



Infrastructure/Integration/Schedule constraints

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[WP2/WP13 HL-LHC Satellite Meeting, Uppsala 2022 - Long-Range Beam-Beam Wire](#)

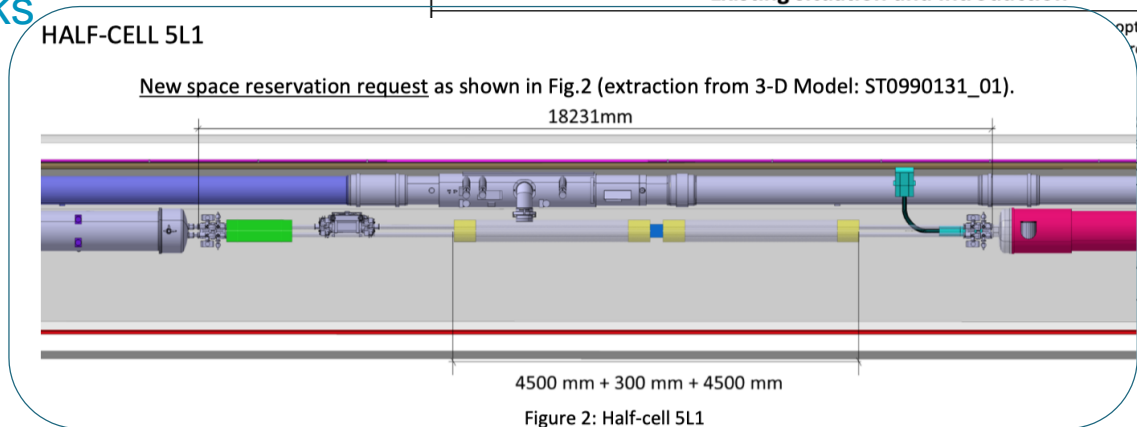
HL-LHC space reservation



EDMS NO. 2037987	REV. 1.0	VALIDITY VALID
REFERENCE : NOT REQUIRED		

- A space reservation of 4.5 m on both beams was made on either sides of IP1/5 = 1 unit per beam per location, in cell 5 (between Q4 and Q5)
- Space for racks

HL – LHC SPACE RESERVATION			
MODIFICATIONS TO THE IR1 AND IR5 OF THE LHC FOR BEAM-BEAM LONG-RANGE COMPENSATOR DEVICES			
DESCRIPTION			
<i>WP Originator</i>	WP13, PBS: 13.8.0.0.0.0	<i>Date of Issue</i>	2018-10-01
<i>Equipment</i>	BBLR	<i>CI responsible</i>	A. Rossi
<i>Drawing</i>	LHCLSXH_0001 and 0002 , 0009 and 0010	<i>Document</i>	LHC-BBC-EC-0001 (EDMS 503722)
Existing situation and introduction			



