

**A Report Summarizing the Scan of the AGATA  
S002 and S003 Symmetric Detectors**

**University of Liverpool, 2006 / 2007**

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This report documents the details of the scanning of the 2<sup>nd</sup> and 3<sup>rd</sup> symmetric Canberra Eurisys AGATA prototype detectors. The data is in MTsort format, see <http://ns.ph.liv.ac.uk/software.html>. A summary of the \*FORMATS and \*DATA sections required to develop a sort code to analyze this data can be found in *Appendix 1*. An example of an un-coded Eurogam format event can be found in *Appendix 2*.

### **Fine-scan Overview**

The fine-scan involved the raster scanning a highly collimated 920MBq Cs-137 (662keV) source across the front face of each AGATA detector. Both measurements were performed with a 1mm injection collimation. The collimator was moved in 1mm increments, at 60 seconds per position.

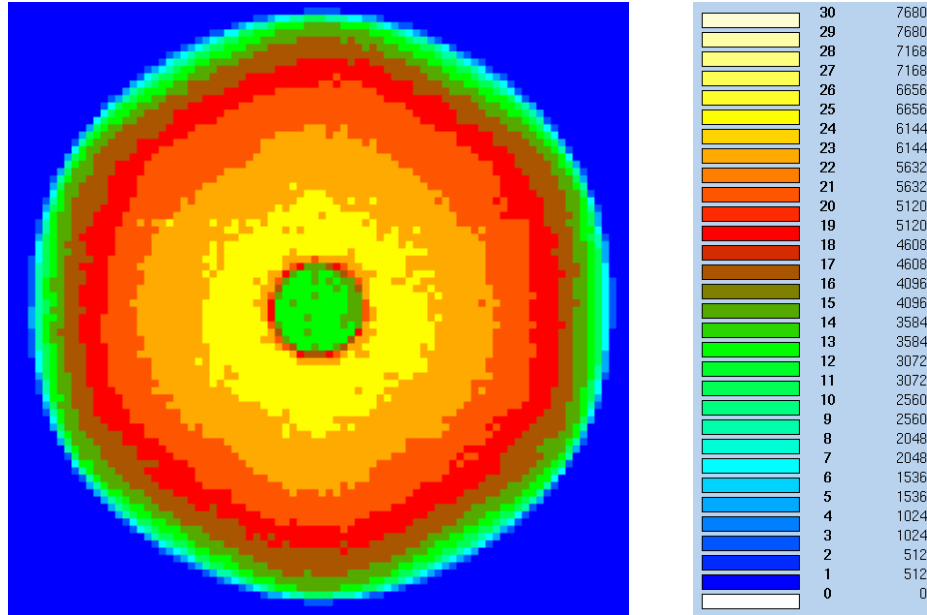
The data acquisition system used the GRT4 VME cards to digitize the pulse shapes. The GRT4 cards contain 14-bit 80MHz Flash ADC's which digitize over a dynamic range of  $\pm 1V$ . 3.1 $\mu$ s of data (250 samples at 12.5ns / sample) is recorded for each trace. The cards utilize the Moving Window Deconvolution (MWD) algorithm to determine the energy of the interaction. All GRT energies are output at 0.5keV / channel to maintain the resolution of the germanium. The fold of an event is incremented for each segment that has a pulse with magnitude greater than three standard deviations of the baseline noise. The system is triggered with an external CFD with a threshold of  $\sim 450keV$ . The maximum requested trigger rate was  $\sim 720Hz$ , with a background count of  $\sim 40Hz$ . The accepted trigger rate was  $\sim 120Hz$ .

The raw data was written out at 64kB = 1 block and  $\sim 900GB$  of data was collected per detector. The raw data has been presorted using a geometric suppression algorithm. For a given hit-segment, the nearest and next nearest neighbor image charges are kept in that ring. The image charges directly below and above are also kept. For the front ring, the opposite image charge is kept as well. The presorted data is gated on 618 to 668keV on the centre contact. This total compression leaves  $\sim 160GB$  or  $\sim 2.5 \times 10^6$  events per detector. There are 83 input files that comprise this total. Each file has been individually gzipped. The compressed data (83GB) is available to download through the University of Liverpool Nuclear Structure web server.

The start of each event is signified by a 16-bit event start token. This is followed by a 16-bit word that describes the event length. The first group data item (255) is the position table information, listing the x position, y position and step number. The digitized pulse shape information follows the position table and is in the format of extended groups (group numbers > 256). Each of these 37 groups is read out followed immediately by the baseline (g.e1) and the MWD energy (g.e2) that correspond to that channel. Finally the Silena energies are written as simple data word items.

