IP and Bunch Parameters for ILC

4 March 2008

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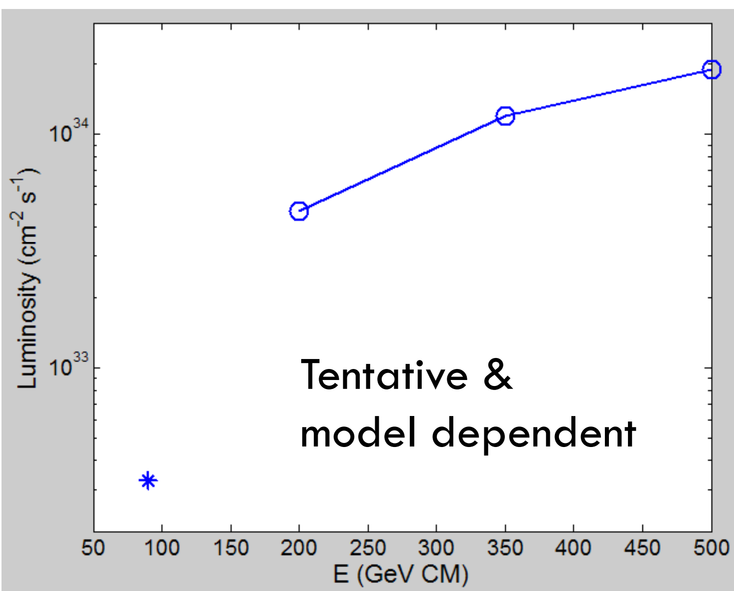
Motivation to discuss range of parameters

- Parameters for 200, 350 & 500 GeV CM – requested earlier for ILC benchmarking studies
- Discuss dependence on L* – important for performance/cost optimization of any LC

ILC parameters. 90-350 numbers are tentative. Dec 07, Integration group. Based on approximate analytical dependencies. The first step. Original plan – the second step to involve more detailed study, include dependence on L* and will be produced at the time of Sendai GDE meeting. C.Adolphsen, E.Paterson, N.Phinney, T.Raubenheimer, A.Seryi, P.Tenenbaum, et al

	Calib.90	Nom.200	Nom.350	Nominal	Upgr.1TeV
Ecms [GeV]	90	200	350	500	1000
N	2.0E+10	2.0E+10	2.0E+10	2.0E+10	2.0E+10
nb	2625	2625	2625	2625	2625
Tsep [ns]	369.2	369.2	369.2	369.2	369.2
Iave in train [A]	0.0087	0.0087	0.0087	0.0087	0.0087
f	2.5	5	5	5	4
Electron polarization, %	N/A[‡]	80	80	80	80
Positron polarization, %	N/A[‡]	N/A[†]	N/A[†]	N/A[†]	N/A[†]
Electron E-spread, %	0.70	0.35	0.20	0.14	<0.14
Positron E-spread, %	0.50	0.25	0.10	0.07	<0.07
IP Parameters					
bx	7.5E-02	2.6E-02	2.0E-02	2.0E-02	3.0E-02
by	2.0E-03	6.0E-04	4.0E-04	4.0E-04	3.0E-04
sigx_effective	3.3E-06	1.2E-06	7.6E-07	6.4E-07	5.5E-07
sigy_effective	3.5E-08	1.3E-08	7.4E-09	5.7E-09	3.3E-09
gamepsX effective	1.3E-05	1.0E-05	1.0E-05	1.0E-05	1.0E-05
gamepsY effective	5.4E-08	5.6E-08	4.7E-08	4.0E-08	3.6E-08
L* [m]	3.5	3.5	3.5	3.5	3.5
BDS Inc. t-t jitter, sigma	0.5	0.5	0.5	0.5	0.5
BDS Inc. b-b jitter, sigma	0.1	0.1	0.1	0.1	0.1
Sigz	3.0E-04	3.0E-04	3.0E-04	3.0E-04	3.0E-04
Dx	0.03	0.13	0.17	0.17	0.11
Dy	3.3	11.4	17.5	19.1	18.9
Uave	0.002	0.010	0.027	0.047	0.109
delta_B	0.0002	0.003	0.012	0.023	0.050
P_Beamstrahlung [W]	1.9E+02	1.4E+04	9.0E+04	2.4E+05	8.4E+05
Ngamma	0.26	0.74	1.09	1.29	1.43
Hd	1.9E+00	1.8E+00	1.7E+00	1.7E+00	1.5E+00
Geo Lum	1.8E+36	2.8E+37	7.4E+37	1.1E+38	1.8E+38
Lum. (m-2 s-1)	**3.3E+36**	**4.7E+37**	**1.2E+38**	**1.9E+38**	**2.8E+38**



