SR Study for ILC

M. Sullivan

Jan. 13, 2011

Effort (3)

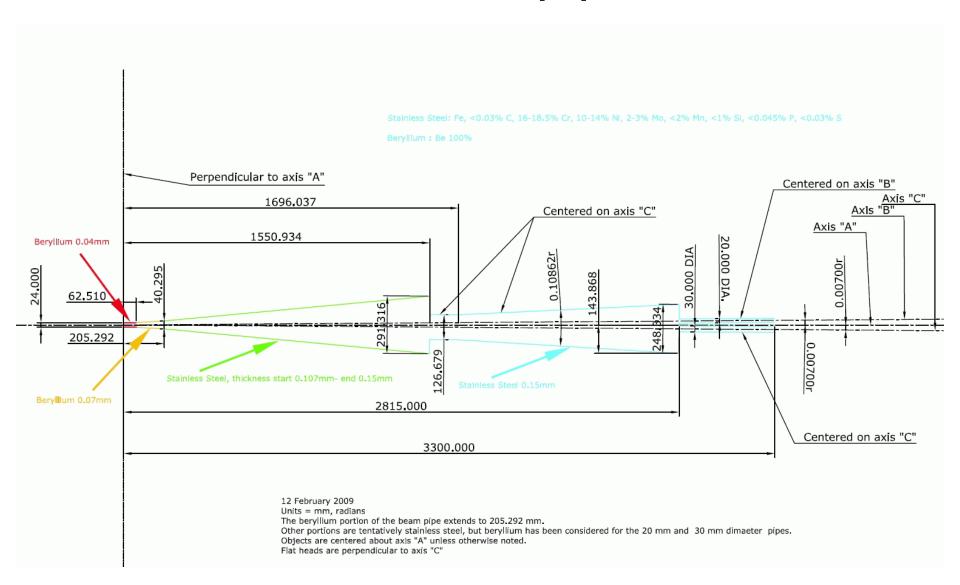
This was from my previous talk

- 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



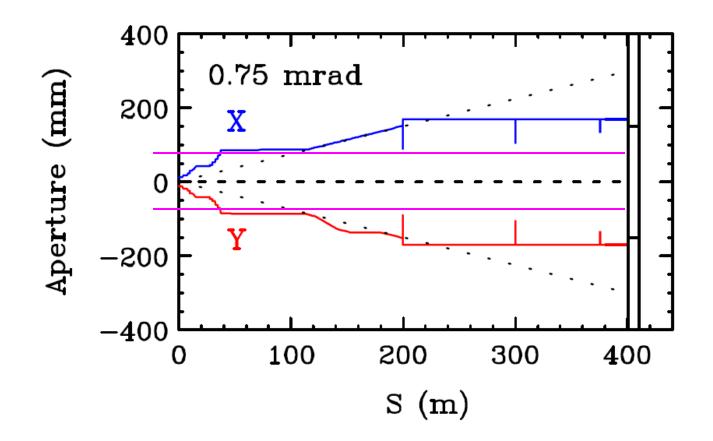
Beam dump aperture

This ref. was from Takashi

SLAC-PUB-11591 December 2005

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
 - 2x10⁻⁸
 - From 200 m
 - 5x10⁻⁹
 - From 300 m
 - 2.2x10⁻⁹
 - 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. (S$ILC_500_14MRAD_A03_500M.TEM) (1/11/2011)
 2.0
                       2820.
                                    È
                                                      (#/BUN)/E10(0.009A); FREQ; BUNCHS, photon units (KeV, MeV, GeV)
                5.
                                       F
             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.
                                       60
                            10
                                                      Number of beam sigmas.
                                                      Number of pts/beam sigma.
250.0
                                                      BEAM ENERGY (GEV)
                                                      # OF KAPPA VALUES
1
           0.011646 0.000993
1.0
                                                      KAPPA, SIGMAX, SIGMAY
                                                      XFOCUS, YFOCUS (CM)
.0
           .0
.0
           .0
                                                      XMAG, YMAG (CM)
.0
           .0
                                                      XSLOPE.YSLOPE (CM/M)
.FALSE.
           .FALSE.
                      .FALSE.
                                            .FALSE.
                                                      ADJSLP, ADJFOC, ADJMAG, FULLMAP, LSYNCP
   20
                                        # OF MAGNETS, # magnet divisions.
               1
B2B
           -183.3
                      2.4
                                 -0.3445
B2A
           -171.0
                                 -0.3445
                                                                                            Η
                      2.4
B1F
           -156.4
                                 -0.1243
                                                                                            Η
                      2.4
                                 -0.1243
B1E
           -144.1
           -131.8
                      2.4
                                 -0.1243
B1C
           -119.5
                      2.4
                                 -0.1243
           -107.2
                                 -0.1243
                                                                                            Η
B1B
                      2.4
           -94.9
                      2.4
                                 -0.1243
                                                                                            Η
B1A
OF 1D
           -9.300
                      .500
                                 0.09626
                                            -5.865
                                                         -412.95
                                                                    0.0
                                                                                   0.0
OF1C
           -8.800
                                            -5.886
                                                         -412.95
                                                                    0.0
                                                                                   0.0
                      .500
                                 0.09626
QF1B
           -8.300
                      .500
                                            -5.907
                                                         -412.95
                                                                    0.0
                                                                                   0.0
                                 0.09626
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
                      .275
                                -0.16983
                                                         -412.95
                                                                    0.0
                                                                                   0.0
           -4.600
                                            -6.064
QDOD
                      .275
                                 -0.16983
                                                         -412.95
                                                                    0.0
                                                                                   0.0