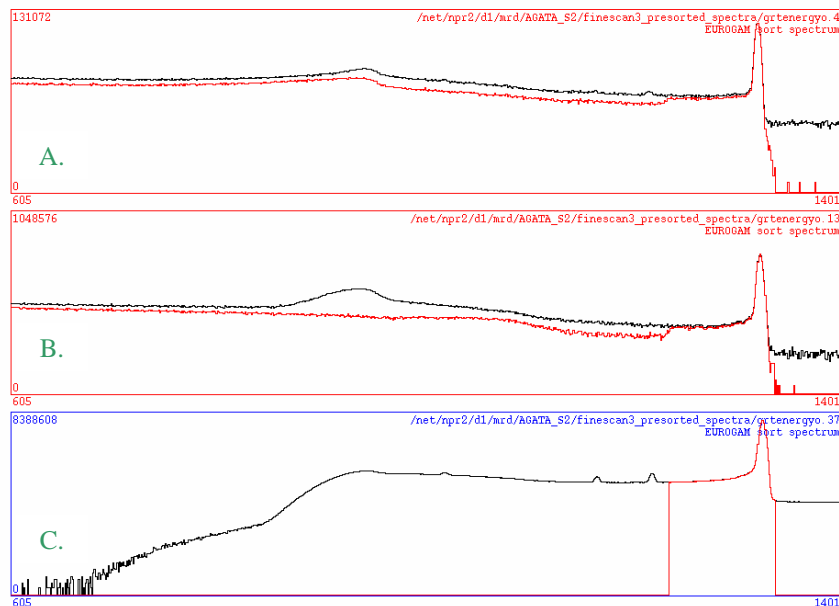
A complete description of the Eurogam output data format can be found in document EDOC073. This is available on the Daresbury laboratory website at <http://npg.dl.ac.uk/documents/edoc073/edoc073.html>.

Figure 1 shows the intensity plot for the presorted data.



(Figure 1 – Detector response as a function of collimator position)

Figure 2 shows the effect of applying the energy cut on the centre contact. In black you can see the energy spectra for two random segments, 4 and 13 (A. and B.) and the core (C.) In red you can see the presorted spectra overlapped. Applying a gate for full energy events on the centre contact causes a step in the continuum below the 618keV mark, on the segments. This is a result of the rejection of fold 1 events with energy <618keV.



(Figure 2 – Non-energy gated and energy gated spectra)

The labeling of the AGATA channels is as follows:

CWC Channel	Channel Number	GRT Channel	CWC Channel	Channel Number	GRT Channel
A1	1	1A	D1	19	5C
A2	2	1B	D2	20	5D
A3	3	1C	D3	21	6A
A4	4	1D	D4	22	6B
A5	5	2A	D5	23	6C
A6	6	2B	D6	24	6D
B1	7	2C	E1	25	7A
B2	8	2D	E2	26	7B
B3	9	3A	E3	27	7C
B4	10	3B	E4	28	7D
B5	11	3C	E5	29	10C
B6	12	3D	E6	30	8B
C1	13	4A	F1	31	8C
C2	14	4B	F2	32	8D
C3	15	4C	F3	33	9A
C4	16	4D	F4	34	9B
C5	17	5A	F5	35	9C
C6	18	5B	F6	36	9D
			CORE	37	10B

