Science & Technology Facilities Council

Linear Collider Positron Source Update

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Nick Walker, Ewan Paterson, Lars Hagge, John A. Osbourne, John Amann, …

Linear Collider – Positron Source

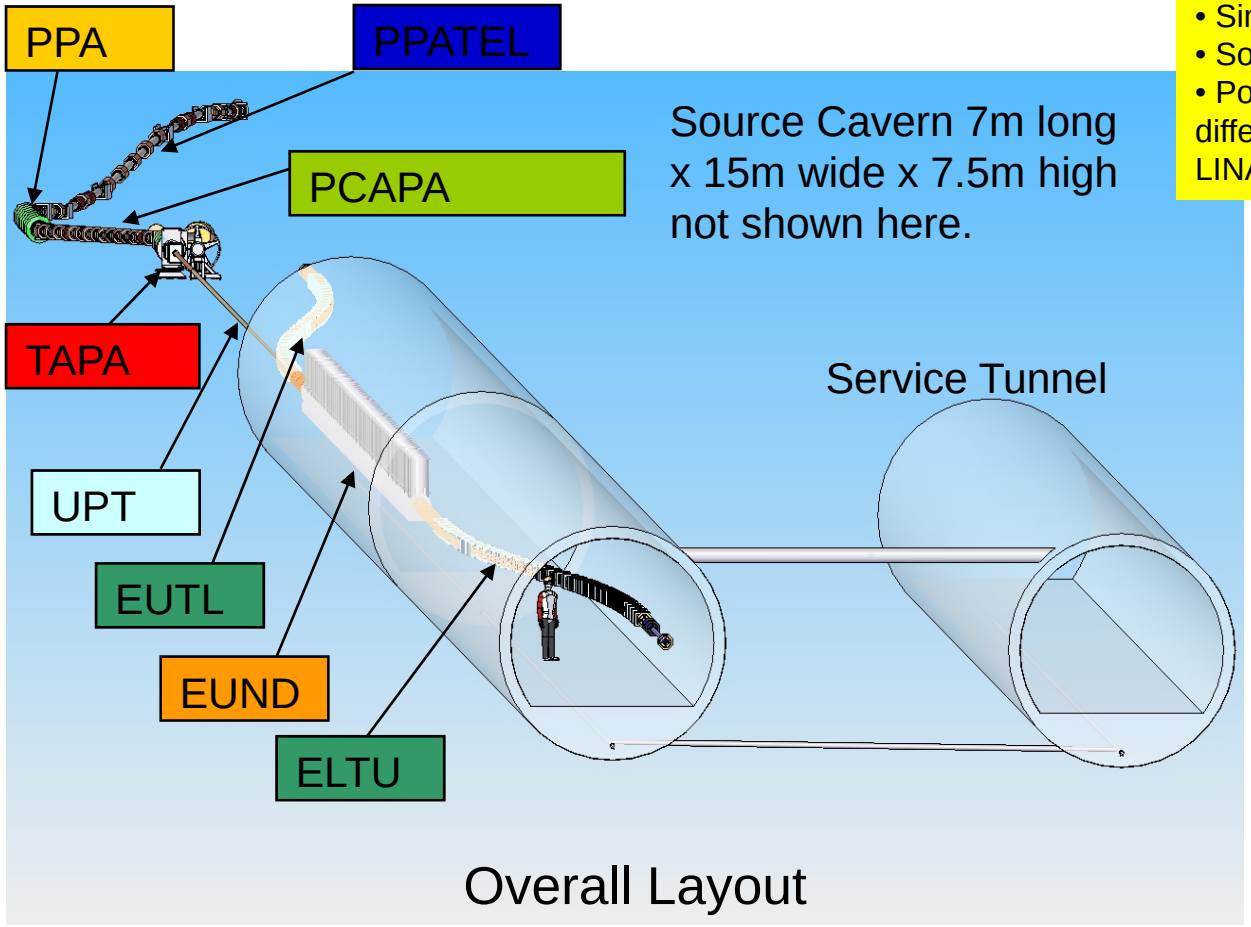
LCWS Chicago 2008 Summary:

- The lattice information is now ‘spot on’ (to RDR basline).
- We have a crude virtual Positron source machine (next slide).
- We are making good progress on a number of systems. Updates to follow by relevant persons (i.e. I. Bailey, J. Rochefort).
- Decision on which CAD package to use needs to made in order to progress to the next level!
- The next level is the inclusion of more detail design into the model!
- Address issues raised and propagate the information to relevant persons for discussion!
- Look at more detailed and feasible Remote Handling design!
- Liaise with other WG to identify space requirements!
- Start support and vacuum design phase!
- Incorporate ‘new lattice’ if available!