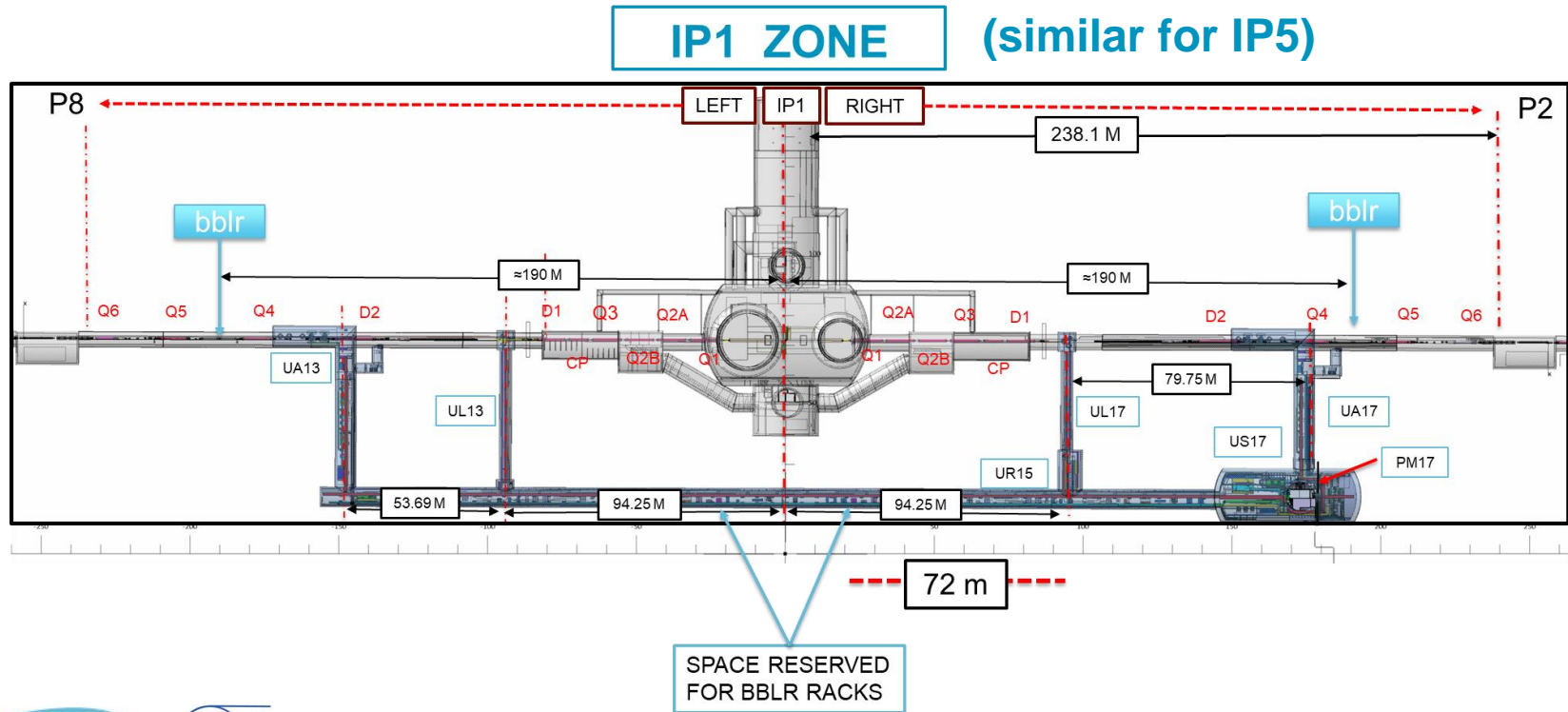
options for HL-LHC to increase ground optics) or as back-up

review, a technical proposal element to the experimental accomplish this milestone, in nitted in [2].

at drawings ([LHCLSXH_0001](#)