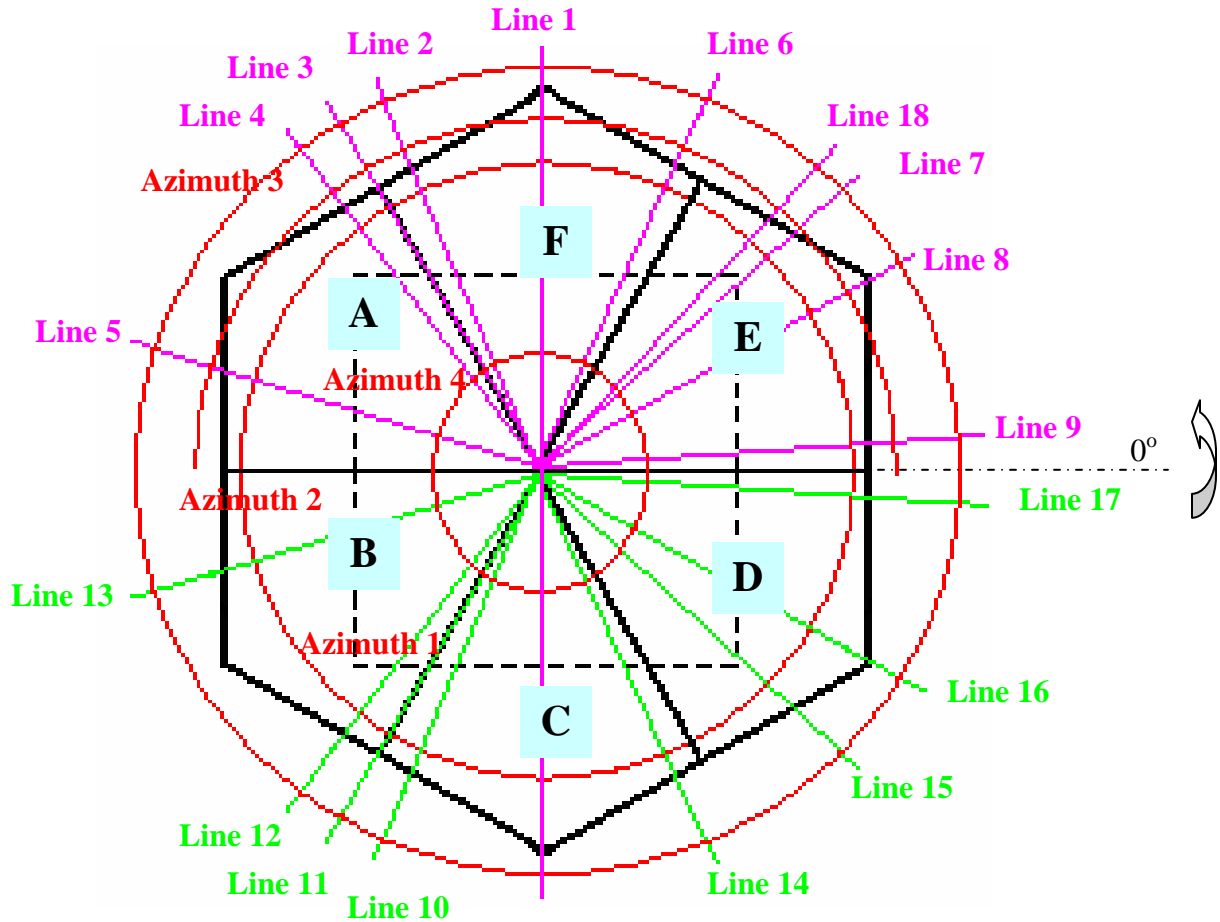
(Table 1 – AGATA channel mapping)

*Note: The CWC differential to single ended converter box channels labeled 1-6, for a given sector, correspond to bottom to top in terms of the physical channel connectors on each box. They also correspond to the rings from the front to the back of the AGATA detector. The core had its own single channel converter box. The sector labels from A to F form an anti-clockwise configuration. This is opposite to the label scheme chosen for each detector in the triple cluster experiment.*

The pre-amplifier output signals were positive for the core and negative for all the segments for S002. For S003, all signals were positive. Typical magnitudes were +65mV and -100mV respectively for 662keV interactions.

## Coincidence-scan Overview

The primary objective of the scan was to fully characterize half of each symmetric AGATA prototype detector. An  $(r^{1/2}, \theta)$  grid was adopted to maximize scan points in non-bulk regions of the crystal. Sectors A, F and E (the upper half) were scanned with sufficient time to achieve 100 good coincidences in each of the first four rings at each position. Sectors B, C and D (the lower half) were also scanned. However, due to time constraints, only ~50 good coincidences were collected at each position. *Figure 3* shows the azimuthal and radial scan lines.



(Figure 3 – Schematic illustration of coincidence scan-positions)

Note: The centre of the S002 detector was determined to be  $x = 72.0$ ,  $y = 72.0$ .

The centre of the S003 detector was determined to be  $x = 65.0$ ,  $y = 69.2$ .

### Position Summary

Line 1 – line scan through center of sectors F and C

Line 2 – line scan  $7.5^\circ$  clockwise from A/F segment boundary

Line 3 – line scan along A/F segment boundary

- Line 4 – line scan 7.5° anticlockwise from A/F segment boundary
- Line 5 – line scan 15° from A/B segment boundary
- Line 6 – line scan 7.5° anticlockwise from F/E segment boundary
- Line 7 – line scan 15° clockwise from F/E segment boundary
- Line 8 – line scan 30° clockwise from F/E segment boundary
- Line 9 – line scan 7.5° anticlockwise from E/D segment boundary
- Line 10 – line scan 7.5° anticlockwise from C/B segment boundary
- Line 11 – line scan along C/B segment boundary
- Line 12 – line scan 7.5° clockwise from C/B segment boundary
- Line 13 – line scan 7.5° anticlockwise from C/B segment boundary
- Line 14 – line scan 7.5° clockwise from C/D segment boundary
- Line 15 – line scan 15° anticlockwise from C/D segment boundary
- Line 16 – line scan 30° clockwise from E/D segment boundary
- Line 17 – line scan 7.5° clockwise from E/D segment boundary
- Line 18 – line scan 10° clockwise from F/E segment boundary (fast axis)

