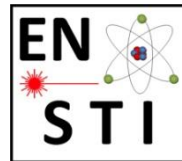# ENERGY DEPOSITION STUDIES

Maria Ilaria Besana & Francesco Cerutti

2015 June 1st

WHAT WE ARE DOING

Radiation impact on the triplet

peak power density (which quench limit?) *and dose in the Nb$_3$Sn coils*

as a function of the tungsten (INERMET) inner shielding thickness

preliminary (not conservative) assumption: continuous shielding along the InterConnects, no beam screen

explored L*=36 and 61.5m   technical report in preparation

Effect of operation condition optimization

regular swap of the vertical crossing angle sign (and of the crossing plane), as suggested by S. Fartoukh

Radiation levels in the detector

maps of dose, 1MeV neutron equivalent fluence, high energy hadron fluence, charged particle fluence
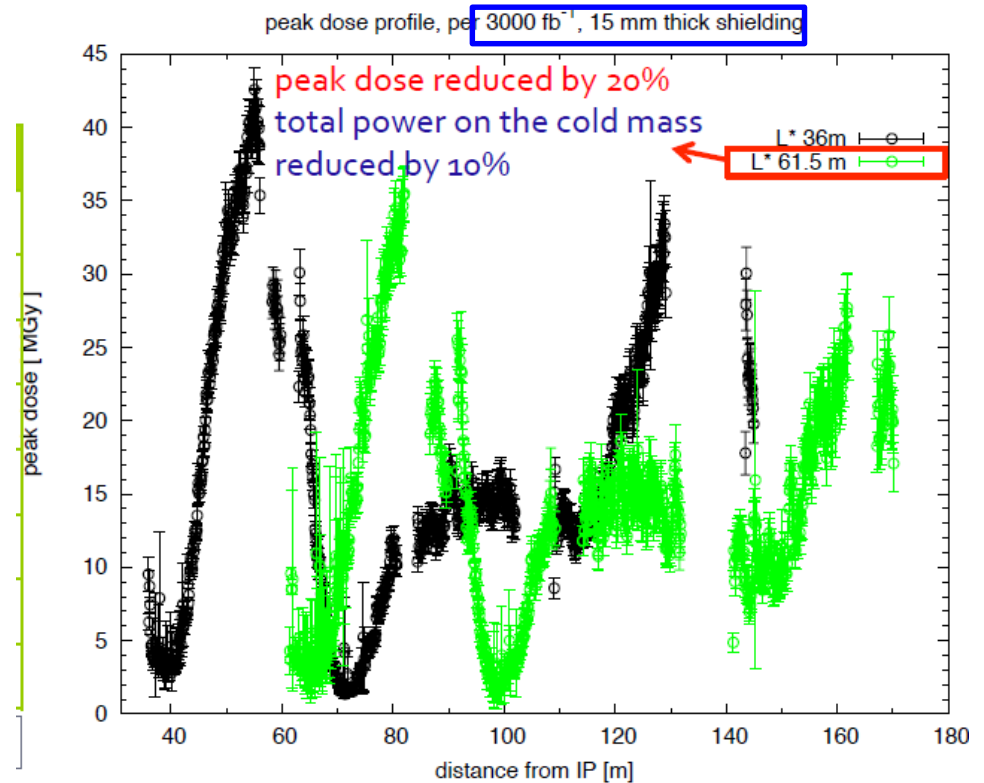

Outside this scope:

beam-gas interaction impact on the arc cell

see Besana's talk in Washington

RADIATION IMPACT ON THE TRIPLET

L* [m]	36	61.5	Effect
crossing plane	vertical	vertical	
half crossing angle [μrad]	70	85	↑
coil aperture [mm]	100	140	↓
maximum gradient [Tm^{-1}]	220	**150**	↓
TAS aperture [mm]	20	35	
Q1/Q3 length [m]	20.0	20.54	
Q2 length [m]	17.5	17.58	
corrector length [m]	1.5	3	

R. Tomas and R. Martin

peak dose profile, per 3000 fb^{-1}, 15 mm thick shielding

peak dose reduced by 20%
total power on the cold mass
reduced by 10%

L* 36m
L* 61.5 m

peak dose [MGy]