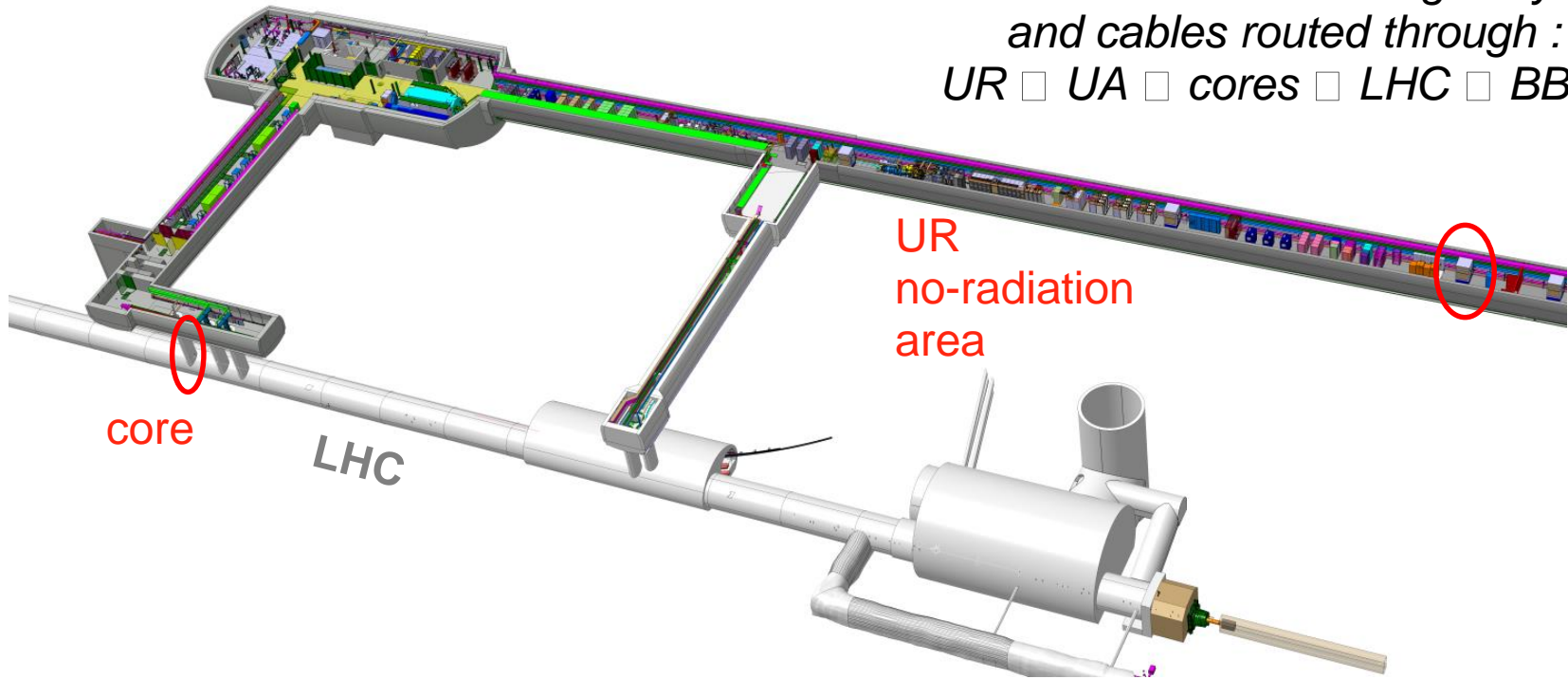


HL-LHC space reservation

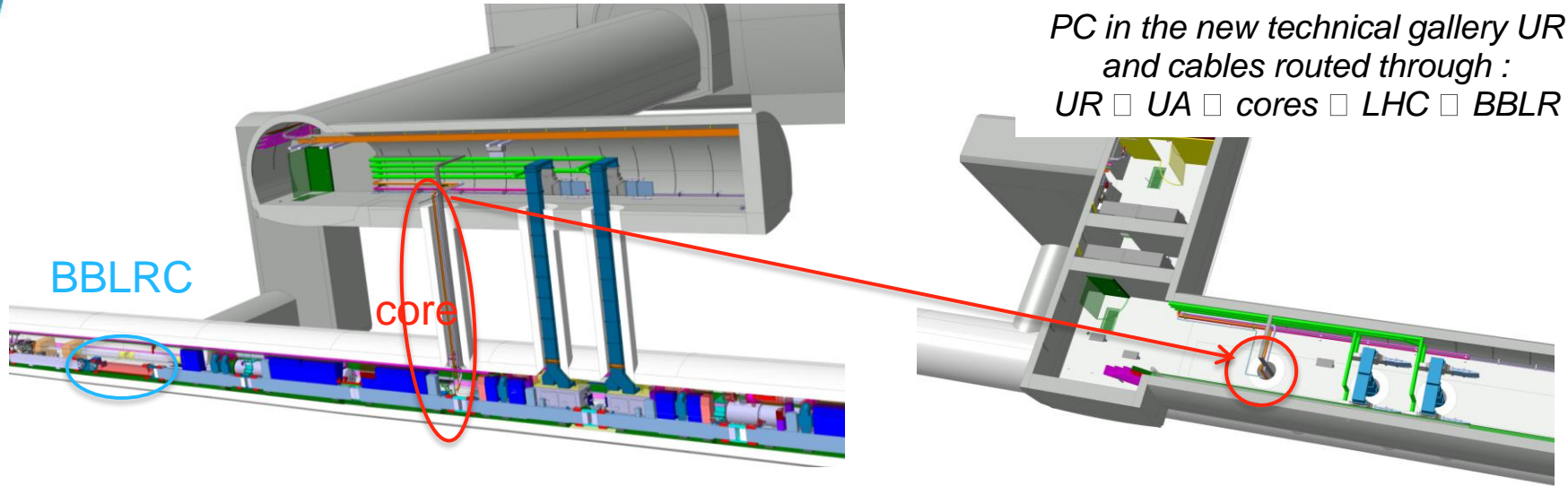


HL-LHC galleries - “UR Option”

*PC in the new technical gallery UR
and cables routed through :*
UR □ UA □ cores □ LHC □ BBLR



HL-LHC galleries - “UR Option”



Pro-1 : Finding/building converters of 150A x 60-70V* rating is feasible with commercial units.

