30 mm radius	17 kW	21 kW
25 mm	25 kW	15 kW
25 mm large	30 kW	13 kW
ellipses	24 kW	15 kW
ellipses ideal		11 kW
20 mm	36 kW	10 kW

Max dose, MBW coils, MGy/year

	1 cmc	Larger bin
No absorber	260	206
40 mm radius	260	200
30 mm radius	23	17
25 mm,large	17	13
ellipses	10	8
ellipses ideal	1.3	0.5
20 mm radius	11	8

Important contribution from radiation scattered inside the beam pipe

Next steps

- New 2d magnetic field in the MBW (already implemented)
- Simulations for the BLM and for the MQW
- Study of the energy in the epoxy layer wrapping the pipes
- A new 3d magnetic field may affect the dose distribution
- Investigate a longer absorber

Questions

- What are our constraints:
  - materials?
  - size of the ellipse?
  - above what level do we need water cooling?