

# SR Study for ILC

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Jan. 13, 2011

# Effort (3)

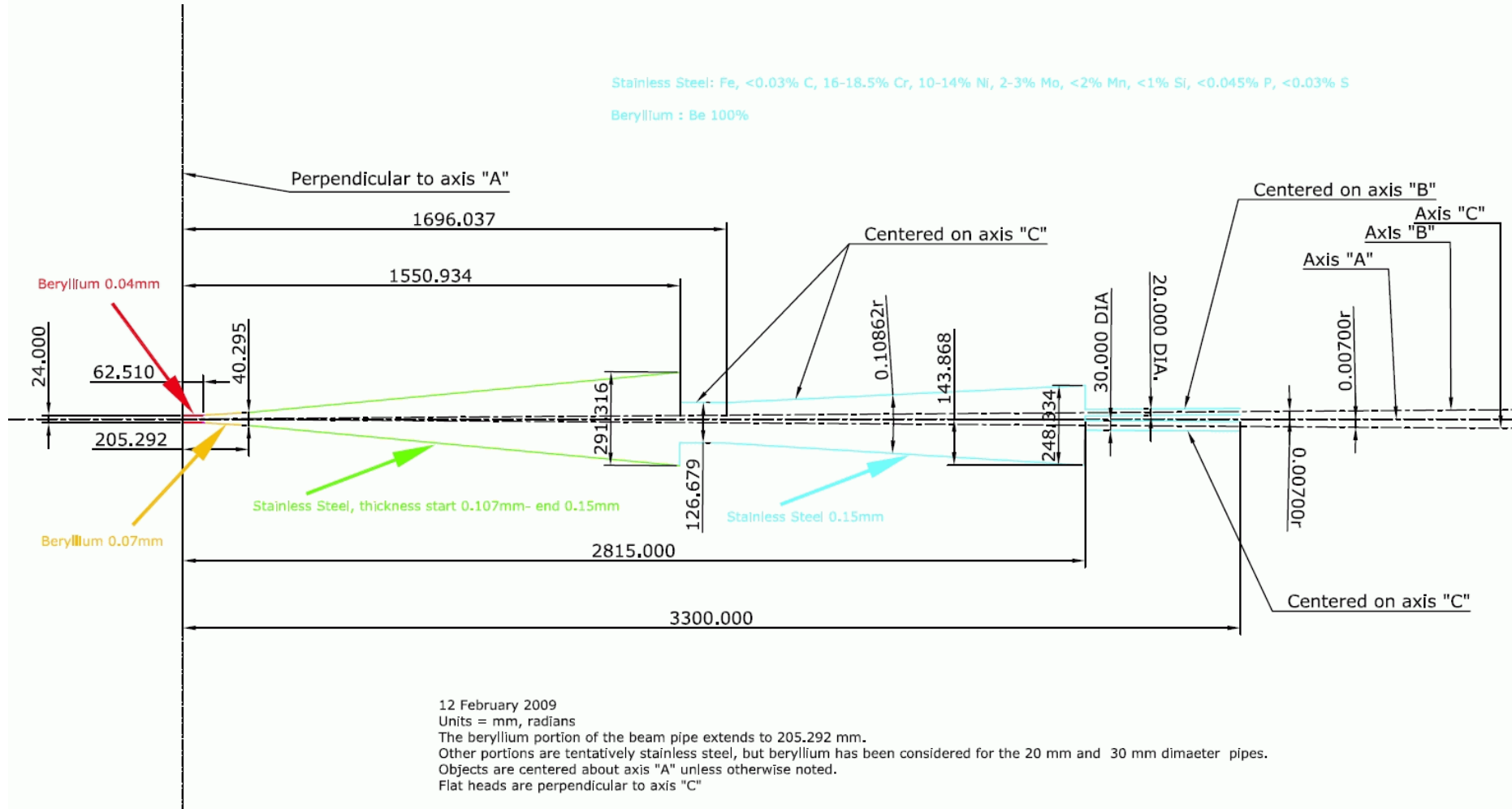
This was from  
my previous talk

- Check detector downstream surfaces and see where we start to get SR hits
  - This includes a careful model of the IP beam pipe and downstream geometry
  - There may be one bounce openings for the backscattered photons
  - Again if the collimators are opened when and where do things start to cause problems

# Present Status

- Have built the IP beam pipe and have included the dump
- Looks like we get hits from SR on the collimators at 100 and 200 m downstream
  - Assuming the dump is at 300 m (from the RDR)
  - Assume dump is Ti window (2 mm?) and water