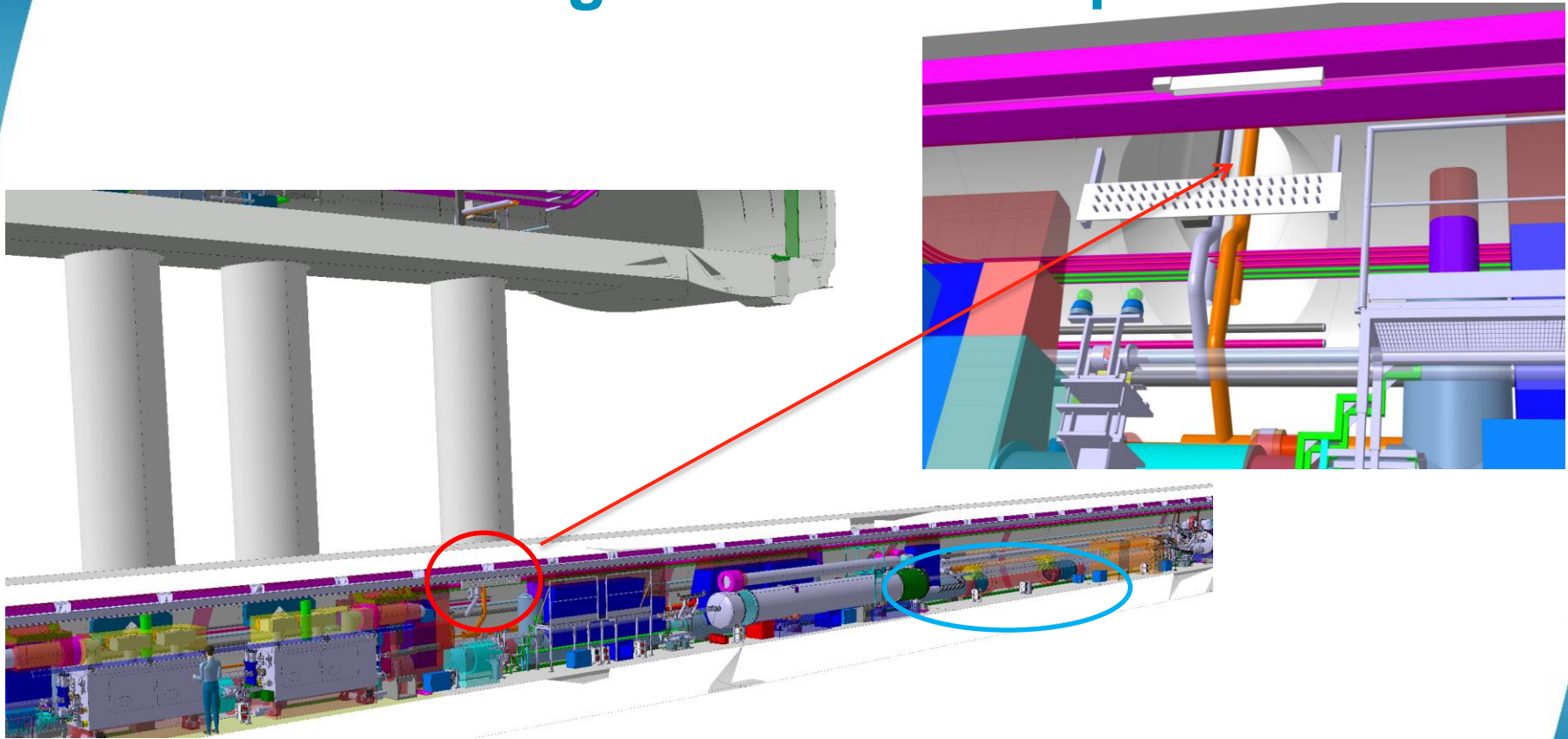
Pro-2 : Space for racks already reserved.

