Science & Technology Facilities Council

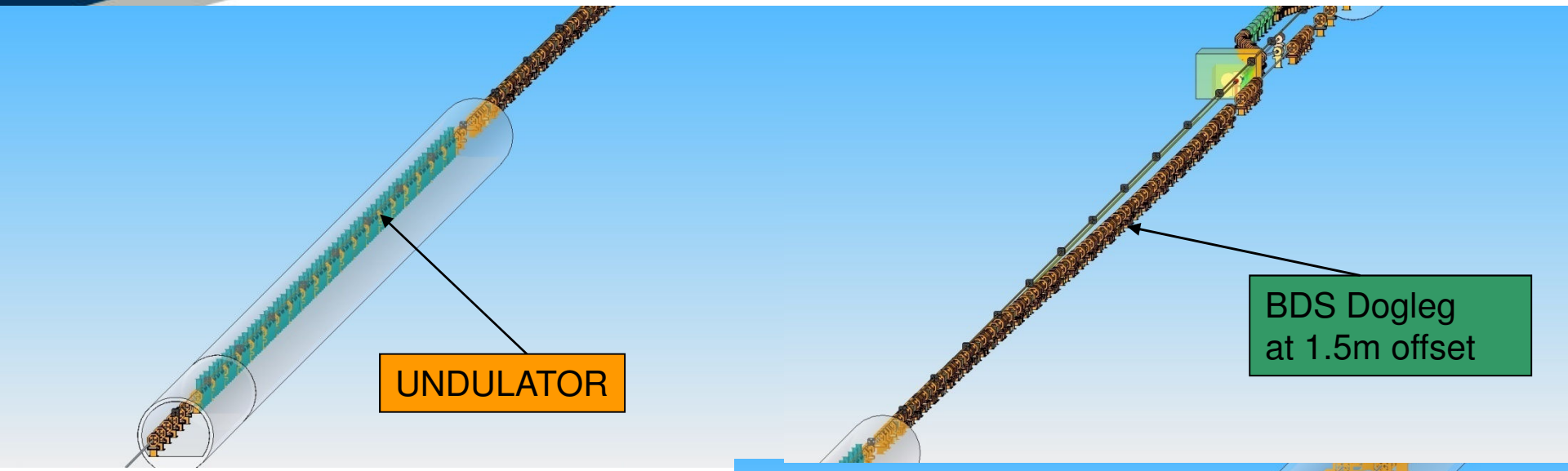
Linear Collider Positron Source and Central Integration Update

Norbert Collomb

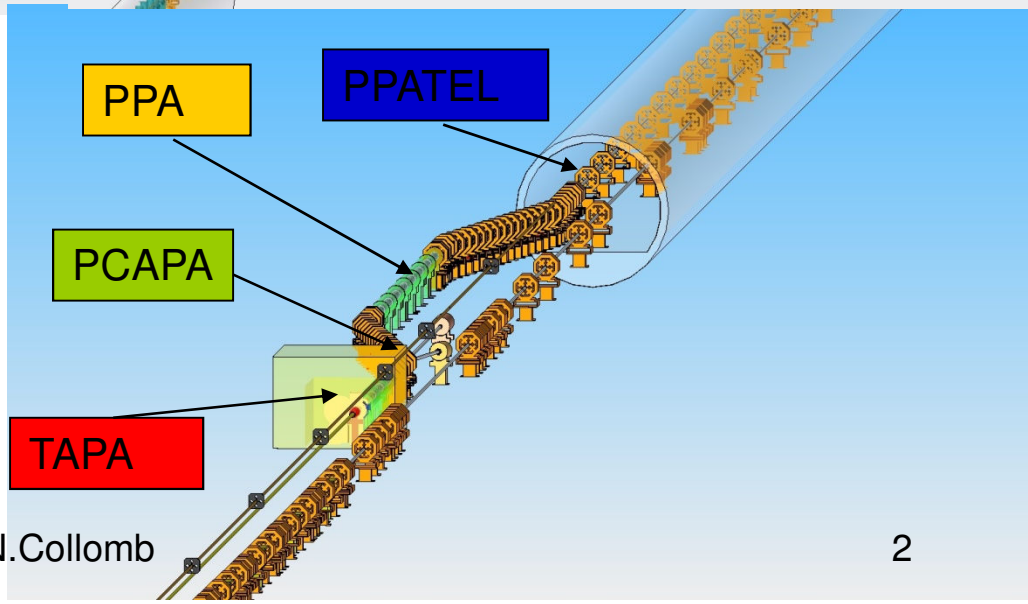
Acknowledging assistance from:

N. Walker, J. Clarke, E. Paterson, V Kuchler, J. A. Osbourne, T. Lackowski, A. Wolski, S. Guiducci, N. Solyak,…

Positron Source – TILC09 status

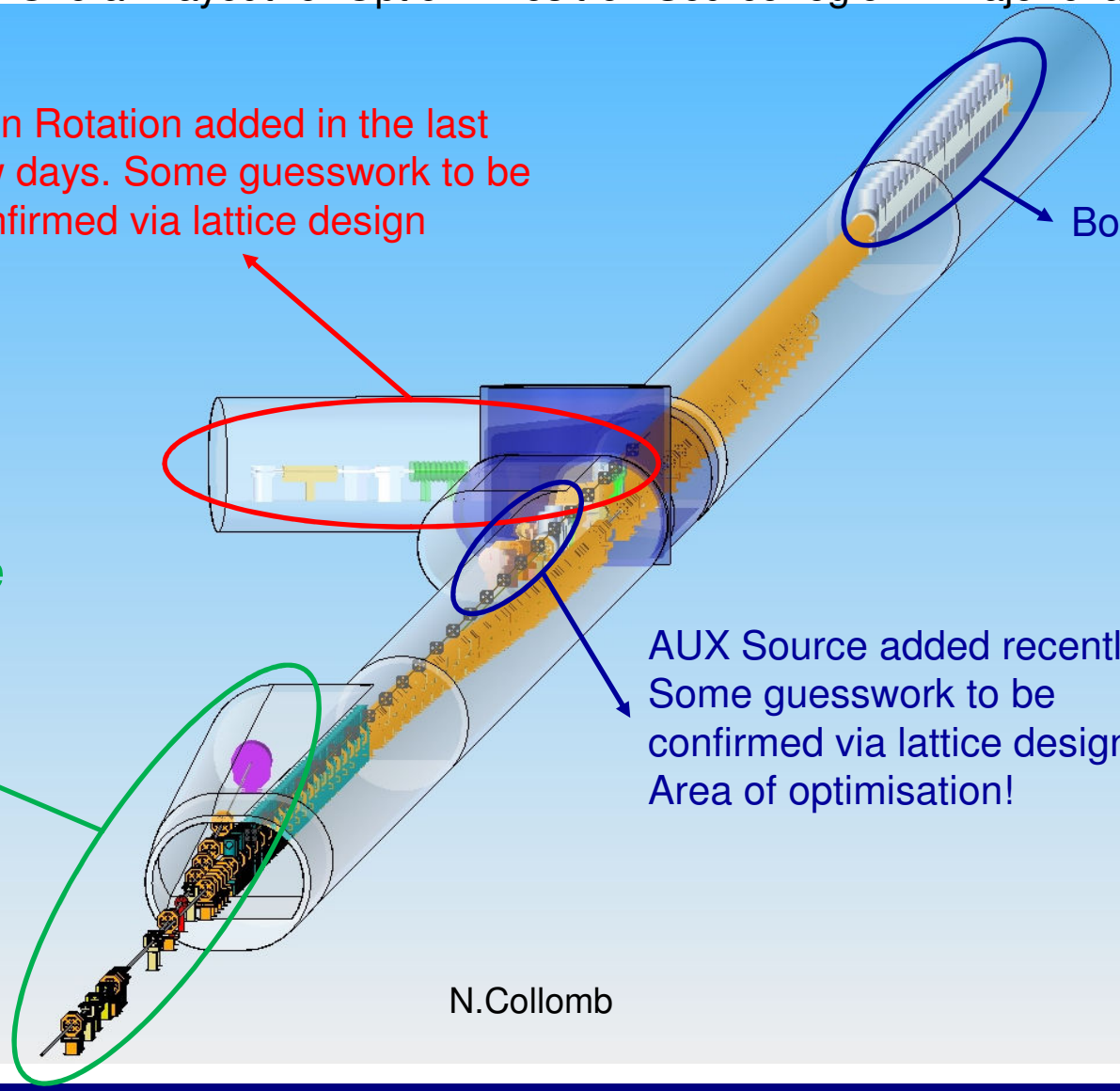


1. Undulator moved from 150 GeV to 250 GeV location.
2. PTRAN moved from ceiling into same plane as rest of machine.
3. No Auxiliary Source and 5GeV Accelerator info.
4. Spin Rotation in question, hence omitted.



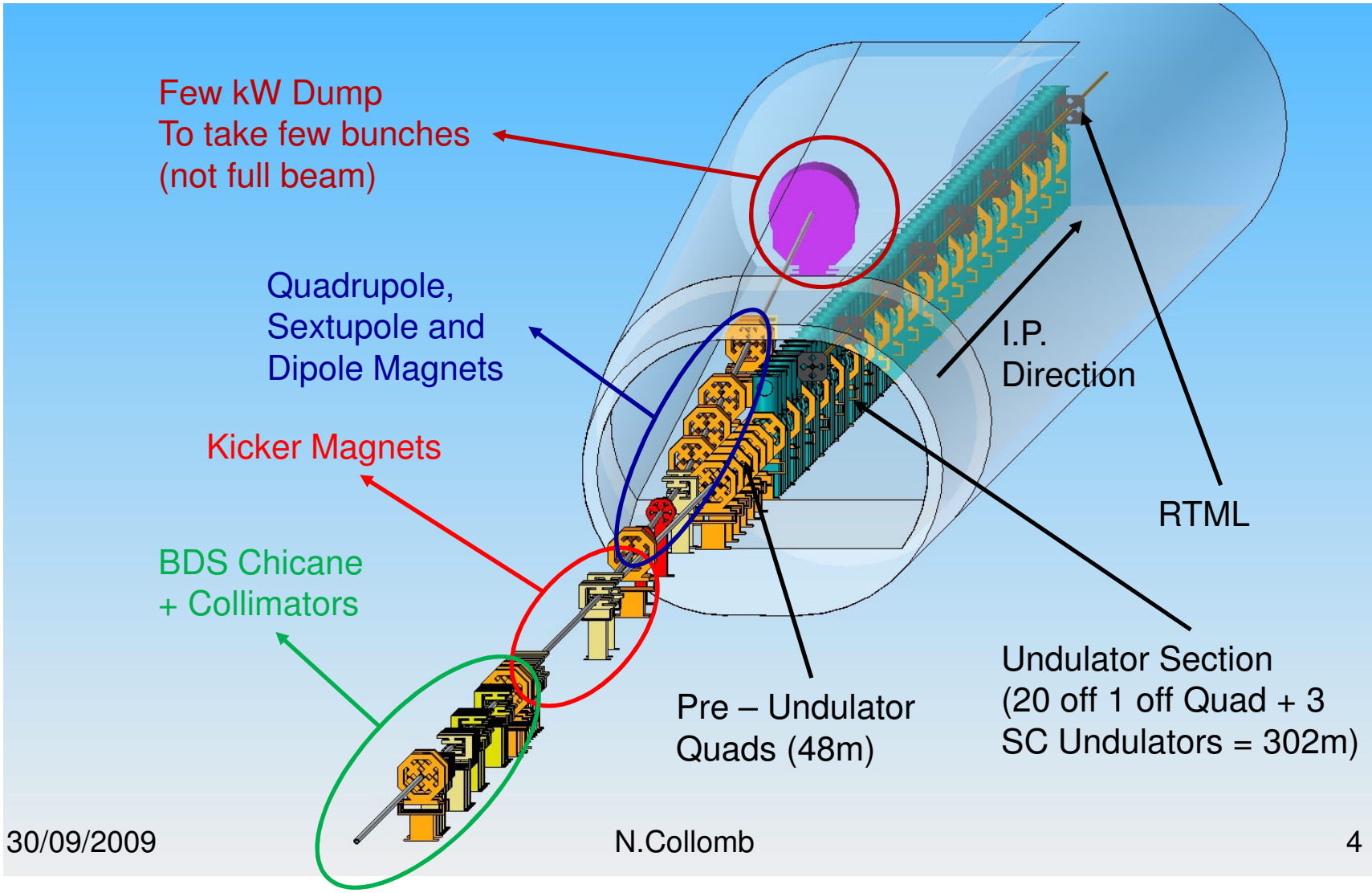
Intensive work with other work groups resulted in current status