distance from IP [m]
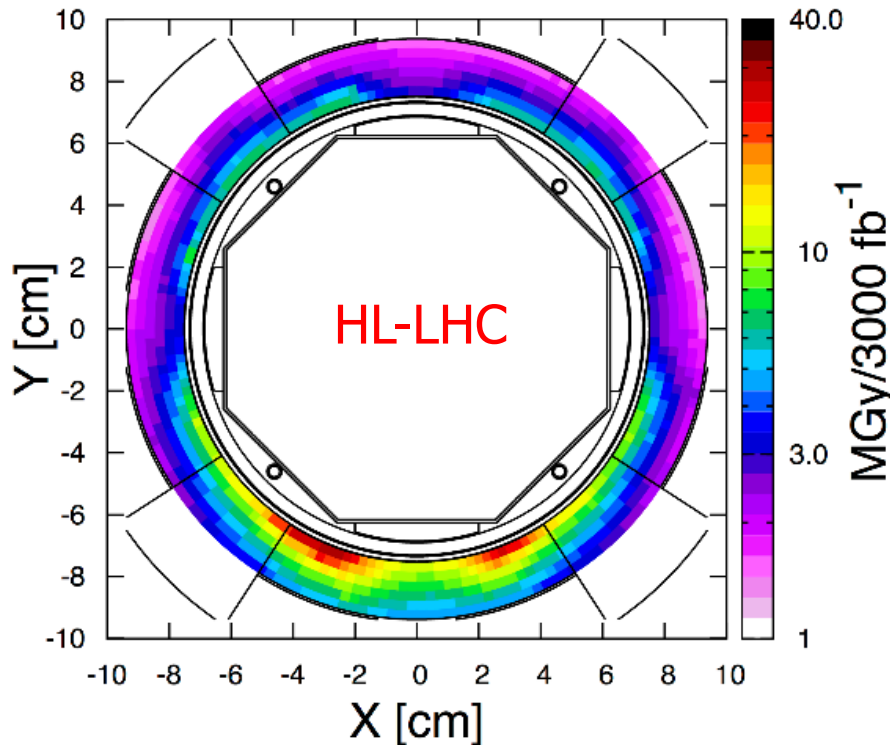
~40 MGy after 3ab^{-1}, present insulation limit taken at ~30 MGy, goal of 30ab^{-1} …
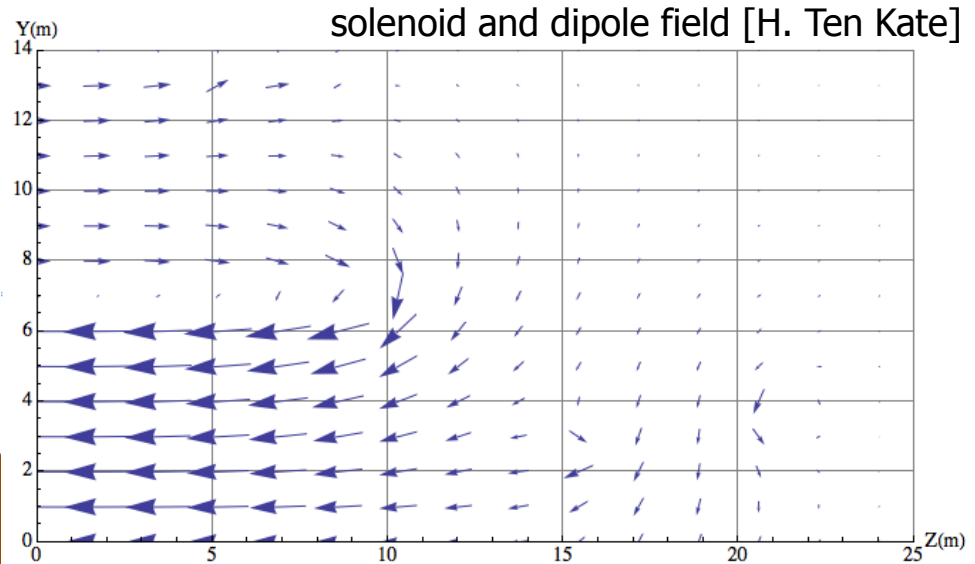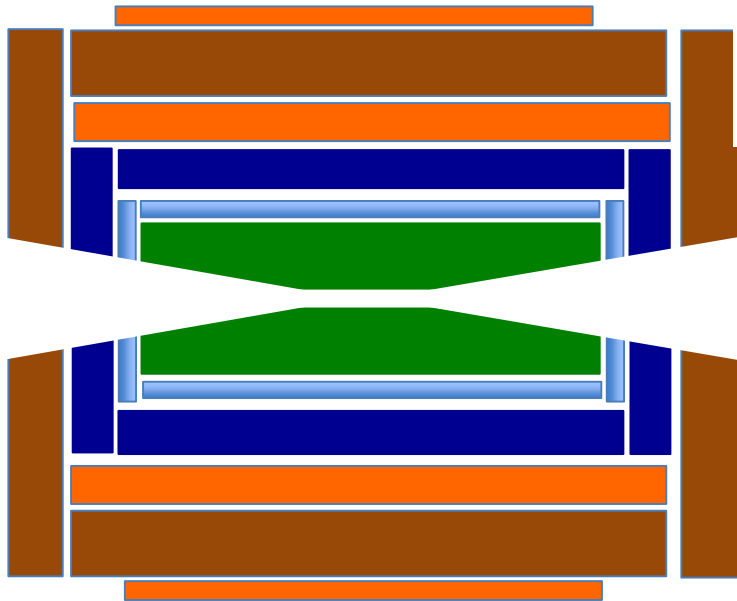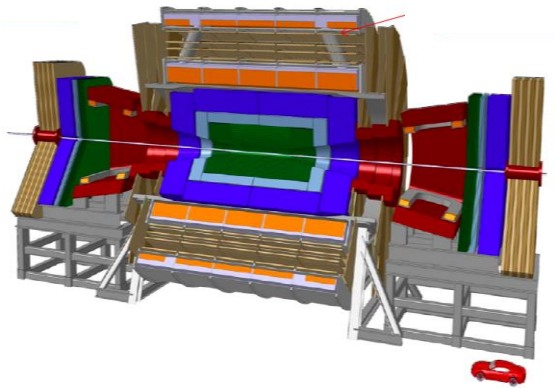
OPTIMIZING OPERATION MODE

Q3B @ IP-side

+295 urad half vertical crossing angle (upwards)

what about running half of the time at inverted angle? [S. Fartoukh]

for a –y reduction of a factor x (=5),
   peak dose gain of (x-1)/2x (=40%) and integrated lumi increase of (x-1)/(x+1) (=67%)

RADIATION CHARACTERIZATION IN THE DETECTOR

solenoid and dipole field [H. Ten Kate]

Tracker

ECAL

input through the MDI group

[W. Riegler]

HCAL

Coil

Beampipe and Forward part to be defined

Muon system