Linear Collider – Positron Source

CAD Progress at LCWS 2008:

- Simplified Positron Source model created,
- Some issues identified,
- Positron Source model created using different method than BDS, Damping Rings, LINAC and CFS,



Overall Layout

Linear Collider – Positron Source

System Integration progress since LCWS 2008:

- Segmented Lattice Deck into manageable sections,
- Creation of corresponding Excel spreadsheets,
- Created CAD models and assemblies to Code of Practice for Positron Source,
- Established Bi-weekly WebEx meeting of Central Integration CAD group,
- Started to establish common CAD procedures across all Work Groups,
- CAD software independent integration using ‘STEP’ format files,
- Decided on section for Electronic Document Management System and trialled it,

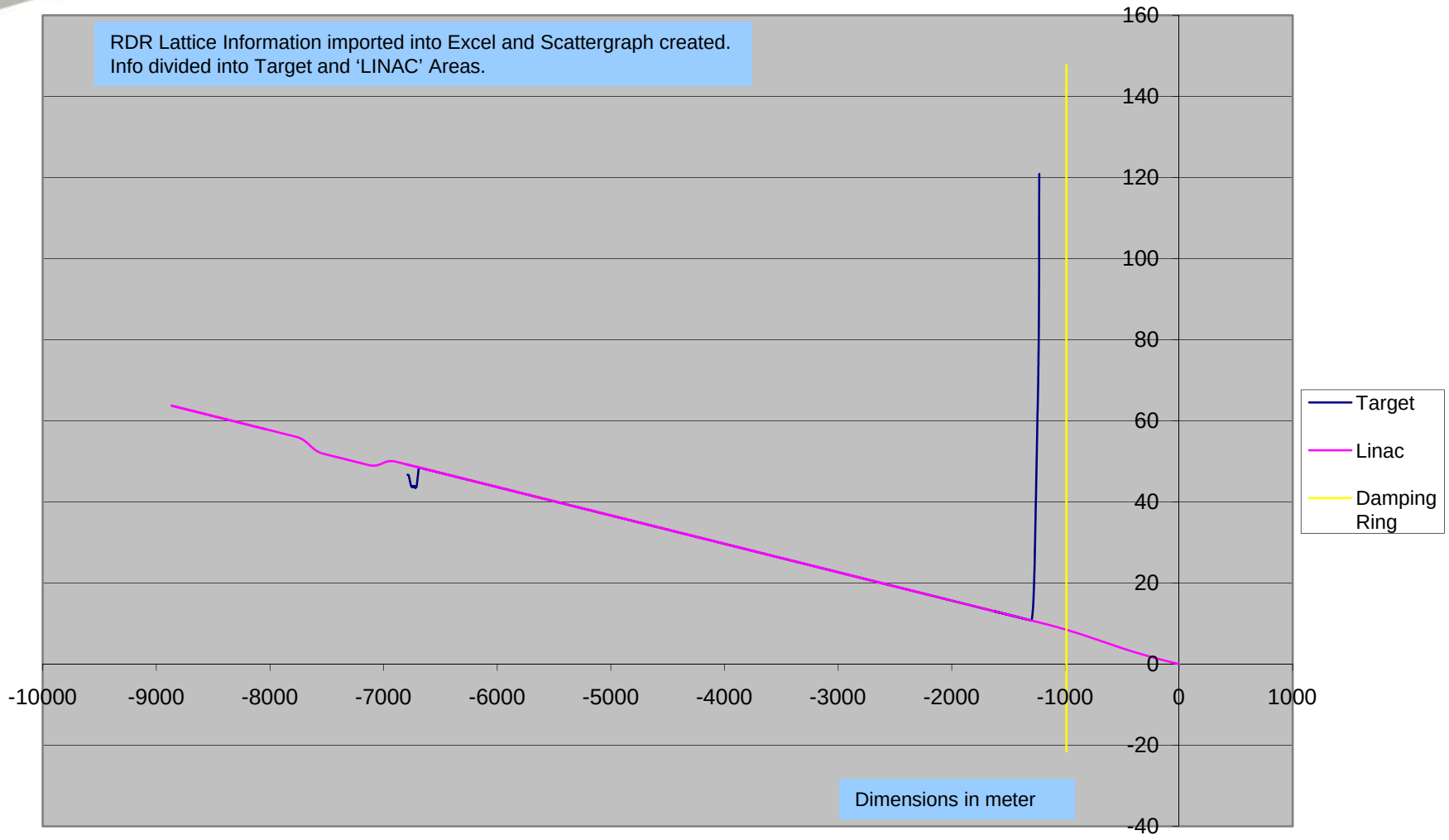
See http://ilc-edms.desy.de/TC51ILC/controller/home under ILC_CAD_Integration_Team.

Linear Collider – Positron Source

Positron Source Progress:

- Segmented Lattice Deck into visible on EDMS sections,
- Creation of corresponding Excel spreadsheets,
- Modelled Quadrupole Magnets based on existing design for similar parameters,
- Modelled remaining components, i.e. Dipoles, Drifts, Target, etc.,
- Created assemblies as per Integration Group discussions,
- Top level Positron Source assembly created,
- CAD data imported into EDMS.