Con-1 : It is not possible to use any existing core: devoted to RF flexwell (fragile) cables, and not to share signal cables with power cables.

Con-2: Heat losses to be managed around the core location.

Split Air Conditioner may be required - study to be done.

HL-LHC galleries - “UR Option”

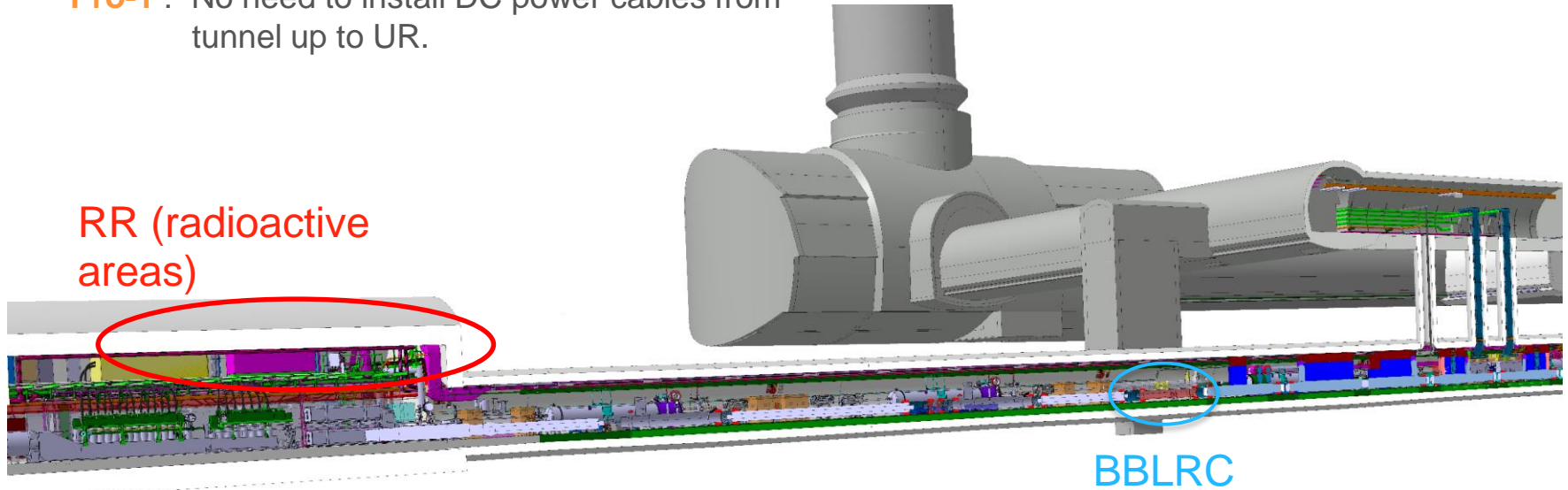


HL-LHC galleries - “RR Option”

- Con-1** : This would require **new** radiation tolerant design converters. Effort (design) for only few units (#8).
- Con-2** : Need to find place in RR(1/5), not studied here.
- Pro-1** : No need to install DC power cables from tunnel up to UR.

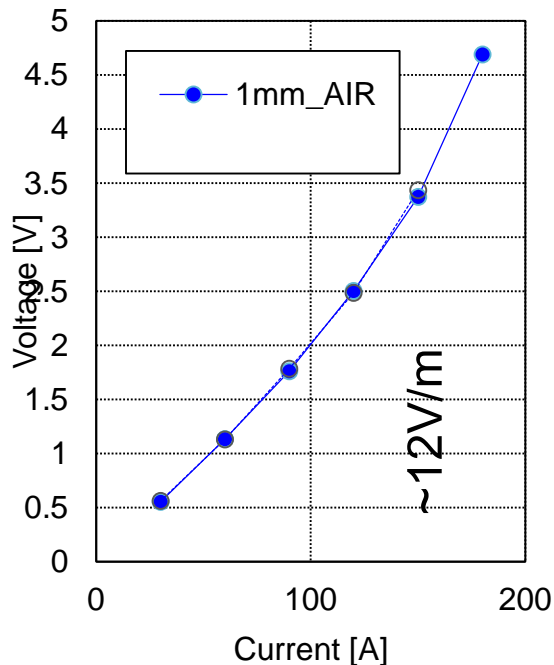
PC in the LHC RR alcoves
and cables routed through :
RR □ BBLR