- Azimuth 1 – 0 to 360° Azimuthal scan, 24mm radius, 4mm (9.6°) steps
- Azimuth 2 – 0 to 180° Azimuthal scan, 27mm radius, 4mm (8.5°) steps
- Azimuth 3 – 0 to 360° Azimuthal scan, 31mm radius, 5.2mm (9.6°) steps
- Azimuth 4 – 0° to 180° Azimuthal scan, 7mm radius, 3.7mm (30°) steps

10 banks of BGO scintillators were mounted around the upper half of the detector. They were stacked through the depth of the crystal, 2 banks / ring. 2 further banks of BGOs were mounted around the front ring of the lower side. 3 NaI(Tl) detectors were used to see the other five rings. The positions of these detectors are summarized in *Table 2* and a schematic illustration is presented in *Appendix 3*.

Silena Channels	Remapped Silena Channels	Detector	AGATA Side	Stack	Bank	AGATA Rings Seen
16	1	BGO	Upper	1	1	1
17	2	BGO	Upper	1	2	1
26	3	BGO	Lower	1	3	1
18	4	BGO	Upper	2	1	1, 2
19	5	BGO	Upper	2	2	1, 2
27	6	BGO	Lower	1	4	1
20	7	BGO	Upper	3	1	3
21	8	BGO	Upper	3	2	3
22	9	BGO	Upper	4	1	4, 5
23	10	BGO	Upper	4	2	4, 5
24	11	BGO	Upper	5	1	6
25	12	BGO	Upper	5	2	6
28	13	Nal	Lower	2	1	2, 3, 4, 5, 6
29	14	Nal	Lower	2	2	2, 3, 4, 5, 7
30	15	Nal	Lower	2	3	2, 3, 4, 5, 8
1	16	<b>AGATA Core</b>	-	-	-	-
3	17	<b>TAC</b>	-	-	-	-

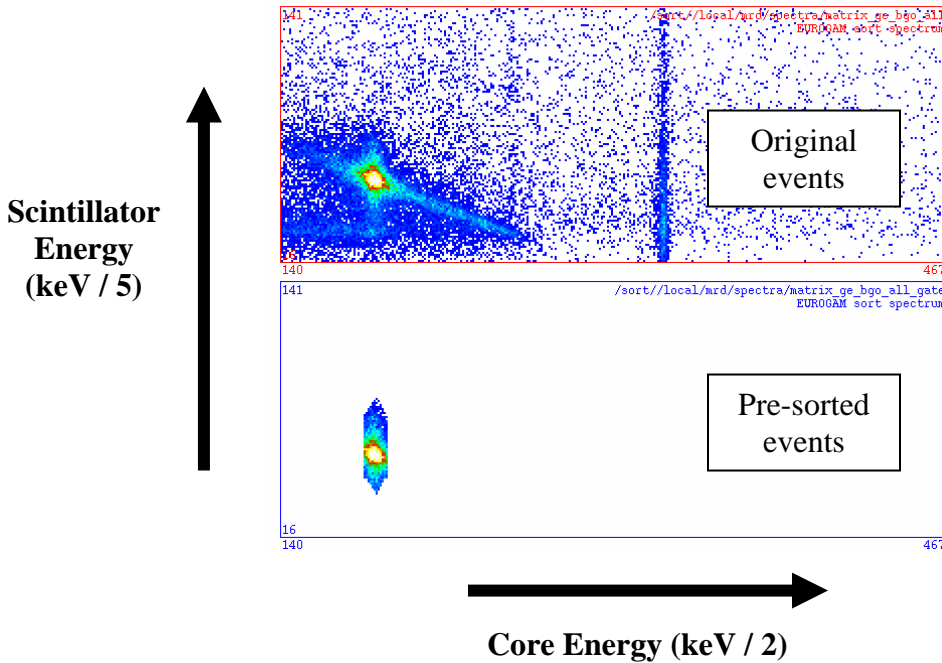
(Table 2 – Silena channel summary)

The coincidence data has been pre-sorted with a triple gate that requires:

- Fold1 for the AGATA segments.
- Fold 1 for the scintillator banks.
- A polygonal energy gate is then applied on the projection of centre contact energy vs scintillator energy. The coordinates of this gate are (187,37), (181,46), (181,76), (187,85), (192,76), (192,46)