Linear Collider – Positron Source



Linear Collider – Positron Source

NAME	Length	Type	X	Y	Z	PHI	THETA	PSI	Check	CAD Trans.
END_EUND	0	MARK	49.32250206	0	-6808.065657	0	-0.007	0	2.955947	
QMLI18	2.955947	DRIF	49.34319352	0	-6811.021532	0	-0.007	0	0.488950	
QMLI17	0.48895	QUAD	49.34661614	0	-6811.51047	0	-0.007	0	0.488950	
QMLI17	0.48895	QUAD	49.35003876	0	-6811.999408	0	-0.007	0	5.490712	
QMLI17	5.490712	DRIF	49.38847343	0	-6817.489985	0	-0.007	0	0.488950	
QMLI16	0.48895	QUAD	49.39189605	0	-6817.978923	0	-0.007	0	0.488950	
QMLI16	0.48895	QUAD	49.39531867	0	-6818.467861	0	-0.007	0	15.575437	
QMLI16	15.575437	DRIF	49.50434584	0	-6834.042916	0	-0.007	0	0.488950	
QMLI15	0.48895	QUAD	49.50776846	0	-6834.531854	0	-0.007	0	0.488950	
QMLI15	0.48895	QUAD	49.51119108	0	-6835.020792	0	-0.007	0	0.500000	
QMLI15B	0.5	DRIF	49.51469105	0	-6835.52078	0	-0.007	0	0.000000	
WSMLI4	0	WIRE	49.51469105	0	-6835.52078	0	-0.007	0	5.500000	
QMLI15A	5.5	DRIF	49.55319074	0	-6841.020645	0	-0.007	0	0.488950	
QMLI14	0.48895	QUAD	49.55661336	0	-6841.509583	0	-0.007	0	0.488950	
QMLI14	0.48895	QUAD	49.56003598	0	-6841.998521	0	-0.007	0	6.000000	
QMLI14	6	DRIF	49.60203564	0	-6847.998374	0	-0.007	0	0.488950	
QMLI13	0.48895	QUAD	49.60545826	0	-6848.487312	0	-0.007	0	0.488950	
QMLI13	0.48895	QUAD	49.60888089	0	-6848.97625	0	-0.007	0	0.500000	
QMLI13B	0.5	DRIF	49.61238086	0	-6849.476238	0	-0.007	0	0.000000	
WSMLI3	0	WIRE	49.61238086	0	-6849.476238	0	-0.007	0	5.500000	
QMLI13A	5.5	DRIF	49.65088054	0	-6854.976103	0	-0.007	0	0.488950	
QMLI12	0.48895	QUAD	49.65430316	0	-6855.465041	0	-0.007	0	0.488950	
QMLI12	0.48895	QUAD	49.65772579	0	-6855.953979	0	-0.007	0	6.000000	
QMLI12	6	DRIF	49.69972544	0	-6861.953832	0	-0.007	0	0.488950	
QMLI11	0.48895	QUAD	49.70314807	0	-6862.44277	0	-0.007	0	0.000000	
BEGEMIT	0	MARK	49.70314807	0	-6862.44277	0	-0.007	0	0.488950	
QMLI11	0.48895	QUAD	49.70657069	0	-6862.931708	0	-0.007	0	End	

NAME	Length	Type	X	Y	Z	PHI	THETA	PSI	Check
END_EUND	0	MARK	49.32250206	0	-6808.065657	0	-0.007	0	2.955947
QMLI18	2.955947	DRIF	49.34319352	0	-6811.021532	0	-0.007	0	0.488950
QMLI17	0.48895	QUAD	49.34661614	0	-6811.51047	0	-0.007	0	0.488950
QMLI17	0.48895	QUAD	49.35003876	0	-6811.999408	0	-0.007	0	5.490712
QMLI17	5.490712	DRIF	49.38847343	0	-6817.489985	0	-0.007	0	0.488950
QMLI16	0.48895	QUAD	49.39189605	0	-6817.978923	0	-0.007	0	0.488950
QMLI16	0.48895	QUAD	49.39531867	0	-6818.467861	0	-0.007	0	15.575437
QMLI16	15.575437	DRIF	49.50434584	0	-6834.042916	0	-0.007	0	0.488950
QMLI15	0.48895	QUAD	49.50776846	0	-6834.531854	0	-0.007	0	0.488950
QMLI15	0.48895	QUAD	49.51119108	0	-6835.020792	0	-0.007	0	0.500000
QMLI15B	0.5	DRIF	49.51469105	0	-6835.52078	0	-0.007	0	5.500000
QMLI15A	5.5	DRIF	49.55319074	0	-6841.020645	0	-0.007	0	0.488950
QMLI14	0.48895	QUAD	49.55661336	0	-6841.509583	0	-0.007	0	0.488950
QMLI14	0.48895	QUAD	49.56003598	0	-6841.998521	0	-0.007	0	6.000000
QMLI14	6	DRIF	49.60203564	0	-6847.998374	0	-0.007	0	0.488950
QMLI13	0.48895	QUAD	49.60545826	0	-6848.487312	0	-0.007	0	0.488950
QMLI13	0.48895	QUAD	49.60888089	0	-6848.97625	0	-0.007	0	0.500000
QMLI13B	0.5	DRIF	49.61238086	0	-6849.476238	0	-0.007	0	5.500000
QMLI13A	5.5	DRIF	49.65088054	0	-6854.976103	0	-0.007	0	0.488950
QMLI12	0.48895	QUAD	49.65430316	0	-6855.465041	0	-0.007	0	0.488950
QMLI12	0.48895	QUAD	49.65772579	0	-6855.953979	0	-0.007	0	6.000000
QMLI12	6	DRIF	49.69972544	0	-6861.953832	0	-0.007	0	0.488950
BEGEMIT	0	MARK	49.70314807	0	-6862.44277	0	-0.007	0	End