RR (radioactive
areas)

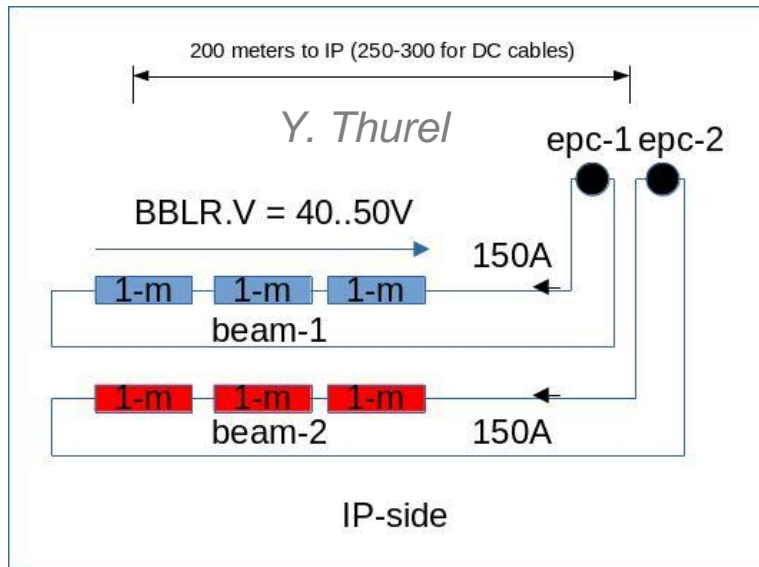


BBLRC

Powering: series recommended




A. Bertarelli et. al,
Special Joint HiLumi WP2/WP5 Meeting
22.02.2022

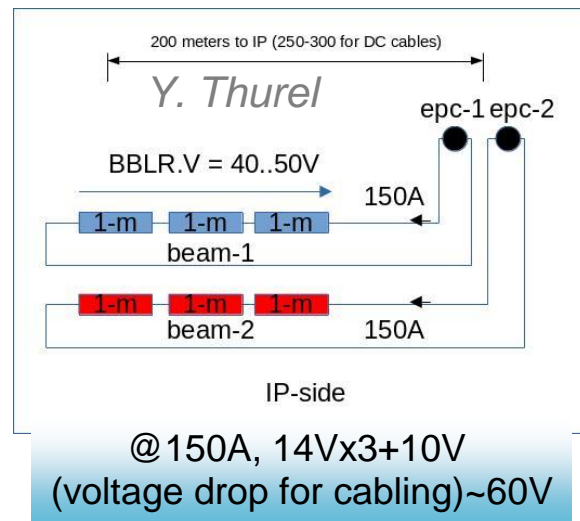


@150A, $14\text{V} \times 3 + 10\text{V}$
(voltage drop for cabling)
52V

Powering: series recommended

Power Converter Characteristics

COMBO Converters	<i>COMmercial Based cOnverter</i> <i>01 COMBO Power Rack</i>  <i>02 COMBO-DELTA [200 A; 60 V] - HCRPAHL</i>
Converter Type	<i>1 Quadrant</i>
Control type	<i>FGC3 / Ethernet+</i>
Current Accuracy	<i>100 ppm</i>



Ballpark figures:

- 1 rack with 2 converters of 12 kWatts each \approx 60 kCHF \Rightarrow 240 kCHF
 - (1 rack with 1 converters of 18 kWatts each \approx 50 kCHF \Rightarrow 400 kCHF)
- Cabling expected \approx 500 kCHF (to be confirmed)

Schedule constraints

- Cabling should be ideally implemented in the same campaign as for the rest of HL-LHC (LS3)
 - If the power cable have to go in the same core as the RF cables, we should install them before (hybrid solution with bas-bars?) so to minimise impact on RF cables. Thermal studies to be done.
 - If HL-LHC chooses to add another core (review in Nov. 2022), time may be more relaxed, but it would be less expensive/more efficient to do it at LS3.