           -4.325
                                            -6.075
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
                                 -0.16983
                                            -6.109
                                                         -412.95
                                                                    0.0
                                                                                   0.0
           -183.30
                       1.00
                                    1.00
                                           -129.6
                                                       0.0
           -10.025
                        0.25
                                    0.25
                                           -7.018
                                                       0.0
           -3.300
                                           -2.310
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                        1.0
                                    1.0
           -2.815
                        1.0
                                    1.0
                                           -1.971
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           -1.551
                        4.0
                                             0.0
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                                    4.0
           -0.2053
                        2.02
                                    2.02
                                             0.0
                                                       0.0
           -0.0625
                        1.2
                                    1.2
                                             0.0
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           0.0625
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                        1.2
                                    1.2
            0.2053
                        2.02
                                    2.02
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            1.551
                        6.0
                                    6.0
                                           1.0857
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            2.815
                        1.5
                                    1.5
                                           1.9705
                                                       0.0
            3.300
                        1.5
                                    1.5
                                            2.310
                                                       0.0
            5.500
                        1.8
                                    1.8
                                            3.850
                                                       0.0
            9.800
                        3.0
                                    3.0
                                            6.860
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           10.000
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                                    3.0
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           20.000
                        5.0
                                    5.0
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           40.000
                        7.5
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           100.00
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           200.00
                        7.5
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                                           140.00
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           300.00
                        0.01
                                    0.01
                                           210.00
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SR rates (2) 100 m point

1 MAGV 18 AT S -100 (OOOO HAG EIIIDTIGAI H	OIF AV - 7 5000	AY = 7.5000, XOFF =	_10 3880 VAFF	= 0.000	n	KA	PPA = 1.00
MASK 10 AI 5 -100.0	EHIT	EMISS	PHIT	PMISS		SPLIT	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 1	.0976	10976
FROM QF1	0.0000E+00	1.0248E+13	0.0000E+00	5.6423E+09	0	0 1	.0976	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 1	.0108	10976
FROM QDO	8.3695E+06	1.5946E+12	2.2903E+03	1.7149E+09	0	176 1	.0800	10976
FROM QDO	0.0000E+00	1.3326E+12	0.0000E+00	1.5728E+09	0	0 1	.0976	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							
	> 1 KEV = 5.886E+07	> 4 KEV = 5.695E+	07 > 10 KEV = 5.512E	E+07 > 50 KEV	= 5.022E+07	> 200	KEV =	4.346E+07
SLOPE REGIONS 1	1 4	10 20	40 80		250	_	00	999
SLOPES	251.430 95.09	0 45.128	23.094 11.763	6.211	3.605	2.015		1.069