NAME	Length	Type	X	Y	Z	X-Rot.	Y-Rot.	Z-Rot.	Check
END_EUND	0	MARK	0	0	0	0	-0.401070457	0	2.955947
QMLI18	2.955947	DRIF	0.02069146	0	-2.955875	0	-0.401070457	0	0.488950
QMLI17_01	0.48895	QUAD	0.02411408	0	-3.444813	0	-0.401070457	0	0.488950
QMLI17_02	0.48895	QUAD	0.0275367	0	-3.933751	0	-0.401070457	0	5.490712
QMLI17	5.490712	DRIF	0.06597137	0	-9.424328	0	-0.401070457	0	0.488950
QMLI16_01	0.48895	QUAD	0.06939399	0	-9.913266	0	-0.401070457	0	0.488950
QMLI16_02	0.48895	QUAD	0.07281661	0	-10.402204	0	-0.401070457	0	15.575437
QMLI16	15.575437	DRIF	0.18184378	0	-25.977259	0	-0.401070457	0	0.488950
QMLI15_01	0.48895	QUAD	0.1852664	0	-26.466197	0	-0.401070457	0	0.488950
QMLI15_02	0.48895	QUAD	0.18868902	0	-26.955135	0	-0.401070457	0	0.500000
QMLI15B	0.5	DRIF	0.19218899	0	-27.455123	0	-0.401070457	0	5.500000
QMLI15A	5.5	DRIF	0.23068868	0	-32.954988	0	-0.401070457	0	0.488950
QMLI14_01	0.48895	QUAD	0.2341113	0	-33.443926	0	-0.401070457	0	0.488950
QMLI14_02	0.48895	QUAD	0.23753392	0	-33.932864	0	-0.401070457	0	6.000000
QMLI14	6	DRIF	0.27953358	0	-39.932717	0	-0.401070457	0	0.488950
QMLI13_01	0.48895	QUAD	0.2829562	0	-40.421655	0	-0.401070457	0	0.488950
QMLI13_02	0.48895	QUAD	0.28637883	0	-40.910593	0	-0.401070457	0	0.500000
QMLI13B	0.5	DRIF	0.2898788	0	-41.410581	0	-0.401070457	0	5.500000
QMLI13A	5.5	DRIF	0.32837848	0	-46.910446	0	-0.401070457	0	0.488950
QMLI12_01	0.48895	QUAD	0.3318011	0	-47.399384	0	-0.401070457	0	0.488950
QMLI12_02	0.48895	QUAD	0.33522373	0	-47.888322	0	-0.401070457	0	6.000000
QMLI12	6	DRIF	0.37722338	0	-53.888175	0	-0.401070457	0	0.488950
QMLI11_01	0.48895	QUAD	0.38064601	0	-54.377113	0	-0.401070457	0	0.488950
QMLI11_02	0.48895	QUAD	0.38406863	0	-54.866051	0	-0.401070457	0	End

Copied End Undulator to Beginning Emitter Excel data. Check geometry is sound.

Deleted all ‘zero length’ data. Check geometry remains o.k.

Renaming duplicate ‘NAME’ entries, Translate origin to X: 0, Y: 0 and Z: 0, Convert radians into degrees, Check geometry again after data manipulation.

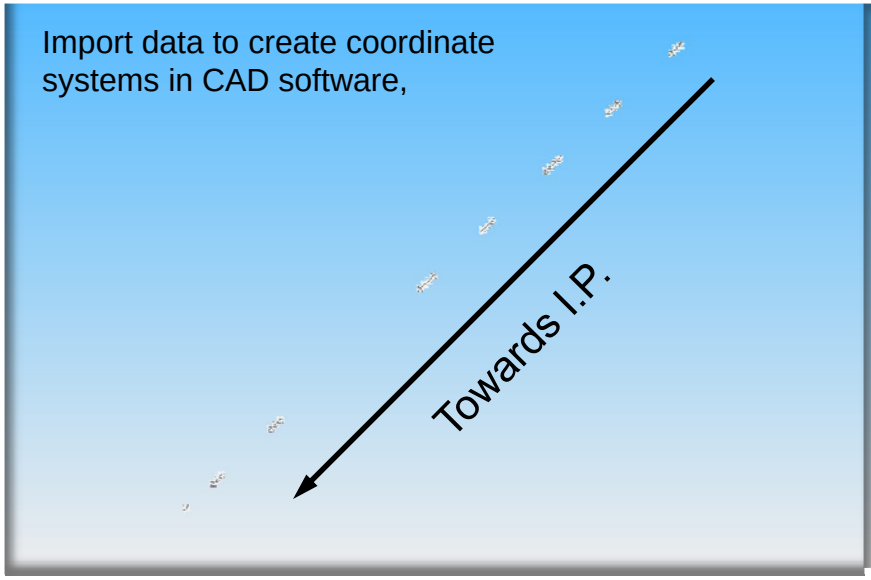
Linear Collider – Positron Source

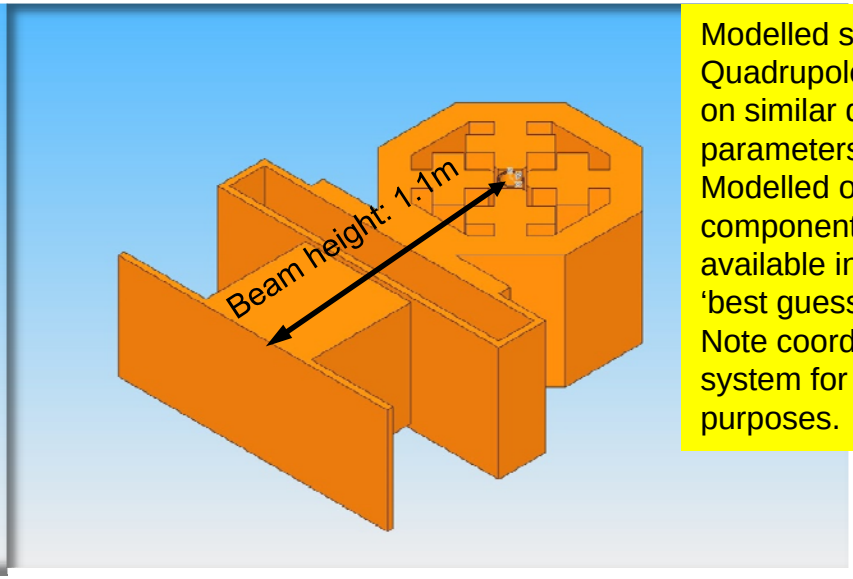
CAD specific spreadsheet created,

MACRO for CAD software can read new location and rotation and update CAD coordinate system to reflect changes almost immediately.