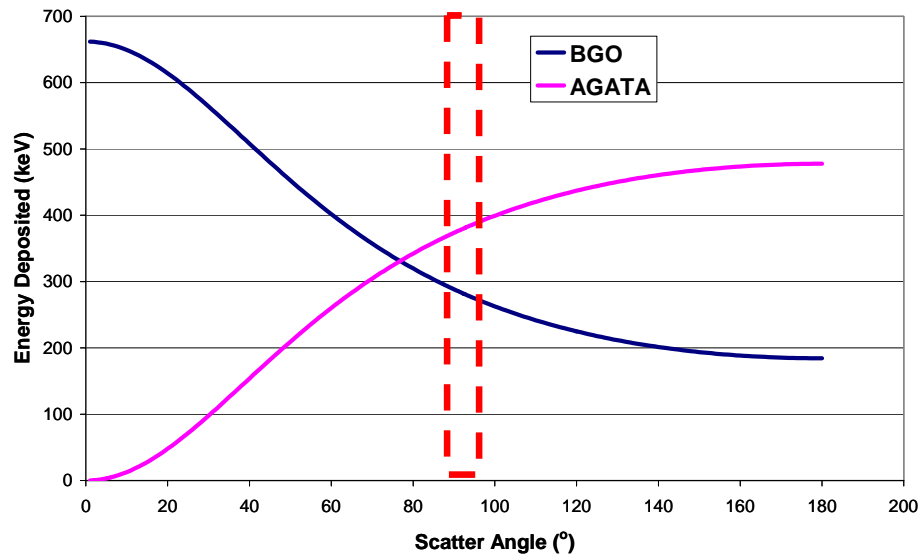
The spectral representation of this energy gate can be seen in *Figure 4*. The centre contact energies are compressed by a factor of 2, while those of the scintillators are compressed by a factor of 5.

*Note: The scintillator fold is incremented by 1 for each scintillator channel that has Silena ADC energy > 10keV.*



(Figure 4 – Coincidence data for scan line 1, before (upper) and after pre-sorting (lower))

This energy constraint confines the angle of scatter to between  $\sim 86.5^\circ$  and  $\sim 94.0^\circ$ , see *Figure 5*.



*(Figure 5 – Energy deposition as a function of scatter angle for 662keV photons)*

Not all of the positions were collected in sequence and as such, some of the scan lines are in sections rather than a single continuous run. The detailed information of how the data was collected is displayed on the following pages.



## Line 1 – S002

**Download:** line1.tar.gz

**Contents:** outRun11 Collected 4<sup>th</sup> to 9<sup>th</sup> May 2006 5.2GB => 290MB  
outRun26 Collected 15<sup>th</sup> to 16<sup>th</sup> May 2006 704MB => 17MB  
outRun27 Collected 16<sup>th</sup> to 19<sup>th</sup> May 2006 47MB

**Total Events:** 16919

### outRun11

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	-43	72.000	29.000	1.50	5400
2	-39	72.000	33.000	1.50	5400
3	-35	72.000	37.000	1.98	7124
4	-31	72.000	41.000	3.17	11403
5	-27	72.000	45.000	4.88	17555
6	-23	72.000	49.000	6.51	23436
7	-19	72.000	53.000	7.47	26903
8	-15	72.000	57.000	7.50	27000
9	-11	72.000	61.000	7.50	27000
10	-7	72.000	65.000	7.50	27000
11	-1	72.000	71.000	7.50	27000
12	3	72.000	75.000	7.50	27000
13	7	72.000	79.000	7.50	27000
14	11	72.000	83.000	7.50	27000
15	15	72.000	87.000	7.47	26900
16	19	72.000	91.000	6.51	23436
17	23	72.000	95.000	4.88	17555
18	27	72.000	99.000	3.17	11403
19	31	72.000	103.000	1.98	7123
20	35	72.000	107.000	1.50	5400
21	39	72.000	111.000	1.50	5400
				106.51	

Note: Position (-43mm) was a test point to see if photons were scattering off of the edge of the germanium back to the NaI detectors over the top of the Pb collimators.