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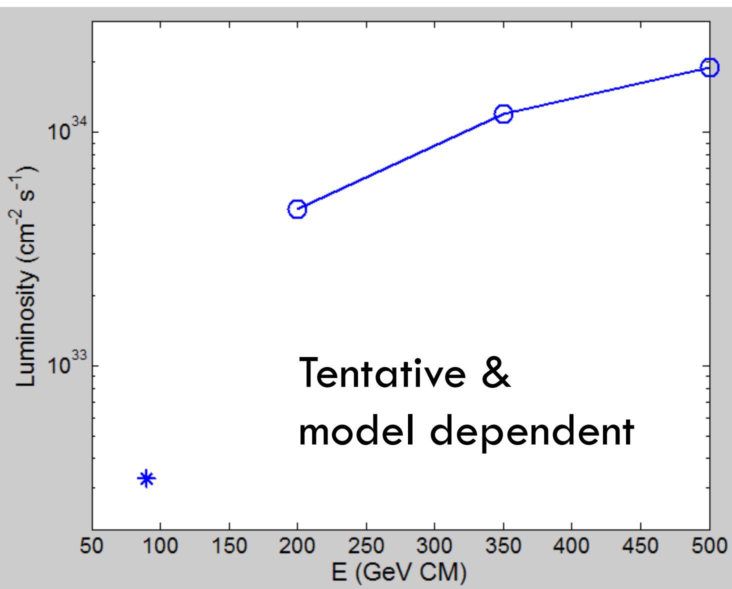
Notes:

Table is based on number of assumptions for collimation wakes, for method to change beta*, for beam jitter, etc., that would need to be further verified. Model dependent.

Footnotes:

† Positron polarization is not required in the baseline. Since the e+ baseline source can still give ~30% polarized beams, the BDS polarimeters are included for both electrons and positrons in the baseline.

‡ At 90GeV CM, neither electron no positron polarization are required in the baseline. The BDS polarimeters are not designed to measure polarization of either electrons or positrons below 200GeV CM in the baseline.