Name	X	Y	Z	X Rotation	Y Rotation	Z Rotation	New X	New Y	New Z	New X Rotation	New Y Rotation	New Z Rotation	STATUS
END_EUND	0	0	0	0	-0.401070457	0							Created as END_EUND
DMLI18	0.02069146	0	-2.955875	0	-0.401070457	0							Created as DMLI18
QMLI17_01	0.02411408	0	-3.444813	0	-0.401070457	0							Created as QMLI17_01
QMLI17_02	0.0275367	0	-3.933751	0	-0.401070457	0							Created as QMLI17_02
DMLI17	0.06597137	0	-9.424328	0	-0.401070457	0							Created as DMLI17
QMLI16_01	0.06939399	0	-9.913266	0	-0.401070457	0							Created as QMLI16_01
QMLI16_02	0.07281661	0	-10.402204	0	-0.401070457	0							Created as QMLI16_02
DMLI16	0.18184378	0	-25.977259	0	-0.401070457	0							Created as DMLI16
QMLI15_01	0.1852664	0	-26.466197	0	-0.401070457	0							Created as QMLI15_01
QMLI15_02	0.18868902	0	-26.955135	0	-0.401070457	0							Created as QMLI15_02
DMLI15B	0.19218899	0	-27.455123	0	-0.401070457	0							Created as DMLI15B
DMLI15A	0.23068868	0	-32.954988	0	-0.401070457	0							Created as DMLI15A
QMLI14_01	0.2341113	0	-33.443926	0	-0.401070457	0							Created as QMLI14_01
QMLI14_02	0.23753392	0	-33.932864	0	-0.401070457	0							Created as QMLI14_02
DMLI14	0.27953358	0	-39.932717	0	-0.401070457	0							Created as DMLI14
QMLI13_01	0.2829562	0	-40.421655	0	-0.401070457	0							Created as QMLI13_01
QMLI13_02	0.28637883	0	-40.910593	0	-0.401070457	0							Created as QMLI13_02
DMLI13B	0.2898788	0	-41.410581	0	-0.401070457	0							Created as DMLI13B
DMLI13A	0.32837848	0	-46.910446	0	-0.401070457	0							Created as DMLI13A
QMLI12_01	0.3318011	0	-47.399384	0	-0.401070457	0							Created as QMLI12_01
QMLI12_02	0.33522373	0	-47.888322	0	-0.401070457	0							Created as QMLI12_02
DMLI12	0.37722338	0	-53.888175	0	-0.401070457	0							Created as DMLI12
QMLI11_01	0.38064601	0	-54.377113	0	-0.401070457	0							Created as QMLI11_01
QMLI11_02	0.38406863	0	-54.866051	0	-0.401070457	0							Created as QMLI11_02