### outRun26

step	Radius (mm)	x	y	Time (h)	Time (s)
1	5	72.000	77.000	5.87	21139
				5.87	

### outRun27

step	Radius (mm)	x	y	Time (h)	Time (s)
1	5	72.000	77.000	5.13	18461
2	6	72.000	78.000	11.00	39600
3	8	72.000	80.000	8.50	30600
4	9	72.000	81.000	8.00	28800
				32.63	

### Line 1 – S003

**Download:** line1.gz

**Contents:** outRun9 Collected 15<sup>th</sup> to 20<sup>th</sup> Sept 2006 6.9GB => 293MB

**Total Events:** 14017

### outRun9

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	-39	65	30.2	1.50	5400
2	-35	65	34.2	1.50	5400
3	-31	65	38.2	1.98	7124
4	-27	65	42.2	3.17	11403
5	-23	65	46.2	4.88	17555
6	-19	65	50.2	6.51	23436
7	-15	65	54.2	7.47	26903
8	-11	65	58.2	7.50	27000
9	-7	65	62.2	9.00	32400
10	5	65	74.2	11.00	39600
11	6	65	75.2	11.00	39600
12	7	65	76.2	9.00	32400
13	8	65	77.2	8.50	30600
14	9	65	78.2	8.00	28800
15	11	65	80.2	7.50	27000
16	15	65	84.2	7.47	26900
17	19	65	88.2	6.51	23436
18	23	65	92.2	4.88	17555
19	27	65	96.2	3.17	11403
20	31	65	100.2	1.98	7123
21	35	65	104.2	1.50	5400
22	39	65	108.2	1.50	5400
				125.51	

## Line 2 – S002

**Download:** line2.tar.gz

**Contents:** outRun16 Collected 23<sup>rd</sup> to 25<sup>th</sup> May 2006 48MB  
outRun34 Collected 2<sup>nd</sup> to 4<sup>th</sup> June 2006 2.2GB => 109MB

**Total Events:** 7499

### outRun16

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	26	62.052	96.022	1.92	6923
2	14	66.643	84.935	2.27	8182
3	10	68.174	81.239	2.50	9000
				6.70	

### outRun34

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	36	58.223	105.260	0.83	3000
2	34	58.989	103.412	0.96	3462
3	32	59.754	101.564	1.14	4091
4	24	62.816	94.173	1.85	6667
5	22	63.581	92.325	1.92	6923
6	21	63.964	91.401	1.92	6923
7	20	64.346	90.478	2.00	7200
8	19	64.729	89.554	2.08	7500
9	18	65.112	88.630	2.08	7500
10	17	65.494	87.706	2.17	7826
11	16	65.877	86.782	2.17	7826
12	15	66.260	85.858	2.27	8182
13	8	68.939	79.391	5.00	18000
14	7	69.321	78.467	7.00	25200
15	5	70.087	76.619	9.00	32400
				42.42	

## Line 2 – S003

**Download:** line2.gz

**Contents:** outRun14 Collected 9<sup>th</sup> to 12<sup>th</sup> Oct 2006 2.9GB => 194MB

**Total Events:** 9241

### outRun14

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	51.991	100.613	1.92	6923
2	32	52.756	98.765	2.27	8182
3	30	53.522	96.917	2.50	9000
4	26	55.052	93.222	3.03	10909
5	24	55.817	91.374	3.70	13333
6	20	57.348	87.678	4.00	14400
7	18	58.113	85.830	4.17	15000
8	16	58.878	83.983	4.35	15652
9	14	59.643	82.135	4.55	16364
10	12	60.409	80.287	4.76	17143
11	10	61.174	78.439	6.67	24000
12	8	61.939	76.591	8.33	30000
13	6	62.704	74.743	10.00	36000
				60.25	

### Line 3 – S002

**Download:** line3.gz

**Contents:** outRun24 Collected 12<sup>th</sup> to 14<sup>th</sup> June 2006 2.7GB => 132MB

**Total Events:** 6315

### outRun24

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	35	54.494	102.307	1.89	6792
2	33	55.494	100.576	2.27	8182
3	31	56.495	98.844	2.50	9000
4	29	57.495	97.112	2.86	10286
5	27	58.495	95.380	3.03	10909
6	15	64.497	84.989	5.00	18000
7	11	66.498	81.525	6.25	22500
8	9	67.498	79.793	7.69	27692
9	7	68.499	78.061	10.00	36000
10	5	69.499	76.330	10.00	36000
				51.49	

## Line 3 – S003

**Download:** line3.gz

**Contents:** outRun15 Collected 12<sup>th</sup> to 14<sup>th</sup> Oct 2006 4.5GB => 116MB

**Total Events:** 5528

### outRun15

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	35	47.494	99.507	1.89	6792
2	33	48.494	97.776	2.27	8182
3	31	49.495	96.044	2.50	9000
4	29	50.495	94.312	2.86	10286
5	27	51.495	92.580	3.03	10909
6	15	57.497	82.189	5.00	18000
7	11	59.498	78.725	6.25	22500
8	9	60.498	76.993	7.69	27692
9	7	61.499	75.261	10.00	36000
10	5	62.499	73.530	10.00	36000
				51.49	