3 D Overall Layout for Option1 Positron Source region – major changes.



Positron Source – AD&I

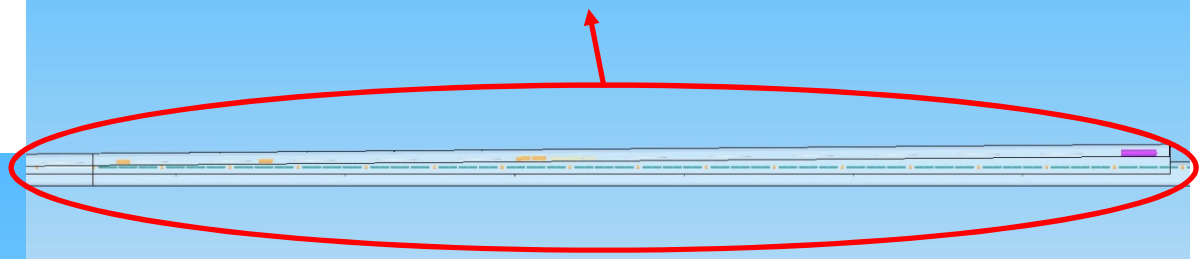
3 D Layout Positron Source BDS Fast Abort region.



Positron Source – AD&I

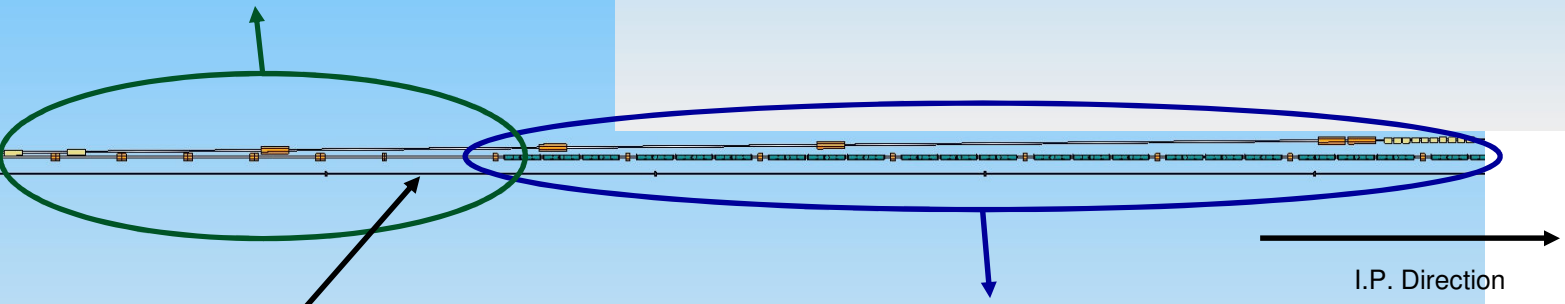
3 D Layout Positron Source BDS Fast Abort region.