L* dependence

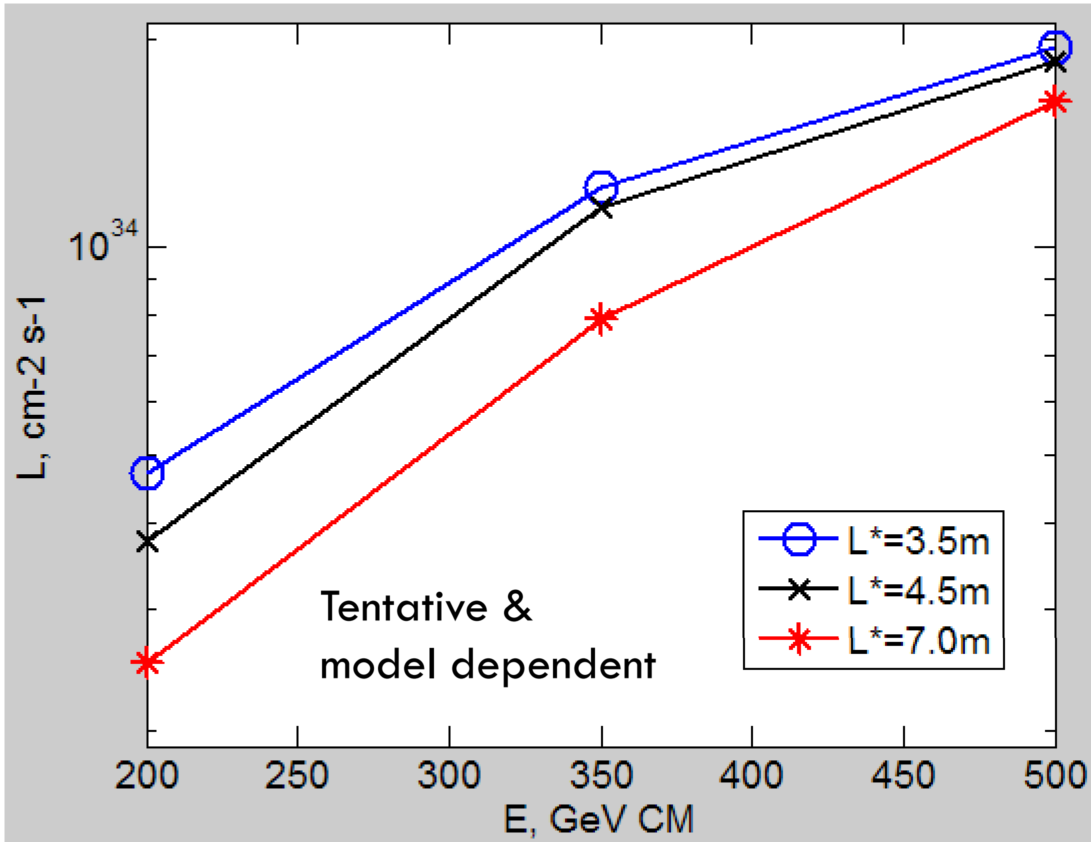
• The original plan was to study the L* dependence (in the range of 3.5-4.5m) before the Sendai meeting. This plan cannot be now completed.

• Thus, results below are based on a model as of early December 2007, which was not scrutinized and may have some flaws, and too optimistic assumptions.

• The information, even tentative, may still be useful for discussion of detector optimization.

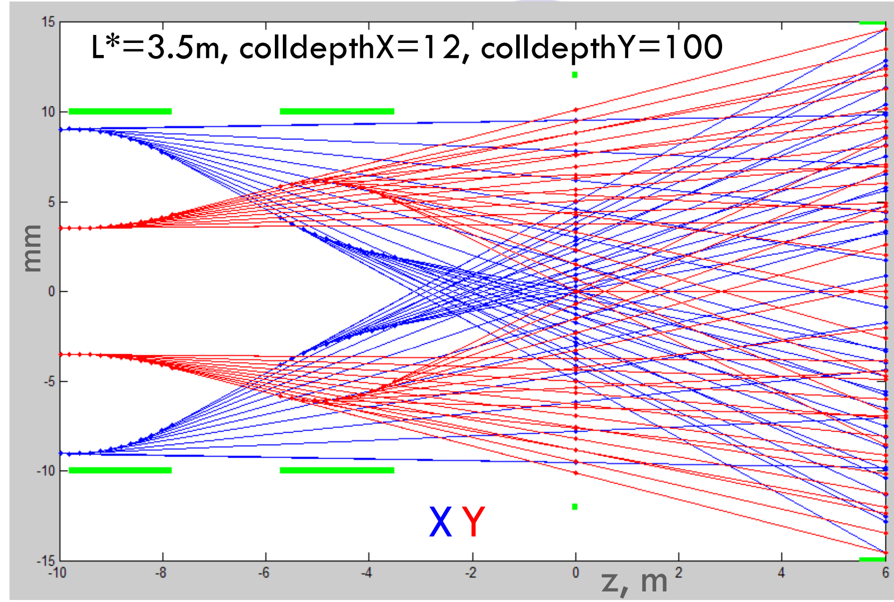
• The case of doubling L* also shown.