## Line 4 – S002

**Download:** line4.gz

**Contents:** outRun31 Collected 27<sup>th</sup> to 29<sup>th</sup> June 2006 2.1GB => 104MB

**Total Events:** 4978

### outRun31

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	51.297	92.703	1.92	6923
2	32	52.515	91.485	2.27	8181
3	30	53.733	90.267	2.50	9000
4	24	57.386	86.614	3.70	13333
5	17	61.649	82.351	4.00	14400
6	16	62.258	81.742	4.35	15652
7	14	63.475	80.525	4.55	16363
8	12	64.693	79.307	4.76	17142
9	7	67.738	76.262	5.50	19800
10	6	68.347	75.653	6.00	21600
				39.55	

## Line 4 – S003

**Download:** line4.gz

**Contents:** outRun17 Collected 15<sup>th</sup> to 17<sup>th</sup> Oct 2006 2.2GB => 118MB

**Total Events:** 5636

### outRun17

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	44.297	89.903	1.92	6923
2	32	45.515	88.685	2.27	8182
3	30	46.733	87.467	2.50	9000
4	24	50.386	83.814	3.70	13333
5	17	54.649	79.551	4.00	14400
6	16	55.258	78.942	4.35	15652
7	14	56.475	77.725	4.55	16364
8	12	57.693	76.507	4.76	17143
9	7	60.738	73.462	7.00	25200
10	6	61.347	72.853	8.00	28800
				43.05	

## Line 5 – S002

**Download:** line5.tar.gz

**Contents:** outRun23 Collected 9<sup>th</sup> to 12<sup>th</sup> June 2006 3.3GB => 174MB  
outRun27 Collected 16<sup>th</sup> to 19<sup>th</sup> June 2006 20MB

**Total Events:** 9275

### outRun23

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	35	38.192	81.057	1.89	6792
2	33	40.124	80.539	2.27	8182
3	31	42.056	80.022	2.50	9000
4	29	43.988	79.504	2.86	10286
5	27	45.920	78.987	3.03	10909
6	15	57.511	75.882	5.00	18000
7	11	61.375	74.846	6.25	22500
8	9	63.307	74.329	7.69	27692
9	7	65.238	73.811	10.00	36000
10	6	66.204	73.553	10.00	36000
11	5	67.170	73.294	10.00	36000
				61.49	

**outRun27**

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	8	64.272	74.070	9.00	32400

**Line 5 – S003**

**Download:** line5.gz

**Contents:** outRun18 Collected 17<sup>th</sup> to 20<sup>th</sup> Oct 2006 3.9GB => 158MB

**Total Events:** 7566

**outRun18**

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	35	31.192	78.257	1.89	6792
2	33	33.124	77.739	2.27	8182
3	31	35.056	77.222	2.50	9000
4	29	36.988	76.704	2.86	10286
5	27	38.920	76.187	3.03	10909
6	15	50.511	73.082	5.00	18000
7	11	54.375	72.046	6.39	23000
8	9	56.307	71.529	6.94	25000
9	8	57.272	71.270	7.78	28000
10	7	58.238	71.011	8.33	30000
11	6	59.204	70.753	9.17	33000
12	5	60.170	70.494	9.72	35000
				65.88	

## Line 6 – S002

**Download:** line6.tar.gz

**Contents:** outRun19 Collected 31<sup>st</sup> May to 2<sup>nd</sup> June 2006 2.5GB => 117MB  
outRun27 Collected 16<sup>th</sup> to 19<sup>th</sup> June 2006 41MB

**Total Events:** 7661

### outRun19

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	85.009	103.413	1.92	6923
2	32	84.244	101.565	2.27	8182
3	30	83.478	99.717	2.50	9000
4	26	81.948	96.022	3.03	10909
5	24	81.183	94.174	3.70	13333
6	20	79.652	90.478	4.00	14400
7	16	78.122	86.783	4.55	16364
8	9	75.444	80.315	7.69	27692
9	6	74.296	77.543	10.00	36000
10	4	73.530	75.696	8.70	31329
				48.37	

### outRun27

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	7	74.678	78.467	9.50	34200
2	8	75.061	79.391	8.50	30600
3	10	75.826	81.239	6.67	24000
				24.67	