Is an Alcove like this feasible?
(9.5° off axis) – CFS answer: yes



I.P. Direction

Interleaved Fast Abort and Undulator Magnets



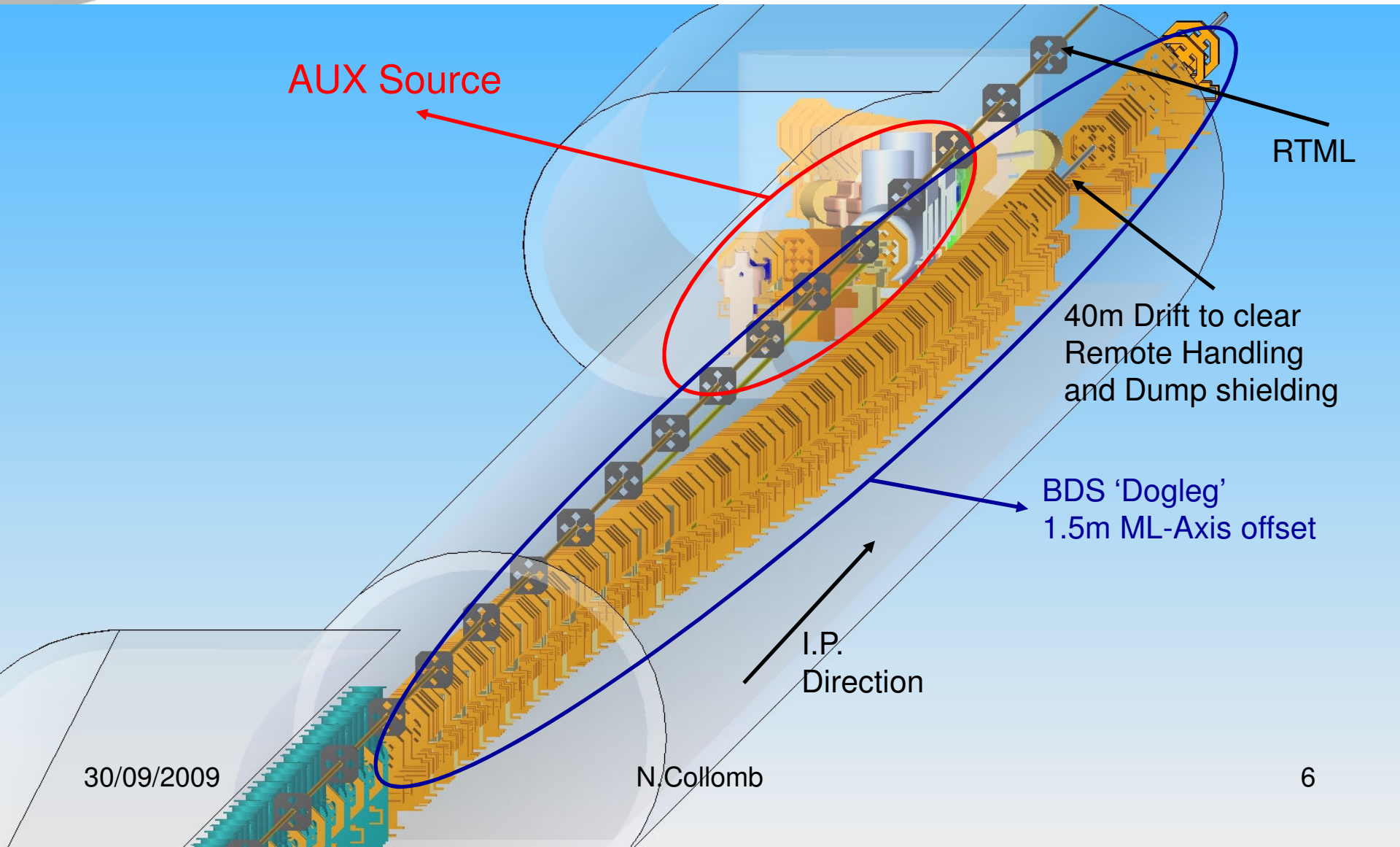
I.P. Direction

RTML

Sufficient clearance between Fast Abort Magnets and Undulator Modules

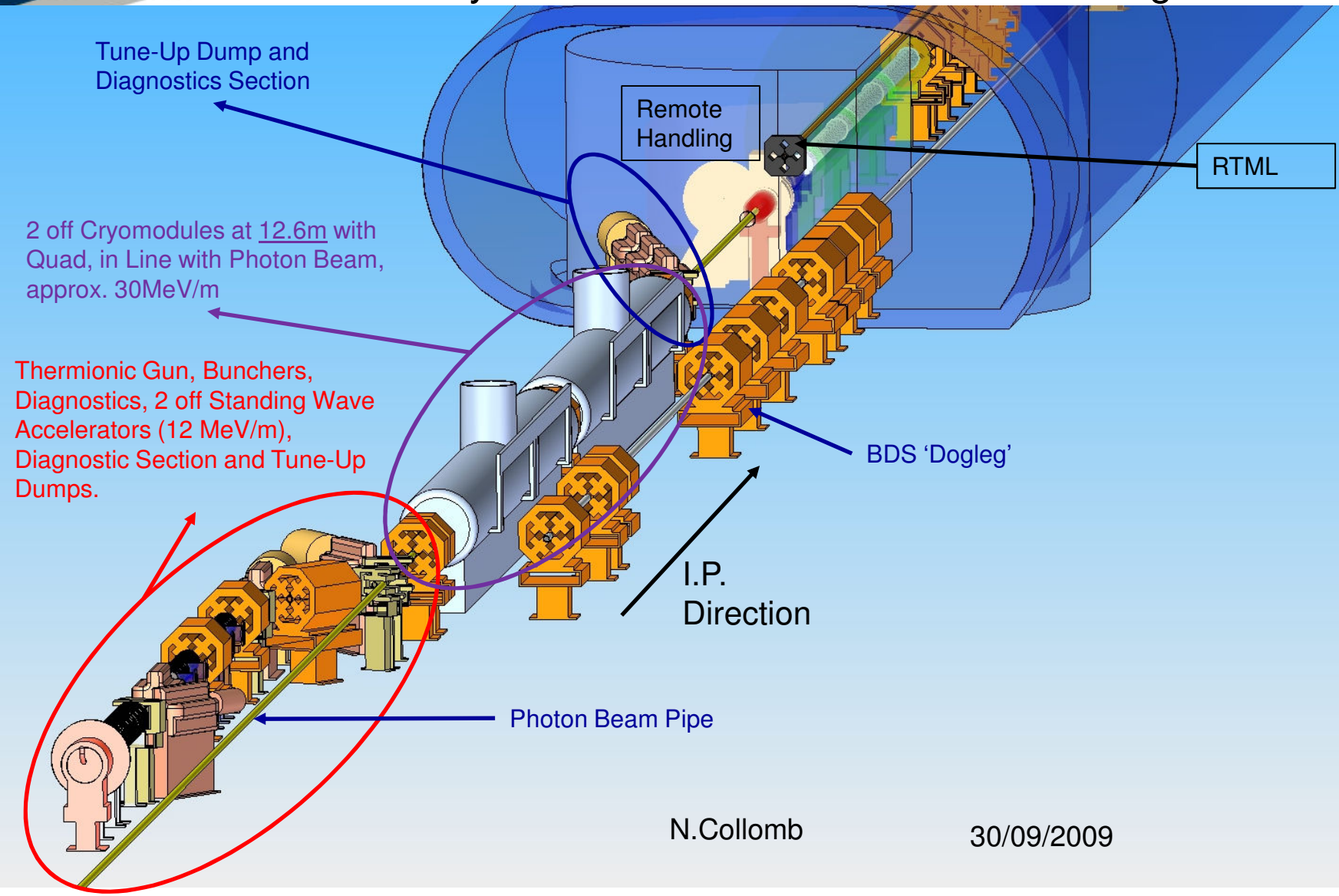
Positron Source – AD&I

3 D Layout Positron Source 'BDS Dogleg' region.



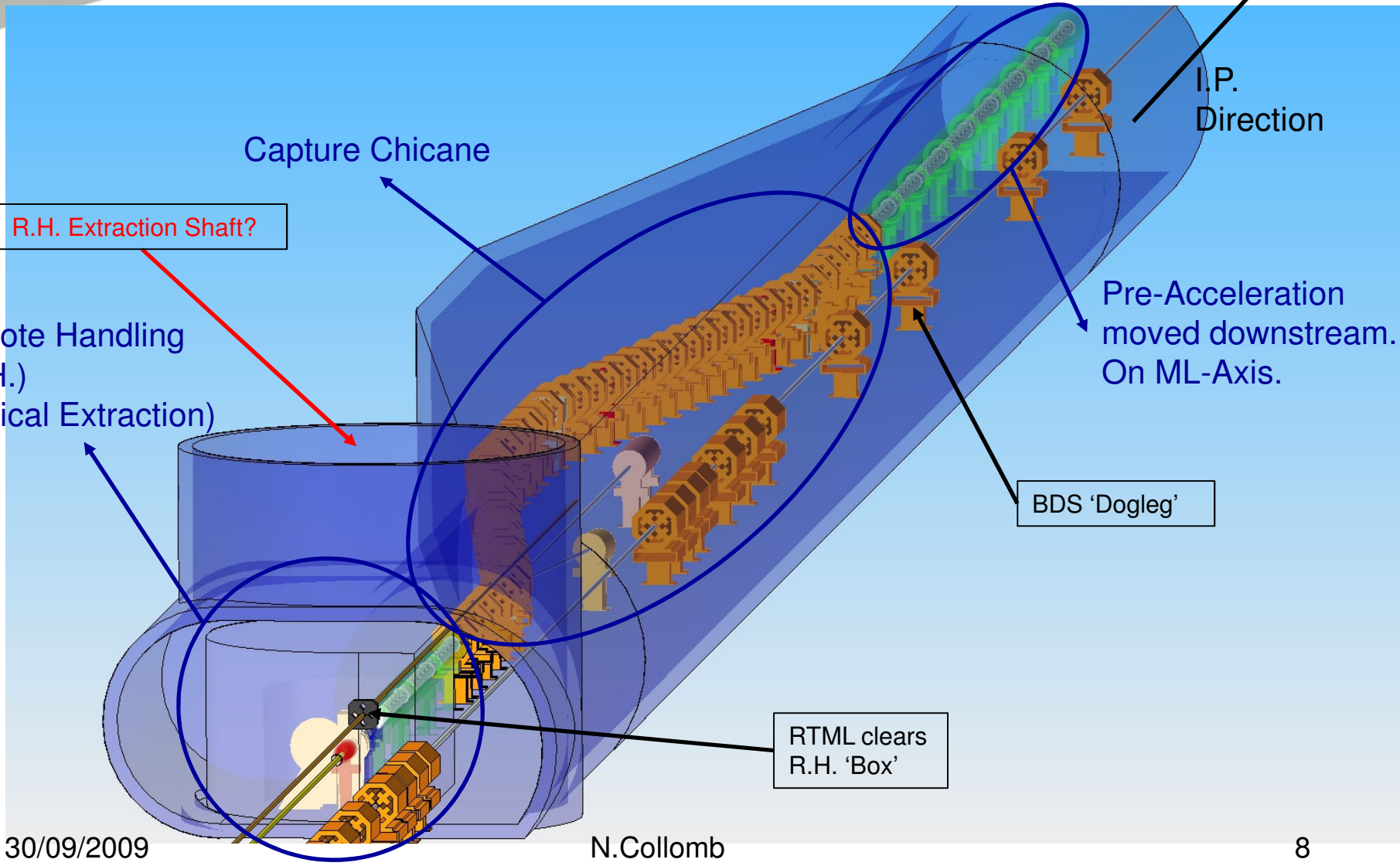
Positron Source – AD&I

3 D Layout Positron Source 'AUX Source' region.



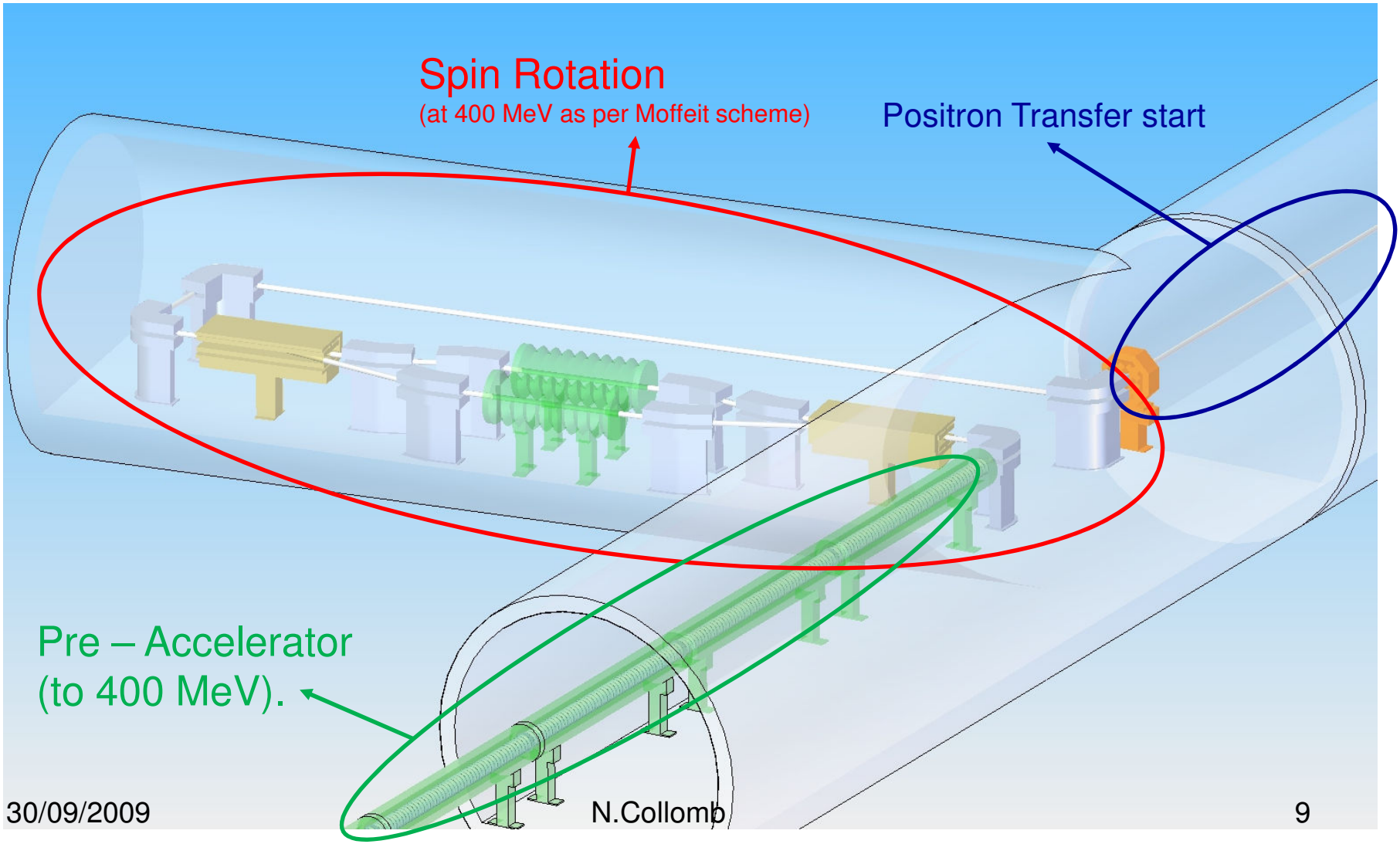
Positron Source – AD&I

3 D Layout Positron Source 'Target Area'.



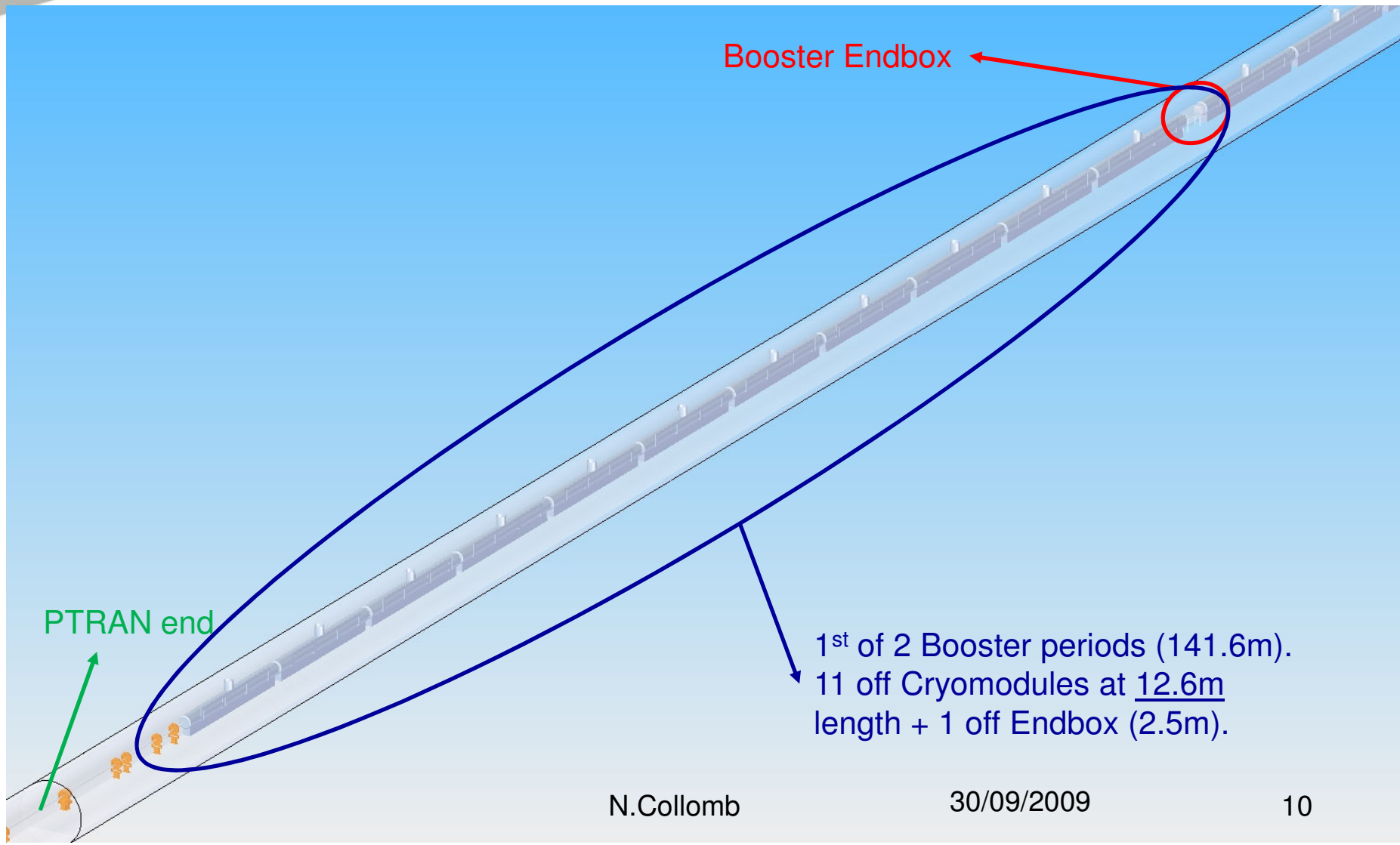
Positron Source – AD&I

3 D Layout Positron Source 'Spin Rotation' region.

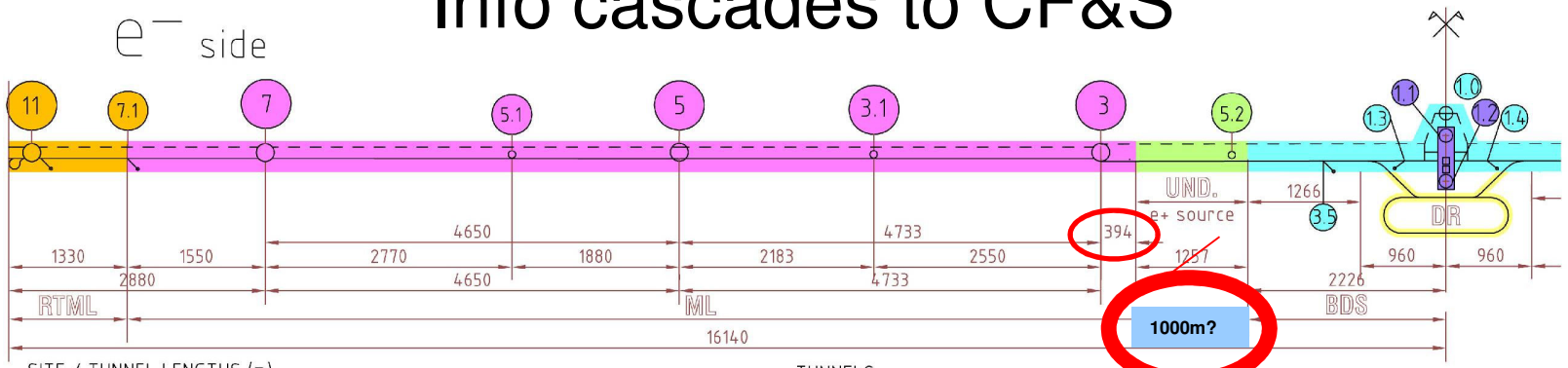


Positron Source – AD&I

3 D Layout for Positron Source 'Booster region'.



Info cascades to CF&S



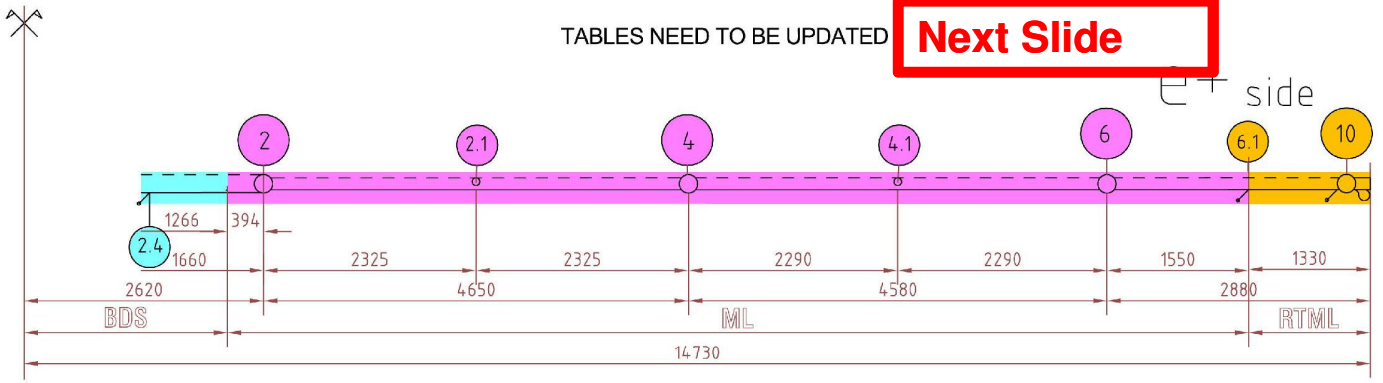
SITE / TUNNEL LENGTHS (m)

e– side + Undulator ML + RTML	e+ side ML + RTML	BDS + sources	DR	TOTAL
13 914 / 27 948	12 504 / 25 128	4452 / 12 236	0 / 6704	30 870 / 72 016

TUNNELS

Area	e- inject.,KAS beam + serv	DR	RTML beam + serv	ML beam + serv	BDS beam + serv	BDS Survey
Øm	4.5	0	4.5 + 4.5	4.5 + 4.5	4.5 + 4.5	1.5 x 2.2

TABLES NEED TO BE UPDATED **Next Slide**



Legend :
- RTML
- ML
- DR
- Sources e- KAS
- BDS
- Detectors Area

SHAFTS

Point	1.0	1.1	1.2	2	3	3.3	5.2	4	5	6	7	10	11	12/C	13/A
Øm	9	16	16	14	14	4	4	14	14	9	9	14	14	9	9

BORINGS

Point	2.1, 3.1, 4.1, 5.1	2.2, 3.2	1.3, 1.4, 2.4, 3.5
Øm	1.50		

SHAFT BASE CAVERNS

Point	2, 3,	4, 5, 6, 7,	10, 11
(LxWxH) m	49 x 16 x 18 + 3 storeys		

MUON WALL WIDENINGS

Point	1.3, 1.4
(LxWxH) m	25 x7x6 +15x7x6

SOURCES CAVERNS