Import data to create coordinate systems in CAD software,

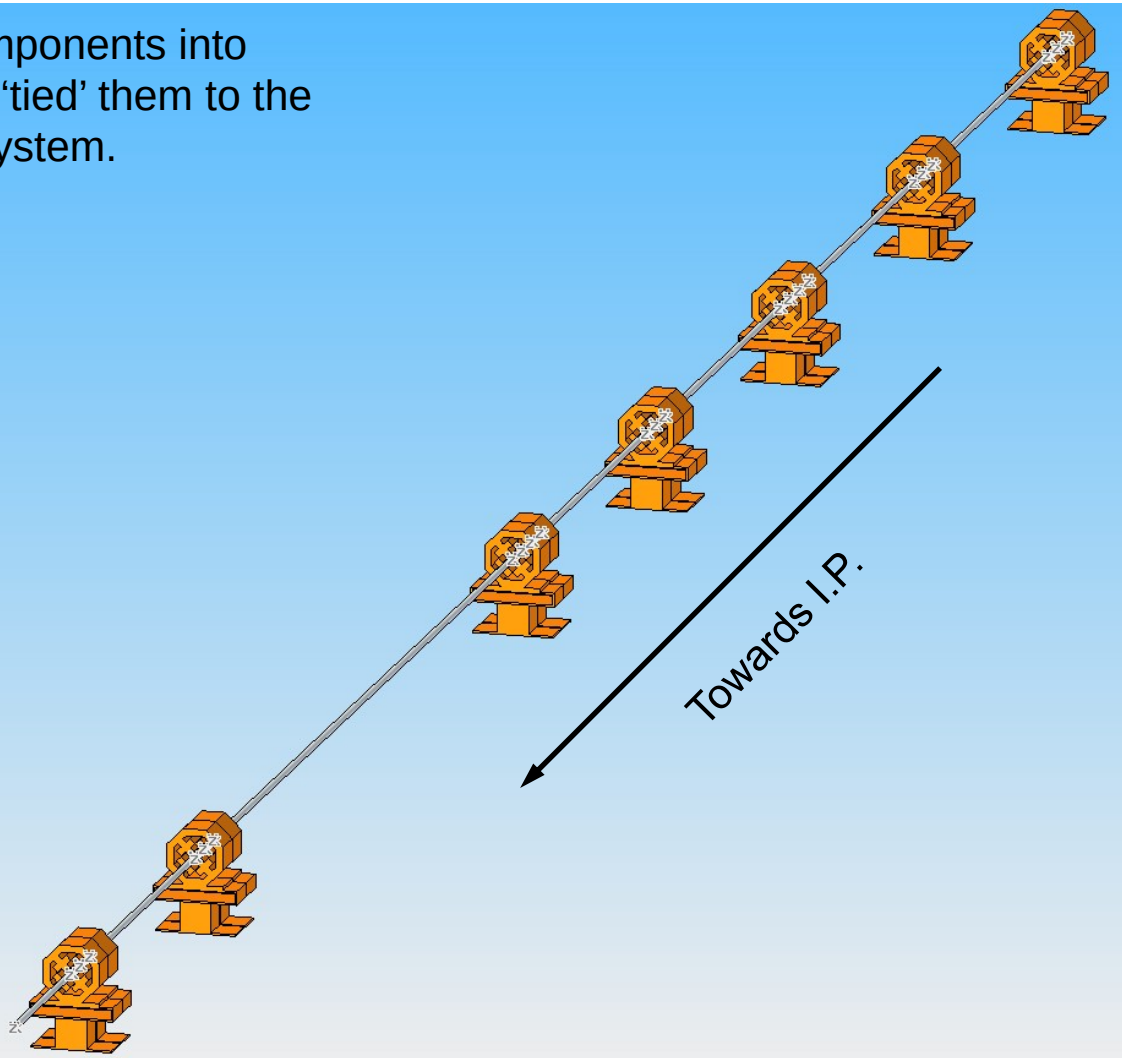




Modelled simplified Quadrupole magnet on similar design and parameters,
Modelled other components based on available info and 'best guess',
Note coordinate system for assembly purposes.

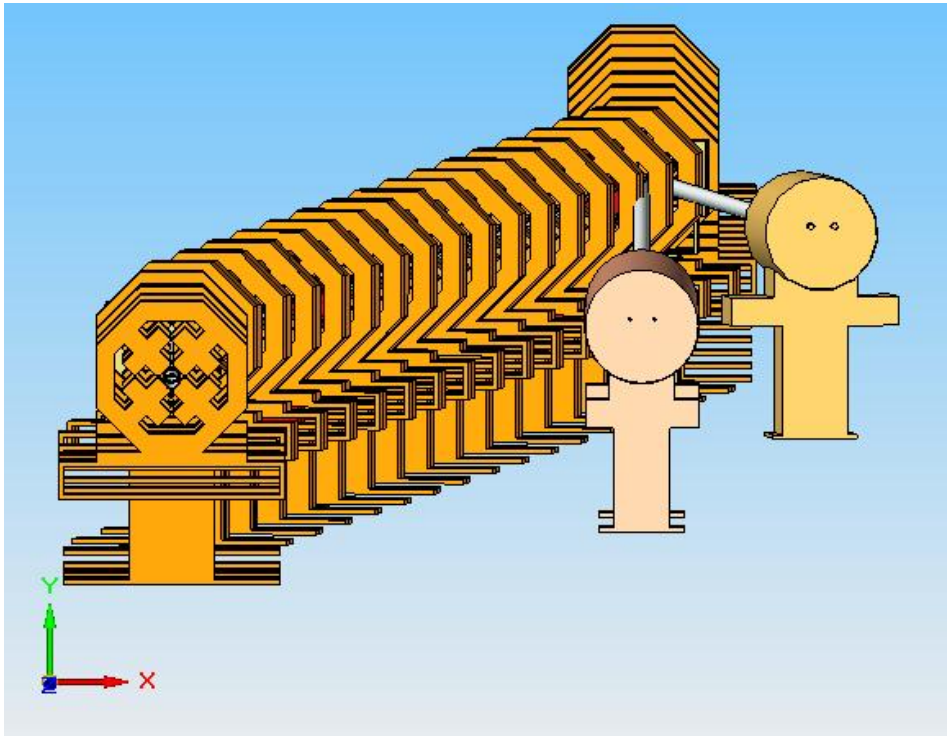
Linear Collider – Positron Source

Dropped components into position and 'tied' them to the coordinate system.