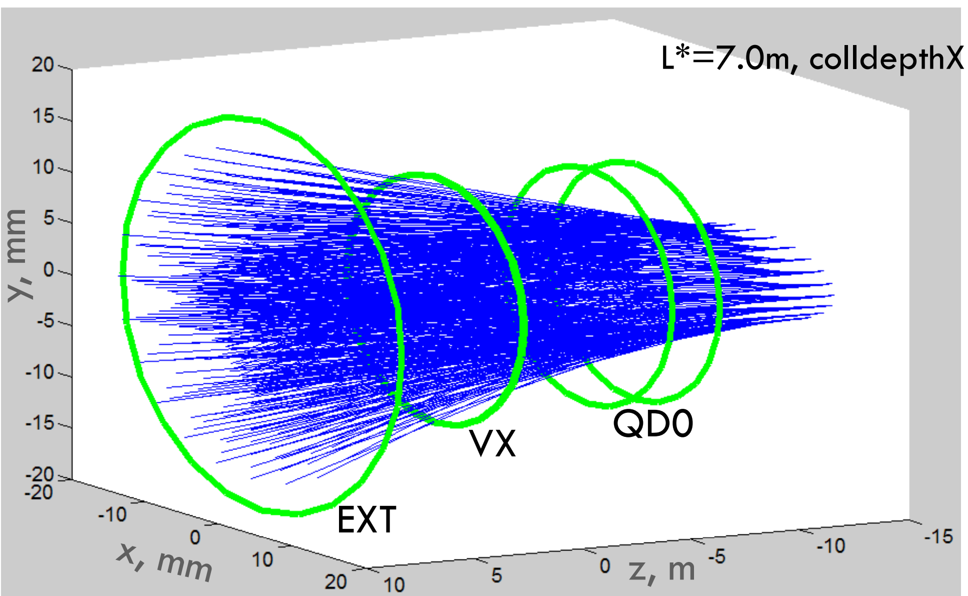
- Tentative dependence of luminosity on L*
  - Reduced by ~10-20% for L* 3.5m => 4.5m
  - Reduced ~factor of two for 3.5m=> 7.0m

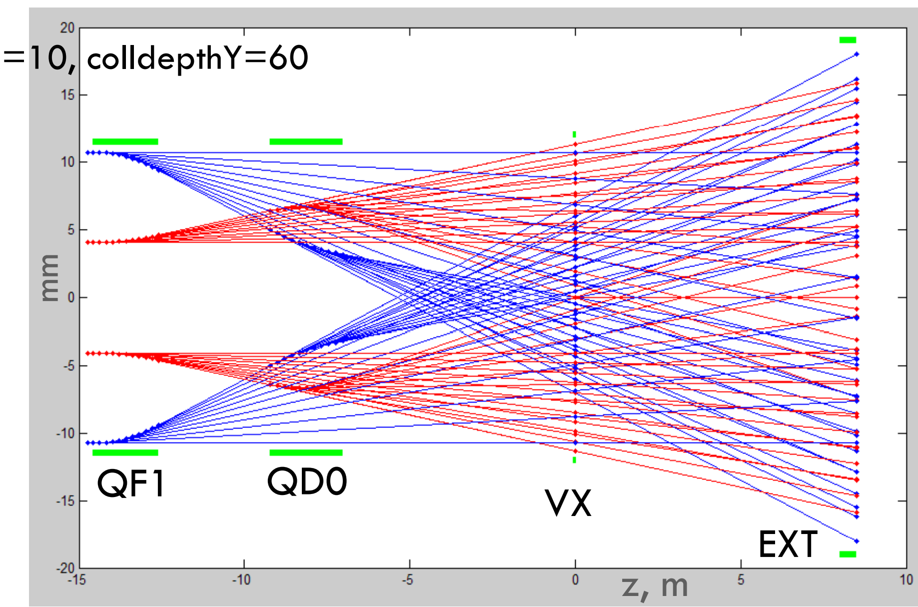


Doubled L*

- Illustration of FD with L*=3.5m and 7.0m
- If determined by incoming and EXT apertures, the collimation depth tightens slower than linear, if one can increase those apertures
- When/if coll.depth would be defined by VX, it will tighten ~1/L*







Rays show trajectories of possible SR photons. Amount of rays is not quantitative.