Point	Undulator 5.2	KAS 3.3	2.2, 3.2
(LxWxH) m	21 161m3	6 574m3	7 X 15 X 7.5

DR ALCOVES

Point	12/C, 13/A	B, D, E, F
(LxWxH) m	75 x 10 x 10 + 1 storey	16 x 8 x 8

DETECTORS HALL

Point	1.1, 1.2	1.0
(LxWxH) m	120 x 25 x 39	40 x 15 x 15

BEAM DUMPS CAVERNS (↖)

Point	SOURCES 2.3, 3.4	RTML 6.1, 7.1, 10, 11	BDS 1.3, 1.4, 2.4, 3.5
(LxWxH) m	5 x 4 x 4		20 x 9 x 15 + 1 storey

BEAM DUMP SERVICE HALLS (↖)

Point	BDS 1.3, 1.4, 2.4, 3.5
(LxWxH) m	30x20x 10

ILC - RE-BASELINING PROPOSALS

UndulatorArea moved, KAS deleted, Dumping Ring 3.2km

EUROPEAN REGION

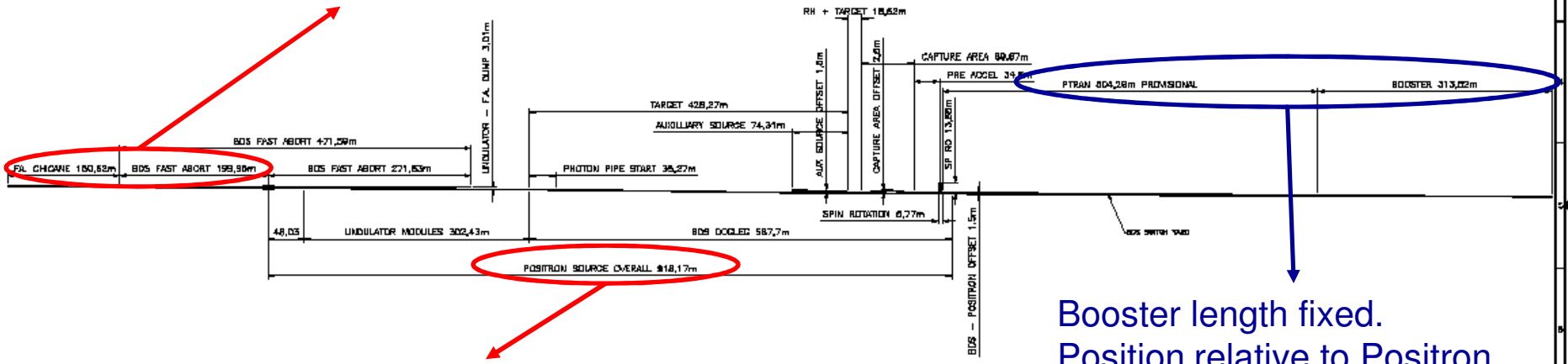
GROUP : TS-CE
CIVIL ENGINEERING
SUPERVISOR : J.OSBORNE
DESIGNER : A.KOSMICKI

SCALE : 1/50000(A3_FORMAT) DATE: JUNE_4TH_2009
ILC-.CE-1.1649.0022 SIZE 3 INDICE

Positron Source – AD&I

2 D Layout for Option1 Positron Source region.

BDS Chicane, Collimation and Fast Abort Extraction (350m).



Positron Source length currently at approx. 920m.

Booster length fixed. Position relative to Positron Source can vary in steps of 16.8m either direction.

Converting this 2 D data into 3 D has taken place as depicted in the following slides.

Positron Source – AD&I

Summary

The Positron Source overall layout can be considered complete (Booster Position and remaining Positron Transfer will require update).

The purpose of this meeting is to trigger some discussions about the Auxiliary Source location and the Spin Rotation proposal.

CAD models can be distributed now or after Beam Delivery lattice design update.

Based on the above discussions, new or modified layout needs to be created.

Note, certain system lengths (Cryomodules) and positions ought to be near a sufficiently large access shaft.