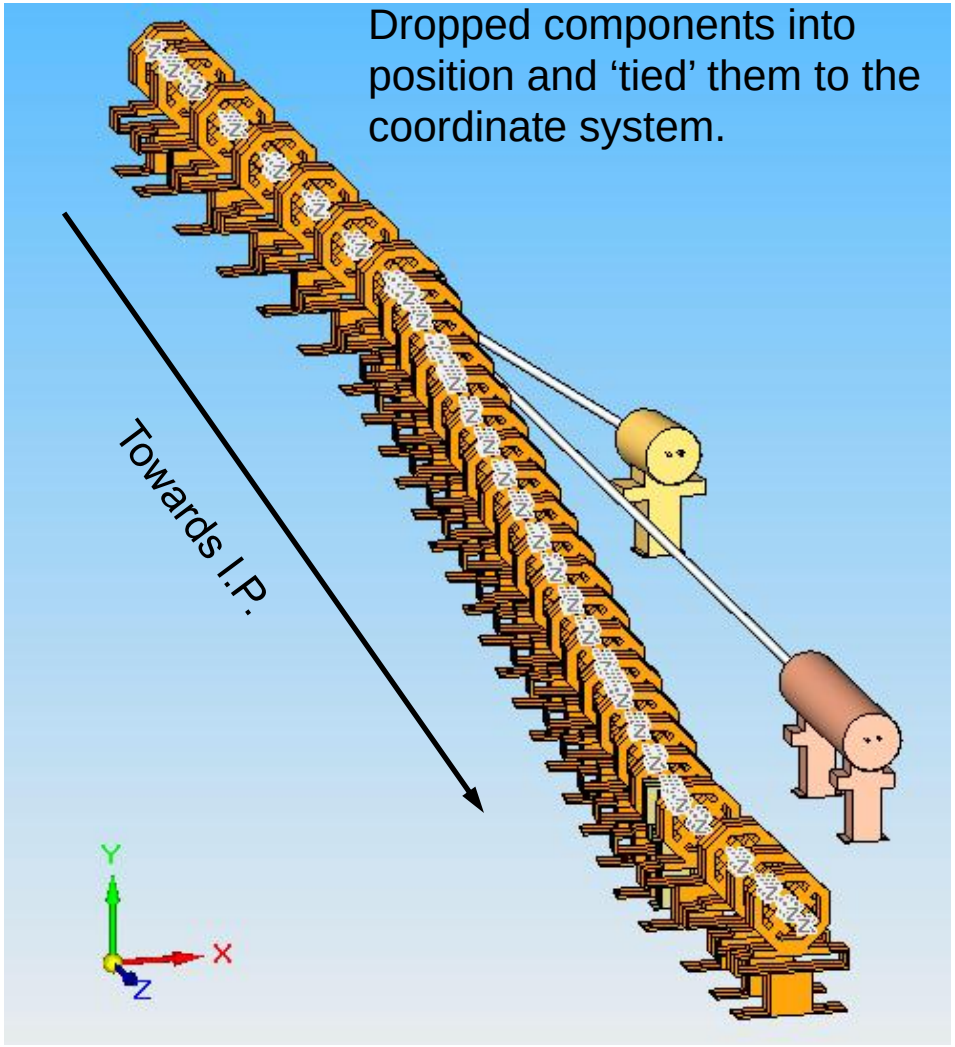


Linear Collider – Positron Source

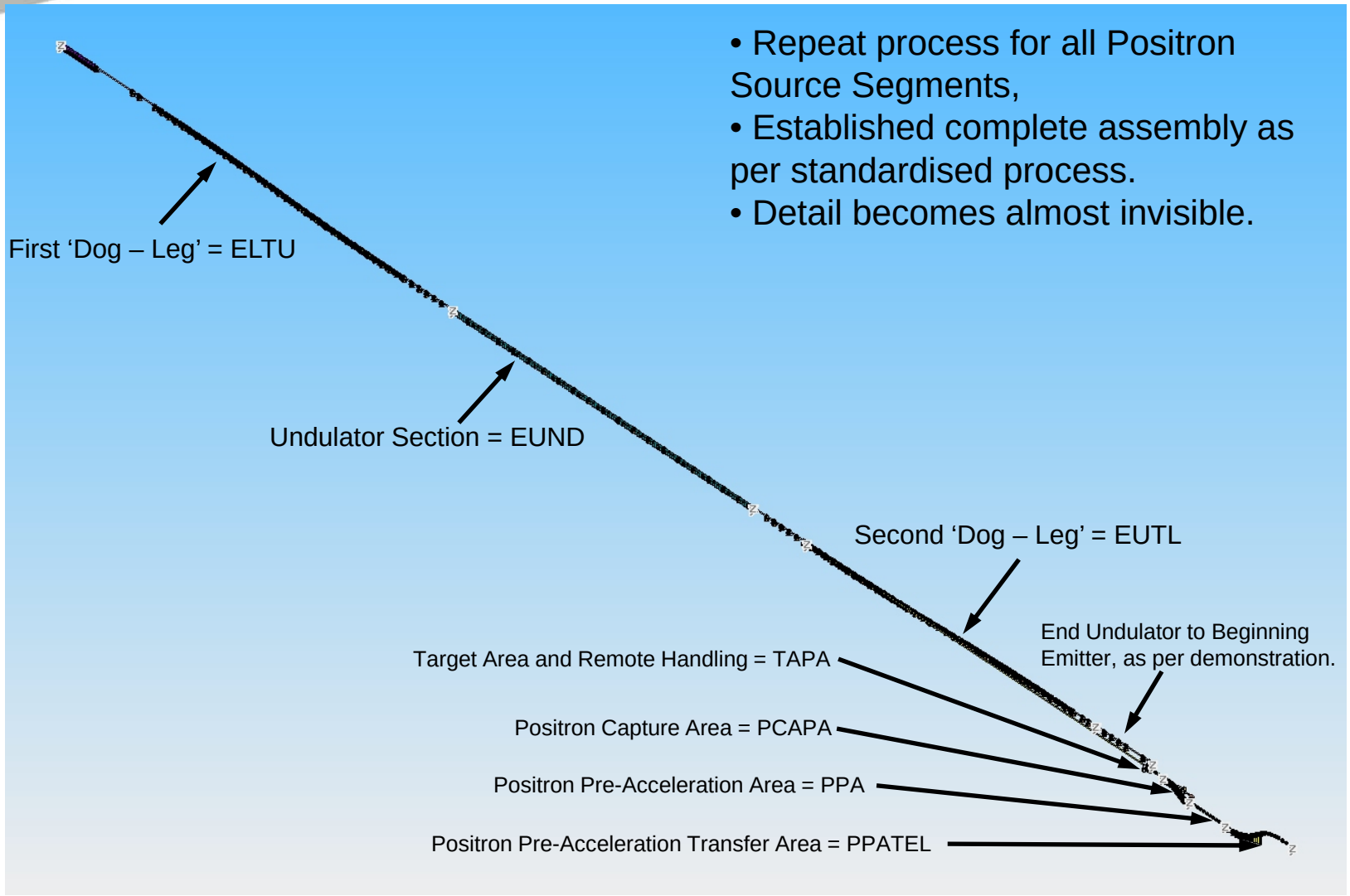
All segments underwent same process.
Segmentation views easy to interpret and handle.