SR rates (3) 100 m point

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OWhere did it come from (LOG 10 of number of photons)
OSIGY/SIGX
              -5.
                          -5.
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                                                                                                                                -1.
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  -50.
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  -45.
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  -40.
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                      0.0
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  -35.
                      0.0
                                   0.0-190.8-190.3-189.9-189.8-189.6-189.4-189.2-189.1-189.2-189.4-189.6-189.8-189.9-190.3-190.8
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  -30.
                      0.0-131.8-131.0-130.5-130.3-152.0-162.8-165.7-168.2-169.0-169.0-168.2-165.7-162.8-151.5-130.3-130.5-131.0-131.8-131.0-130.5-130.3-130.5-131.0-131.8-131.0-130.5-130.3-130.5-131.0-131.8-131.0-130.5-130.3-130.3-130.5-131.0-131.8-131.0-131.8-131.0-130.5-130.3-130.3-130.5-131.0-131.8-131.0-131.8-131.0-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-130.3-
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  -25.
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  -15.
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                                                                                                                                                                                                                                                                      0.0
    30.
                                   0.0-190.8-190.3-189.9-189.8-189.6-189.4-189.2-189.1-189.1-189.2-189.4-189.6-189.8-189.9-190.3-190.8
                                                                                                                                                                                                                                                                      0.0
    35.
                       0.0
                                                0.0-261.0-260.5-260.2-260.0-259.7-259.5-259.4-259.4-259.5-259.7-260.0-260.2-260.5-261.0
                                                                                                                                                                                                                                                          0.0
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    40.
                       0.0
                                   0.0
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    50.
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SR rates (4) 200 m point

MASK 19 AT S =200.0000 HAS ELLIPTICAL HOLE, AX = 7.5000, AY = 7.5000, XOFF = -14.5182, YOFF = 0.0000									
MASK 19 AL 5 =200	EHIT	L HOLE, AX = 7.5000, EMISS	PHIT	-14.5162, 10FF PMISS		ISPLIT	NMISS		
FROM B2B	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	Π	Π	141711	, N	
FROM B2A	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	ň	ŏ	ň	ñ	
FROM B1F	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	ň	ň	ň	ñ	
FROM B1E	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	ň	ŏ	ň	ñ	
FROM B1D	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	ñ	ő	ñ	ñ	
FROM B1C	0.0000E+00	1.3785E+08	0.0000E+00	8.6655E+05	ŏ	ŏ	1618	1618	
FROM B1B	0.0000E+00	5.4545E+10	0.0000E+00	3.4288E+08	ň	ŏ	4508	4508	
FROM B1A	0.0000E+00	4.1231E+11	0.0000E+00	2.5918E+09	ŏ	ŏ	5954	5954	
FROM OF1	0.0000E+00	1.0699E+13	0.0000E+00	5.7640E+09	ň	ň	10976	10976	
FROM QF1	6.4334E+10	1.0183E+13	1.2746E+07	5.6295E+09	ō	4514	6462	10976	
FROM QF1	1.4332E+12	7.8959E+12	3.9922E+08	4.9872E+09		3130	3332	10976	
FROM ÔF1	3.3697E+12	4.5403E+12	1.2540E+09	3.7210E+09		1446	1886	8752	
FROM ÕDO	1.6471E+12	1.7286E+12	7.3372E+08	1.7263E+09	4364	1368	1886	7618	
FROM ÕDO	1.0227E+12	1.7850E+12	4.5711E+08	1.7922E+09	4682	1058	3254	8994	
FROM QDO	5.9907E+11	1.7228E+12	2.7241E+08	1.7803E+09	5180	616	4312	10108	
FROM QDO	3.0196E+11	1.6178E+12	1.3832E+08	1.7359E+09	5230	694	4876	10800	
FROM QDO	1.2656E+11	1.4681E+12	5.7823E+07	1.6571E+09	5270	1604	4102	10976	
FROM QDO	4.4683E+10	1.2879E+12	2.0365E+07	1.5525E+09	6354	1352	3270	10976	
FROM QDO	9.7873E+09	1.1112E+12	4.3150E+06	1.4417E+09	7186	868	2922	10976	
FROM QDO	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+0	9 > 4 KEV = 2.966E+	-09 > 10 KEV = 2.853I	E+09 > 50 KEV :	= 2.552E+09	> 21	00 KEV :	= 2.142E+09	
SLOPE REGIONS	1 4	10 20	40 81		250		500	999	
SLOPES	251.757 95	.326 45.312	23.240 11.879	6.304	3.682	2.07	7	1.060	

SR rates (5) 200 m point

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Where did it come from (LOG 10 of number of photons)
SIGY/SIGX
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                              0.0-131.7-130.7-129.9-129.2-128.7-128.5-128.4-128.3-128.3-128.3-128.3-128.4-128.5-128.7-129.2-129.9-130.7-131.7-130.7-129.2-129.9-130.7-131.7-130.7-129.2-129.9-130.7-131.7-130.7-131.7-130.7-129.2-129.9-130.7-131.7-130.7-129.2-129.9-130.7-131.7-130.7-131.7-130.7-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-129.2-
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                              0.0-131.7-130.7-129.9-129.2-128.7-128.5-128.4-128.3-128.3-128.3-128.4-128.5-128.7-129.2-129.9-130.7-131.7
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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