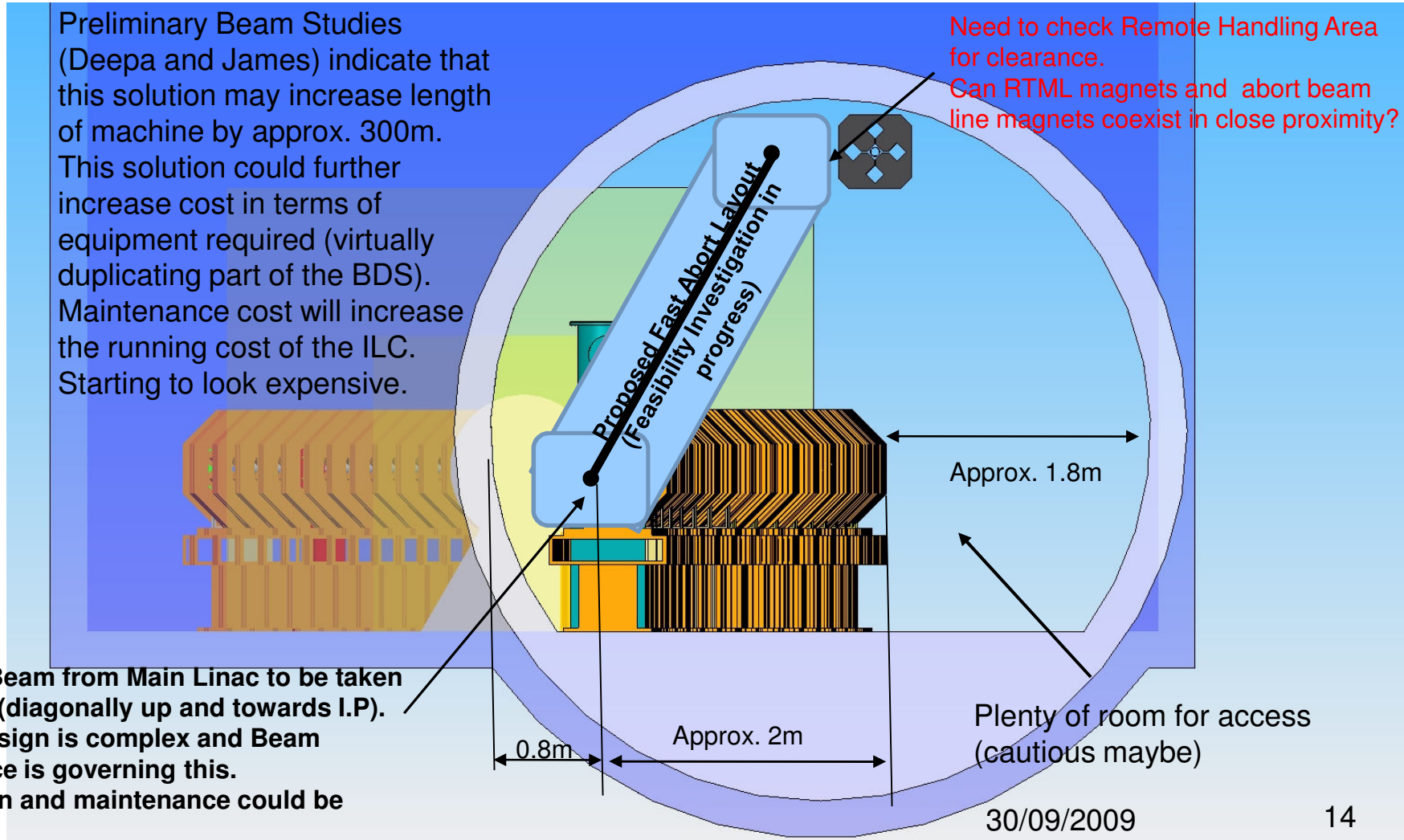
Remote Handling change over process and space requirement investigation/development is high on priority list.

Individual systems need to be developed further (are we at a stage where we can go into more detail?)

AD&I e+ layout Option2

Last not least for the observant, there is an Option2 currently under investigation. This where the Fast Abort is taken downstream to the original location (approximately) to combine it with the Diagnostics Dump.

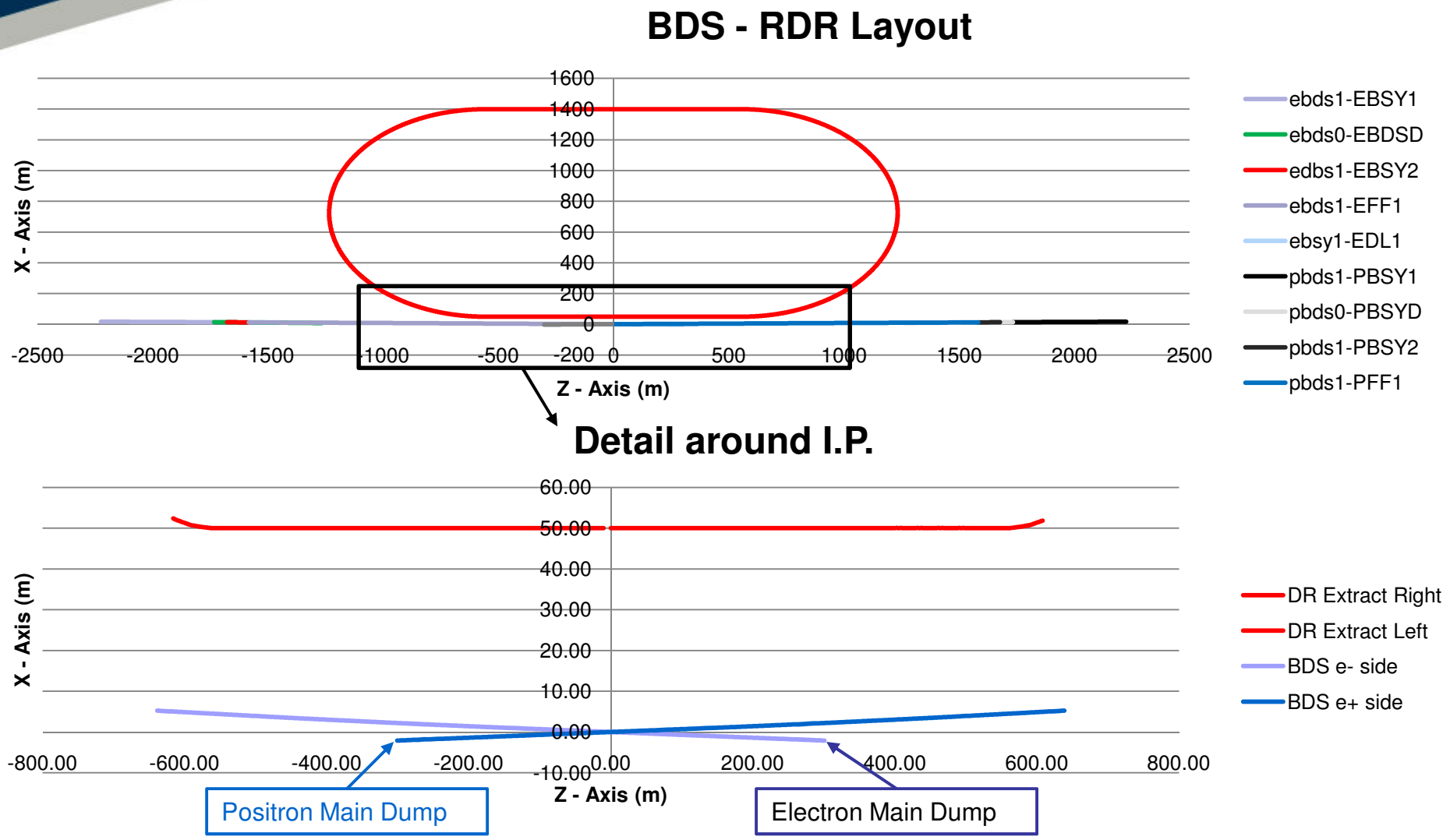
Preliminary Beam Studies (Deepa and James) indicate that this solution may increase length of machine by approx. 300m. This solution could further increase cost in terms of equipment required (virtually duplicating part of the BDS). Maintenance cost will increase the running cost of the ILC. Starting to look expensive.



250 GeV Beam from Main Linac to be taken to ceiling (diagonally up and towards I.P). Lattice design is complex and Beam acceptance is governing this. Installation and maintenance could be difficult!!

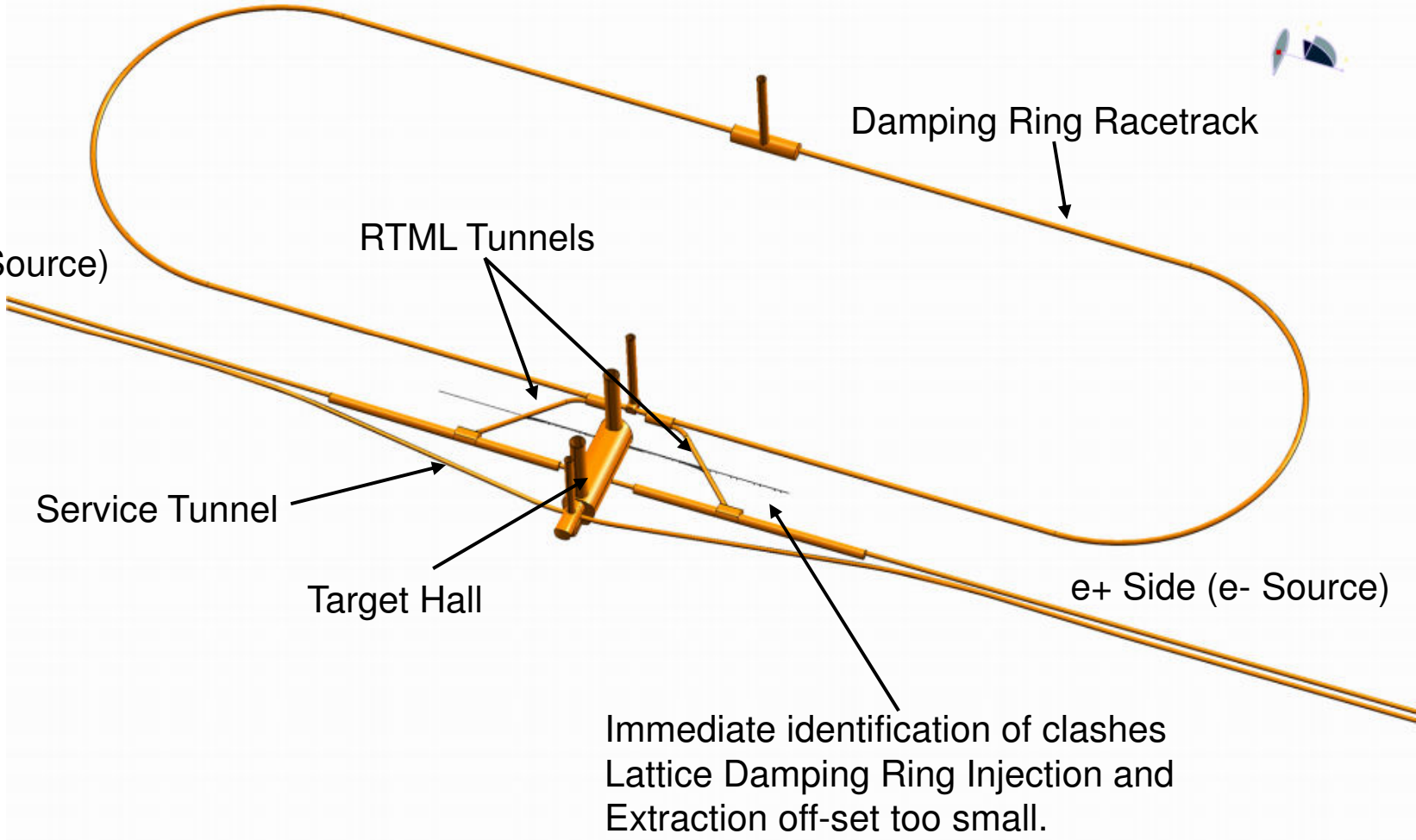
Central Integration – AD&I

'U.K.' AD&I machine layout (I.P. at Z:0, X:0)