# IP beam pipe



# Beam dump aperture

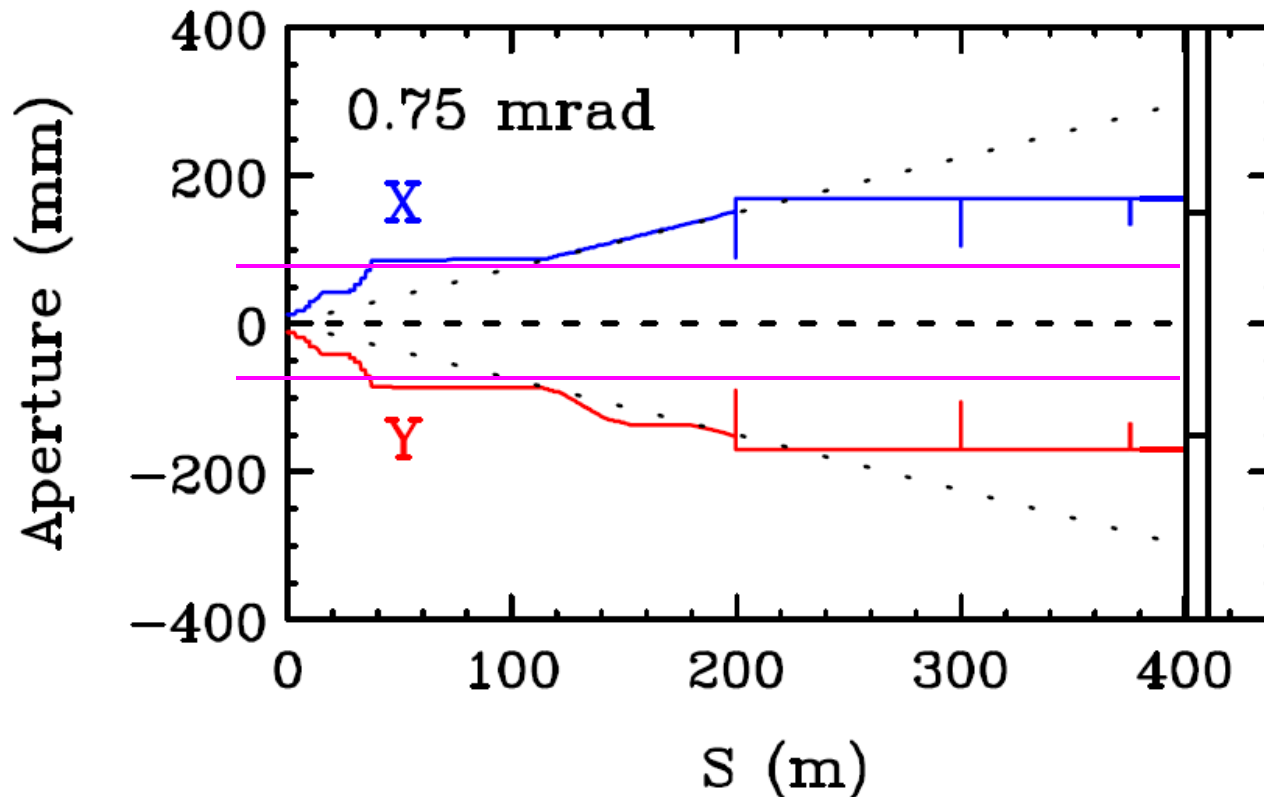
SLAC-PUB-11591

December 2005

This ref. was  
from Takashi

## ILC EXTRACTION LINE FOR 14 MRAD CROSSING ANGLE\*

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# Solid angle estimates

- IP beam pipe SA from parts of the dump
  - From 100 m
    - $2 \times 10^{-8}$
  - From 200 m
    - $5 \times 10^{-9}$
  - From 300 m
    - $2.2 \times 10^{-9}$
  - Conservative numbers. We might have some occlusion from the beam pipe at 2.85 m.