Dropped components into position and ‘tied’ them to the coordinate system.

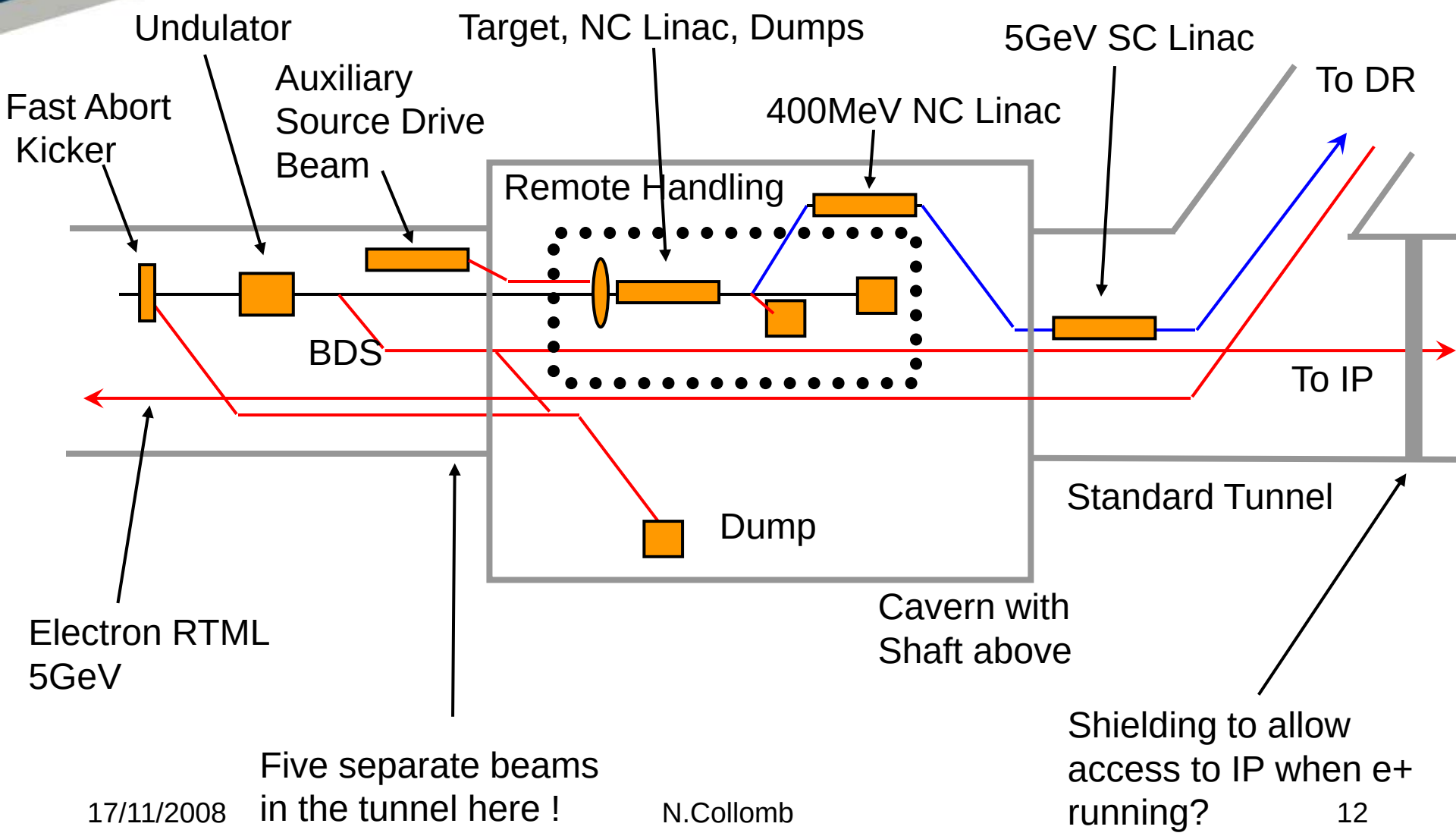


Linear Collider – Positron Source



Linear Collider – Positron Source

Minimum Machine Positron Source Layout (J. Clarke)



Linear Collider – Positron Source

Positron Source Progress Summary:

Apart from the following, all actions (and more) have been addressed since LCWS 2008.

- The next level is the inclusion of more detail design into the model. *Partially done, but requires more.*
- Address issues raised and propagate the information to relevant persons for discussion. *Discussions with LINAC, BDS, CFS and DRs are ongoing*.
- Look at more detailed and feasible Remote Handling design. *This is high priority now and will be addressed very soon.*
- Liaise with other WG to identify space requirements. *Discussions with LINAC, BDS, CFS and DRs are ongoing*.
- Start support and vacuum design phase. *Lower priority, after Remote Handling.*
- Incorporate 'new lattice' if available. *As and when available, but then high priority, especially with BDS impact.*
- Re-created Positron Source to follow Code of Practice.