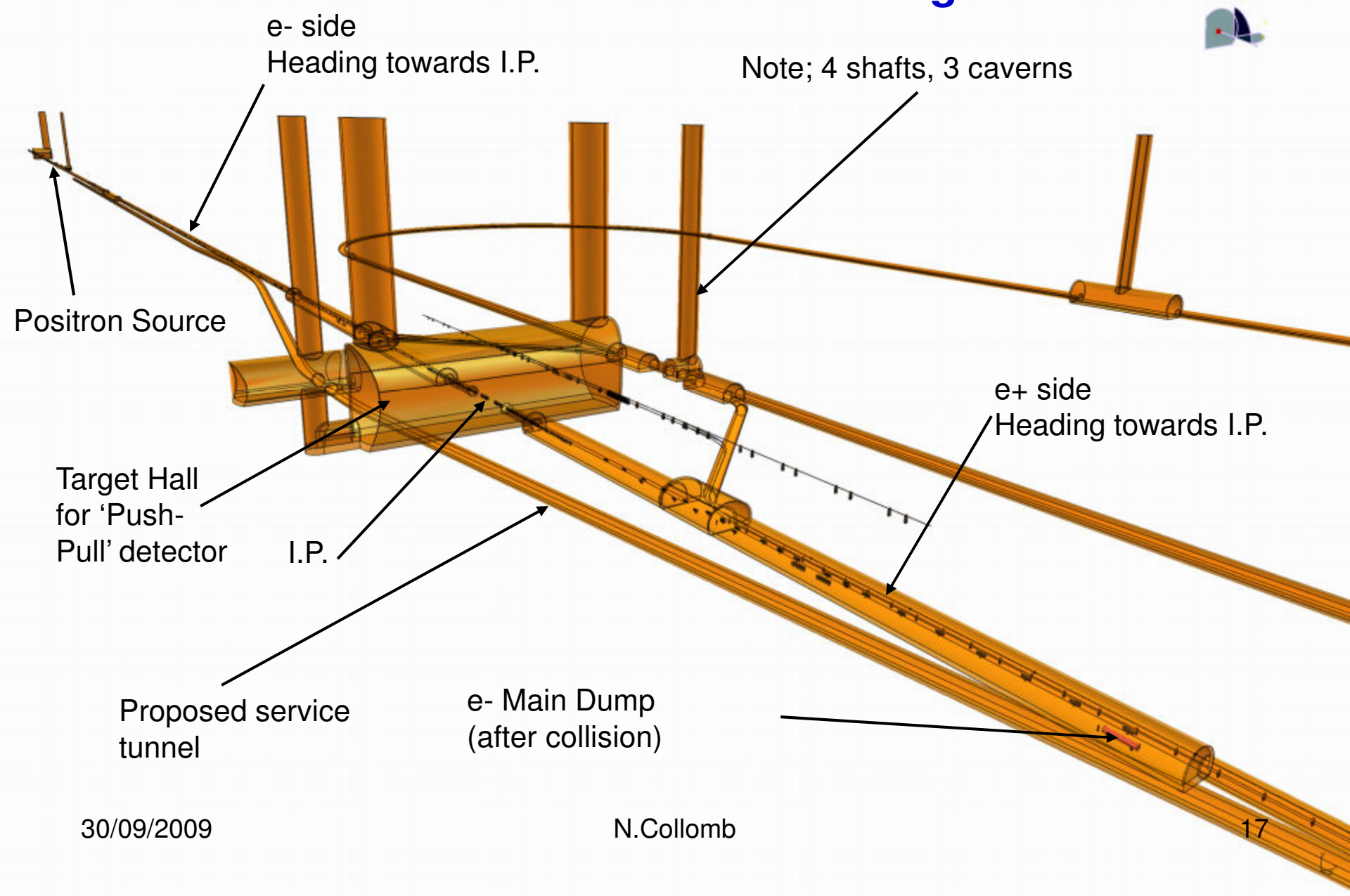


Central Integration – AD&I

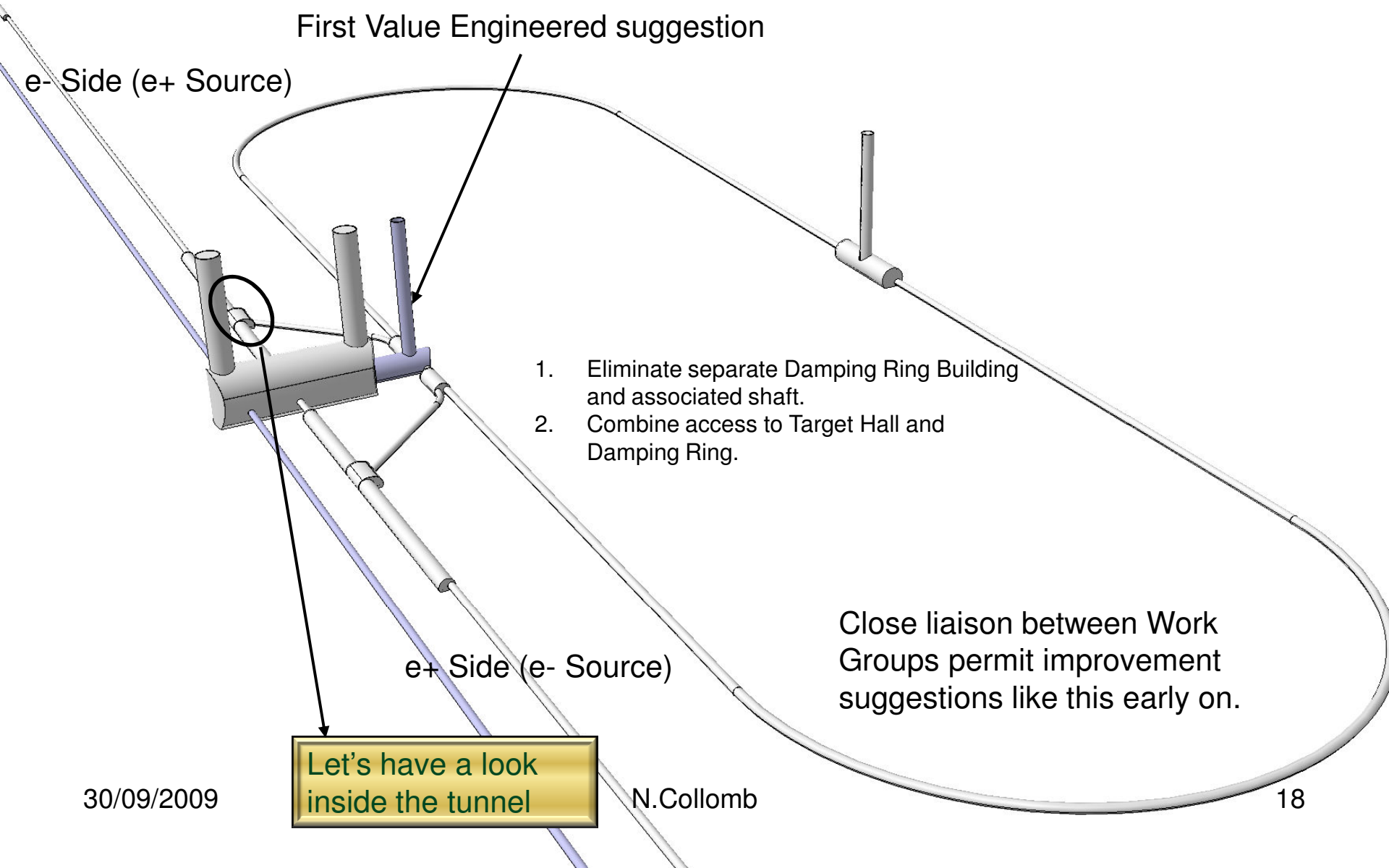
For the first time; Lattice Design components and CF&S 3D CAD combined.