# Rates of SR photons

Input deck for  
SYNC\_BKG

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ILC. 14 mrad ILC_500_14MRAD_A03. (SSILC_500_14MRAD_A03_500M.TEM) (1/11/2011)
2.0      5.      2820.      F      F      (#/BUN)/E10(0.009A);FREQ;BUNCHS,photon units (KeV,MeV,GeV)
0.0D-3   0.0D-3   1.0D-3   1.0D-3   Amplitudes for the 4 dim. bkgds.
0.30     0.10     0.80     0.10     Beam sigma/bkgd sigma for 4 dim.
          5        50       10       60       Number of beam sigmas.
          4        4        4        4        Number of pts/beam sigma.
250.0    BEAM ENERGY (GEV)
1         # OF KAPPA VALUES
1.0      0.011646  0.000993  KAPPA, SIGMAX, SIGMAY
.0       .0          .0        XFOCUS,YFOCUS (CM)
.0       .0          .0        XMAG,YMAG (CM)
.0       .0          .0        XSLOPE,YSLOPE (CM/M)
.FALSE.  .FALSE.  .FALSE.  .TRUE.   .FALSE.  ADJSLP,ADJFOC,ADJMAG,FULLMAP,LSYNCP
20      1         # OF MAGNETS,# magnet divisions.
B2B     -183.3   2.4      -0.3445
B2A     -171.0   2.4      -0.3445
B1F     -156.4   2.4      -0.1243
B1E     -144.1   2.4      -0.1243
B1D     -131.8   2.4      -0.1243
B1C     -119.5   2.4      -0.1243
B1B     -107.2   2.4      -0.1243
B1A     -94.9    2.4      -0.1243
QF1D    -9.300   .500     0.09626  -5.865   -412.95  0.0      0.0
QF1C    -8.800   .500     0.09626  -5.886   -412.95  0.0      0.0
QF1B    -8.300   .500     0.09626  -5.907   -412.95  0.0      0.0
QF1A    -7.800   .500     0.09626  -5.927   -412.95  0.0      0.0
QDOH    -5.425   .275    -0.16983  -6.030   -412.95  0.0      0.0
QDOG    -5.150   .275    -0.16983  -6.041   -412.95  0.0      0.0
QDOF    -4.875   .275    -0.16983  -6.053   -412.95  0.0      0.0
QDOE    -4.600   .275    -0.16983  -6.064   -412.95  0.0      0.0
QDOD    -4.325   .275    -0.16983  -6.075   -412.95  0.0      0.0
QDOC    -4.050   .275    -0.16983  -6.087   -412.95  0.0      0.0
QDOB    -3.775   .275    -0.16983  -6.098   -412.95  0.0      0.0
QDOA    -3.500   .275    -0.16983  -6.109   -412.95  0.0      0.0
3       -183.30   1.00     1.00     -129.6   0.0
3       -10.025  0.25    0.25    -7.018   0.0
3       -3.300   1.0     1.0     -2.310   0.0
3       -2.815   1.0     1.0     -1.971   0.0
3       -1.551   4.0     4.0     0.0     0.0
3       -0.2053  2.02    2.02    0.0     0.0
3       -0.0625  1.2     1.2     0.0     0.0
3       0.0625   1.2     1.2     0.0     0.0
3       0.2053   2.02    2.02    0.0     0.0
3       1.551    6.0     6.0     1.0857  0.0
3       2.815    1.5     1.5     1.9705  0.0
3       3.300    1.5     1.5     2.310   0.0
3       5.500    1.8     1.8     3.850   0.0
3       9.800    3.0     3.0     6.860   0.0
3       10.000   3.0     3.0     7.000   0.0
3       20.000   5.0     5.0     14.000  0.0
3       40.000   7.5     7.5     28.000  0.0
3       100.00   7.5     7.5     70.000  0.0
3       200.00   7.5     7.5     140.000 0.0
3       300.00   0.01    0.01    210.000 0.0