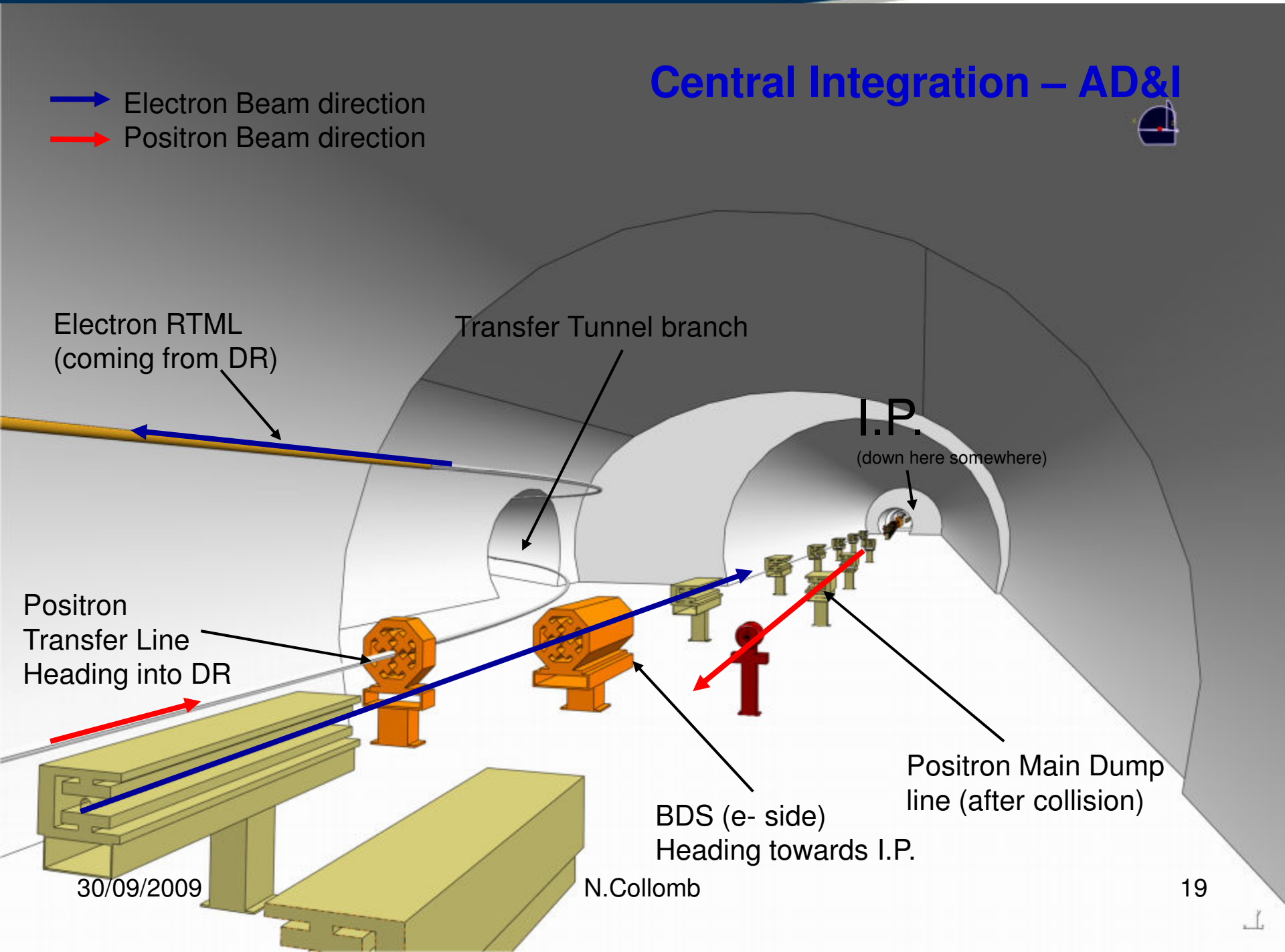
Central Integration – AD&I



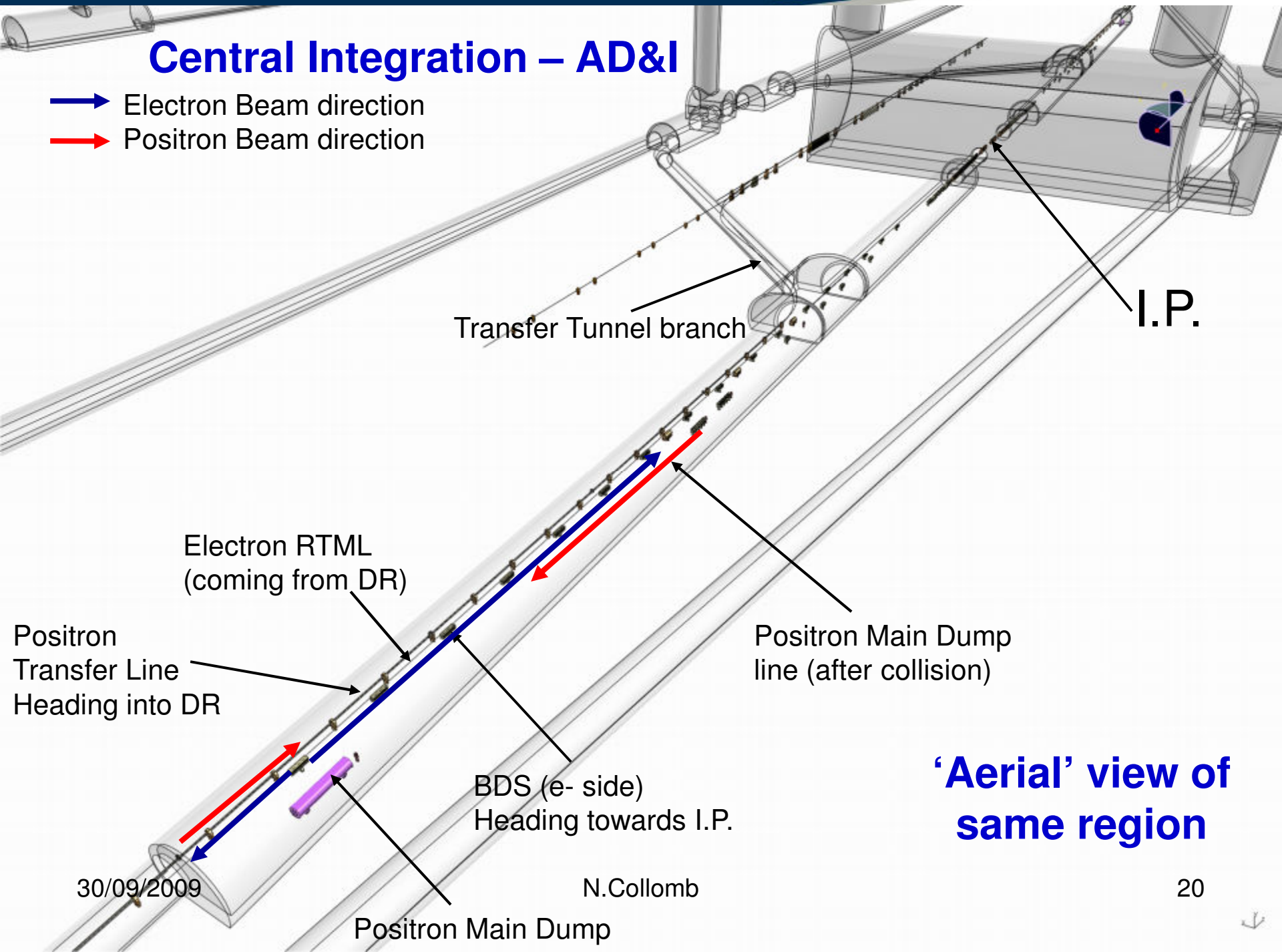
Central Integration – AD&I



Central Integration – AD&I

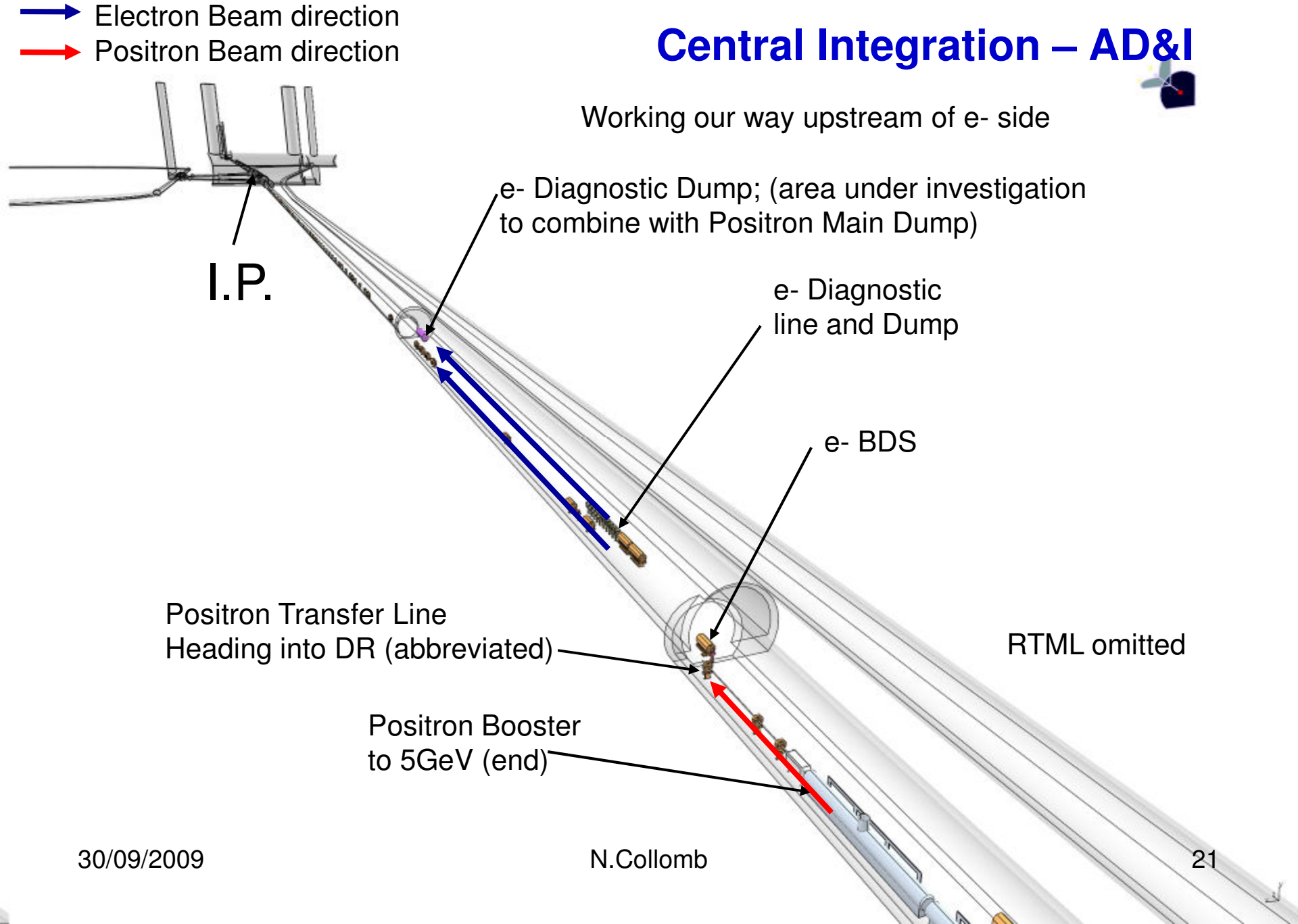


Central Integration – AD&I



'Aerial' view of same region

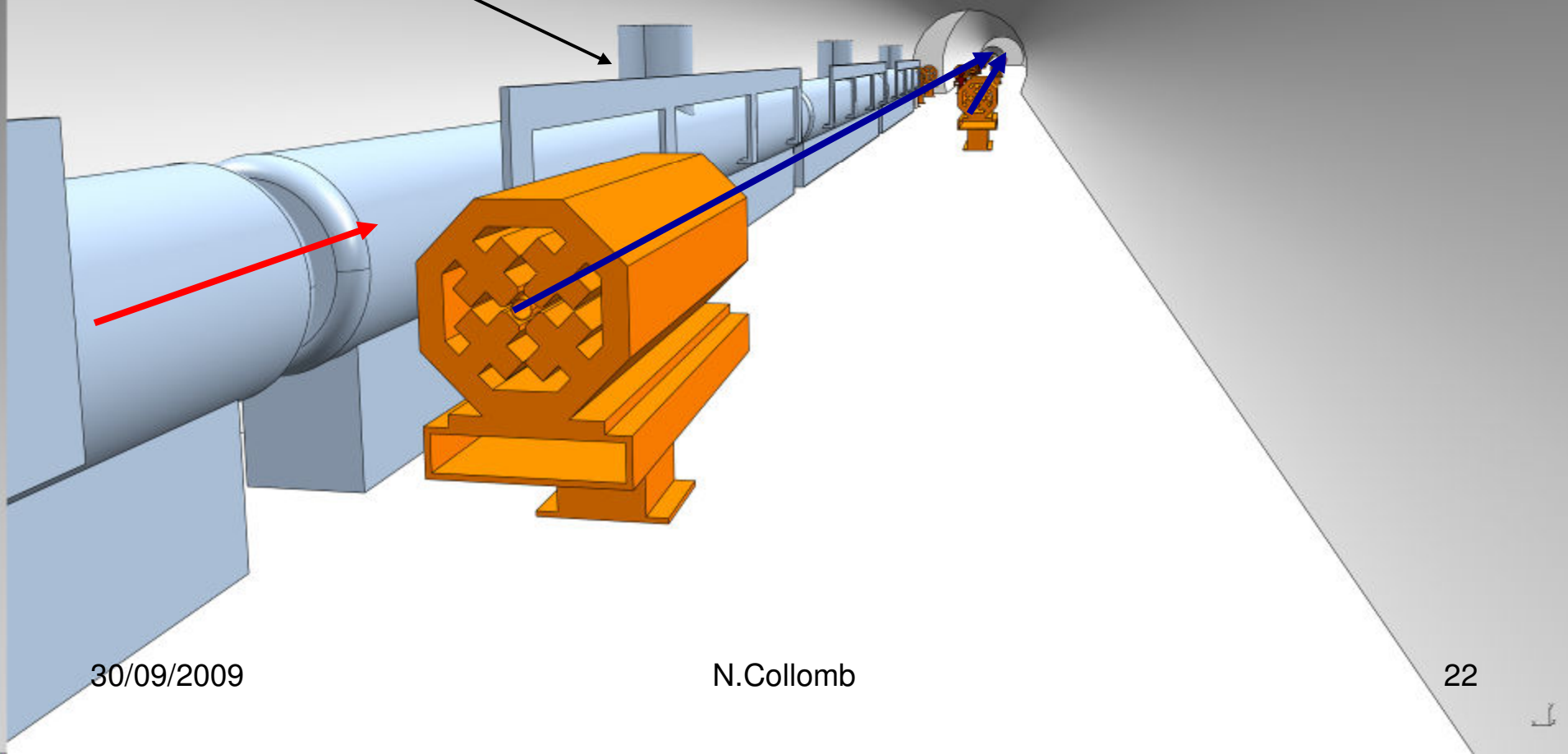
Central Integration – AD&I



Central Integration – AD&I

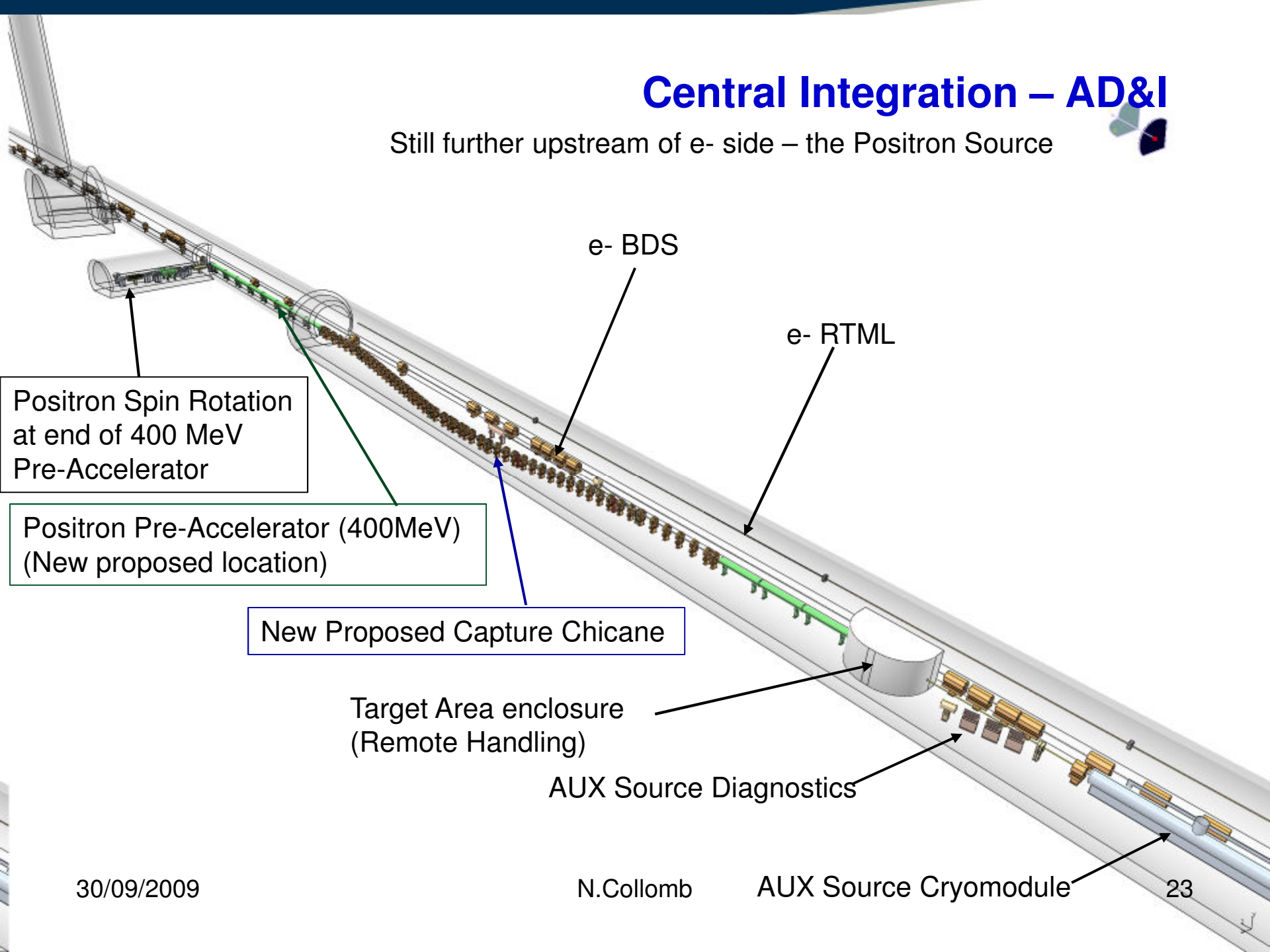
Electron Beam direction
Positron Beam direction

Same area inside tunnel.
Update required.
RTML omitted.

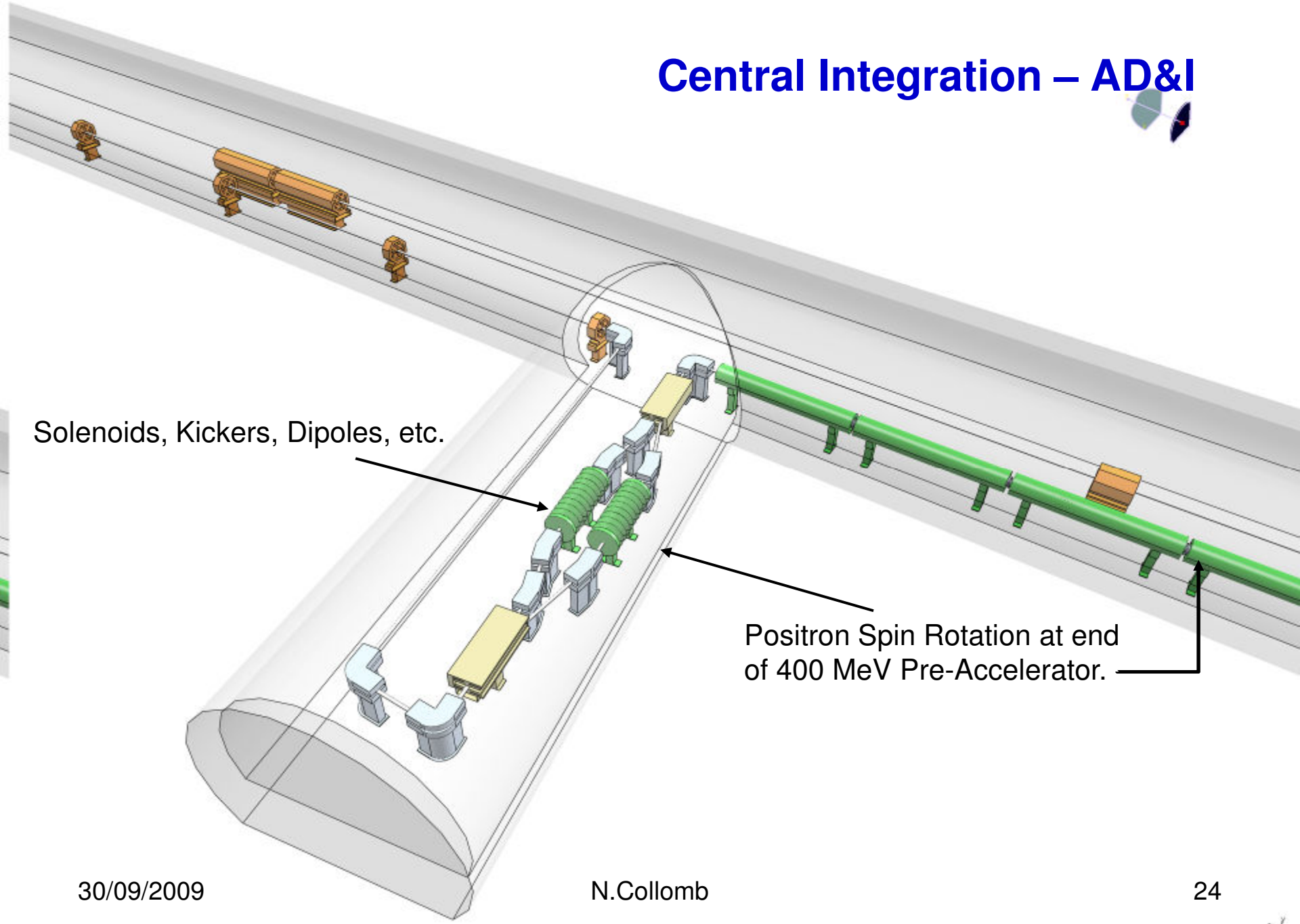


Central Integration – AD&I

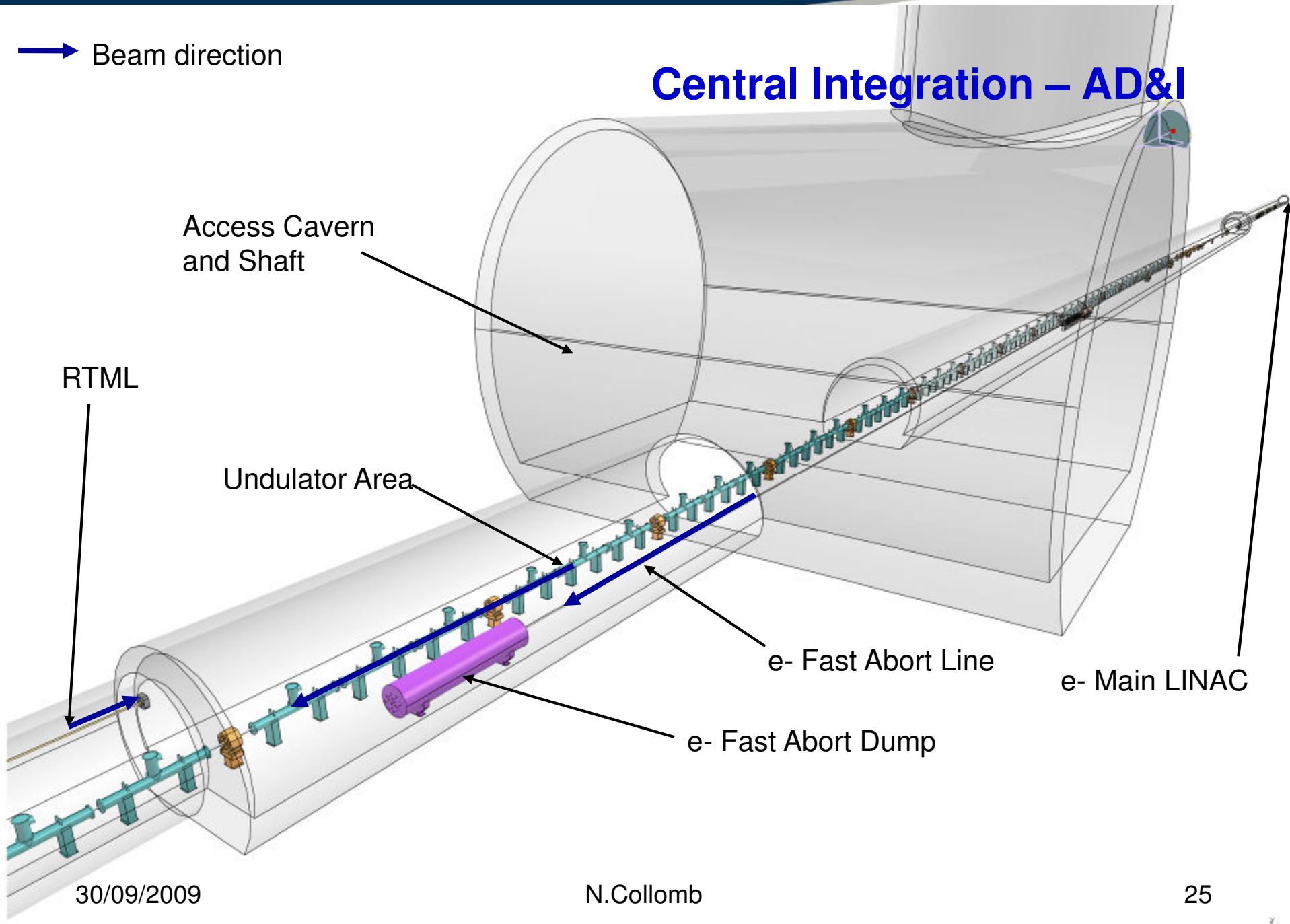
Still further upstream of e- side – the Positron Source



Central Integration – AD&I



Central Integration – AD&I



Central Integration – AD&I

Summary

There are a number of Beam lines which have been omitted due to time constraints.

Some improvements are being incorporated already.

Further value engineering opportunities are being identified.

BDS lattice design is being optimised (as we speak).

Updates of CAD (2D and 3D) are made as quickly as possible after new info is available.

Note, this is a first step in the Overall Layout integration and there are many risk highlights. It is felt that huge progress has been made and continues to do so. There seems to be a light at the end of the tunnel!!

I'd like to go as far as saying that a big proportion of the fluidity of the machine has been solidified. Don't forget that some areas are best guesstimates and need to be confirmed by physicists.

I'd like to thank everyone for their collaboration and excellent communication.