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# SR rates (2) 100 m point

1  
 MASK 18 AT S =100.0000 HAS ELLIPTICAL HOLE, AX = 7.5000, AY = 7.5000, XOFF = -10.3889, YOFF = 0.0000 KAPPA = 1.00

	EHIT	EMISS	PHIT	PMISS	NHIT	NSPLIT	NMISS			
FROM B2B	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0		
FROM B2A	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0		
FROM B1F	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0		
FROM B1E	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0		
FROM B1D	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0		
FROM B1C	0.0000E+00	1.3785E+08	0.0000E+00	8.6655E+05	0	0	1618	1618		
FROM B1B	0.0000E+00	5.4545E+10	0.0000E+00	3.4288E+08	0	0	4508	4508		
FROM B1A	0.0000E+00	4.1231E+11	0.0000E+00	2.5918E+09	0	0	5954	5954		
FROM QF1	0.0000E+00	1.0699E+13	0.0000E+00	5.7640E+09	0	0	10976	10976		
FROM QF1	0.0000E+00	1.0248E+13	0.0000E+00	5.6423E+09	0	0	10976	10976		
FROM QF1	3.8893E+09	9.3291E+12	6.6629E+05	5.3864E+09	0	2224	8752	10976		
FROM QF1	1.3197E+11	7.9100E+12	3.0138E+07	4.9751E+09	2224	2614	6138	10976		
FROM QDO	8.8977E+10	3.3757E+12	2.3801E+07	2.4600E+09	3358	1480	6138	10976		
FROM QDO	2.3897E+10	2.8077E+12	6.4542E+06	2.2493E+09	1982	1376	7618	10976		
FROM QDO	3.8631E+09	2.3218E+12	1.0334E+06	2.0527E+09	868	1112	8996	10976		
FROM QDO	3.7418E+08	1.9197E+12	9.9721E+04	1.8743E+09	176	692	10108	10976		
FROM QDO	8.3695E+06	1.5946E+12	2.2903E+03	1.7149E+09	0	176	10800	10976		
FROM QDO	0.0000E+00	1.3326E+12	0.0000E+00	1.5728E+09	0	0	10976	10976		
FROM QDO	2.3070-180	1.1210E+12	3.8761-184	1.4461E+09	0	1296	9680	10976		
FROM QDO	2.6981-130	9.5018E+11	5.4245-134	1.3330E+09	1296	1422	8258	10976		
TOTAL	2.5298E+11	5.4076E+13	6.2195E+07	3.9406E+10						
TOTAL (WATTS)	5.714987E-01									
NUMBER OF PHOTONS >	1 KEV = 5.886E+07	> 4 KEV = 5.695E+07	> 10 KEV = 5.512E+07	> 50 KEV = 5.022E+07	> 200 KEV = 4.346E+07					
SLOPE REGIONS	1	4	10	20	40	80	150	250	500	999
SLOPES	251.430	95.090	45.128	23.094	11.763	6.211	3.605	2.015	1.069	





# SR rates (4) 200 m point

1 MASK 19 AT S =200.0000 HAS ELLIPTICAL HOLE, AX = 7.5000, AY = 7.5000, XOFF = -14.5182, YOFF = 0.0000 NAREA = 1.00

	EHIT	EMISS	PHIT	PMISS	NHIT	NSPLIT	NMISS		
FROM B2B	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0	
FROM B2A	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0	
FROM B1F	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0	
FROM B1E	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0	
FROM B1D	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0	0	0	0	
FROM B1C	0.0000E+00	1.3785E+08	0.0000E+00	8.6655E+05	0	0	1618	1618	
FROM B1B	0.0000E+00	5.4545E+10	0.0000E+00	3.4288E+08	0	0	4508	4508	
FROM B1A	0.0000E+00	4.1231E+11	0.0000E+00	2.5918E+09	0	0	5954	5954	
FROM QF1	0.0000E+00	1.0699E+13	0.0000E+00	5.7640E+09	0	0	10976	10976	
FROM QF1	6.4334E+10	1.0183E+13	1.2746E+07	5.6295E+09	0	4514	6462	10976	
FROM QF1	1.4332E+12	7.8959E+12	3.9922E+08	4.9872E+09	4514	3130	3332	10976	
FROM QF1	3.3697E+12	4.5403E+12	1.2540E+09	3.7210E+09	5420	1446	1886	8752	
FROM QD0	1.6471E+12	1.7286E+12	7.3372E+08	1.7263E+09	4364	1368	1886	7618	
FROM QD0	1.0227E+12	1.7850E+12	4.5711E+08	1.7922E+09	4682	1058	3254	8994	
FROM QD0	5.9907E+11	1.7228E+12	2.7241E+08	1.7803E+09	5180	616	4312	10108	
FROM QD0	3.0196E+11	1.6178E+12	1.3832E+08	1.7359E+09	5230	694	4876	10800	
FROM QD0	1.2656E+11	1.4681E+12	5.7823E+07	1.6571E+09	5270	1604	4102	10976	
FROM QD0	4.4683E+10	1.2879E+12	2.0365E+07	1.5525E+09	6354	1352	3270	10976	
FROM QD0	9.7873E+09	1.1112E+12	4.3150E+06	1.4417E+09	7186	868	2922	10976	
FROM QD0	1.2878E+09	9.4889E+11	5.4647E+05	1.3325E+09	6206	682	2792	9680	
TOTAL	8.6204E+12	4.5456E+13	3.3506E+09	3.6056E+10					
TOTAL (WATTS)	1.947412E+01								
NUMBER OF PHOTONS > 1 KEV = 3.083E+09 > 4 KEV = 2.966E+09 > 10 KEV = 2.853E+09 > 50 KEV = 2.552E+09 > 200 KEV = 2.142E+09									
SLOPE REGIONS 1 4 10 20 40 80 150 250 500 999									
SLOPES	251.757	95.326	45.312	23.240	11.879	6.304	3.682	2.077	1.060



Will continue  
this study

# Next effort

- Get a value for the number of photons that backscatter from the masks and dump
- Use the SA estimates to get the rate back to the IP
- Can make a file of photons to use as incident on the detector beam pipe
  - Will be many keV so all will go through?
  - Ti layer inside the Be