## Line 6 – S003

**Download:** line6.gz

**Contents:** outRun19 Collected 20<sup>th</sup> to 23<sup>rd</sup> Oct 2006 3.8GB => 187MB

**Total Events:** 8958



### outRun19

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	78.009	100.613	1.92	6923
2	32	77.244	98.765	2.27	8182
3	30	76.478	96.917	2.50	9000
4	26	74.948	93.222	3.03	10909
5	24	74.183	91.374	3.70	13333
6	20	72.652	87.678	4.00	14400
7	16	71.122	83.983	4.55	16364
8	10	68.826	78.439	6.67	24000
9	9	68.444	77.515	7.69	27692
10	8	68.061	76.591	8.50	30600
11	7	67.678	75.667	9.50	34200
12	6	67.296	74.743	10.00	36000
13	5	66.913	73.820	10.00	36000
				74.33	

### Line 7 – S002

**Download:** line7.tar.gz

**Contents:** outRun21 Collected 4<sup>th</sup> to 6<sup>th</sup> June 2006 3.2GB => 181MB  
outRun27 Collected 16<sup>th</sup> to 19<sup>th</sup> June 2006 12MB

**Total Events:** 9386

### outRun27

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	6	76.24	76.24	11.00	39600
				11.00	

### outRun21

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	96.05	96.04	1.92	6923
2	32	94.63	94.62	2.27	8182
3	30	93.22	93.21	2.50	9000
4	26	90.39	90.38	3.03	10909
5	24	88.97	88.97	3.70	13333
6	19	85.44	85.43	4.00	14400
7	18	84.73	84.73	4.17	15000
8	17	84.02	84.02	4.35	15652
9	16	83.32	83.31	4.55	16364
10	15	82.61	82.61	4.76	17143
11	10	79.07	79.07	6.67	24000
12	8	77.66	77.66	8.33	30000
13	4	74.83	74.83	10.00	36000
				60.25	

### Line 7 – S003

**Download:** line7.gz

**Contents:** outRun20 Collected 23<sup>rd</sup> to 28<sup>th</sup> Oct 2006 3.4GB => 217MB

**Total Events:** 10393

### outRun20

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	89.045	93.238	1.92	6923
2	32	87.631	91.824	2.27	8182
3	30	86.216	90.410	2.50	9000
4	26	83.388	87.582	3.03	10909
5	24	81.973	86.168	3.70	13333
6	19	78.437	82.633	4.00	14400
7	18	77.730	81.926	4.17	15000
8	17	77.023	81.219	4.35	15652
9	16	76.315	80.512	4.55	16364
10	15	75.608	79.805	4.76	17143
11	10	72.072	76.270	6.67	24000
12	8	70.658	74.856	8.33	30000
13	6	69.243	73.442	9.00	32400
14	4	67.829	72.028	10.00	36000
				69.25	

## Line 8 – S002

**Download:** line8.tar.gz

**Contents:** outRun20 Collected 2<sup>nd</sup> to 4<sup>th</sup> June 2006 2.5GB => 165MB  
outRun27 Collected 16<sup>th</sup> to 19<sup>th</sup> June 2006 17MB

**Total Events:** 8679

### outRun20

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	37	104.045	90.497	1.82	6545
2	36	103.179	89.997	1.82	6545
3	34	101.447	88.997	1.92	6923
4	32	99.714	87.997	2.27	8182
5	30	97.982	86.997	2.50	9000
6	26	94.518	84.998	3.03	10909
7	24	92.786	83.998	3.70	13333
8	19	88.455	81.498	4.00	14400
9	18	87.589	80.998	4.17	15000
10	17	86.723	80.499	4.35	15652
11	16	85.857	79.999	4.55	16364
12	15	84.991	79.499	4.76	17143
13	4	75.464	74.000	10.00	36000
				48.89	

### outRun27

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	7	78.063	75.499	9.50	34200
				9.50	

## Line 8 – S003

**Download:** line8.gz

**Contents:** outRun21 Collected 30<sup>th</sup> Oct to 2<sup>nd</sup> Nov 2006 3.1GB => 219MB

**Total Events:** 10496

**outRun21**

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	37	97.045	87.697	1.82	6545
2	36	96.179	87.197	1.82	6545
3	34	94.447	86.197	1.92	6923
4	32	92.714	85.197	2.27	8182
5	30	90.982	84.197	2.50	9000
6	26	87.518	82.198	3.03	10909
7	24	85.786	81.198	3.70	13333
8	19	81.455	78.698	4.00	14400
9	18	80.589	78.198	4.17	15000
10	17	79.723	77.699	4.35	15652
11	16	78.857	77.199	4.55	16364
12	15	77.991	76.699	4.76	17143
13	10	73.6607	74.1991	5.56	20000
14	7	71.063	72.699	9.50	34200
15	5	69.330	71.700	10.00	36000
				63.94	

**Line 9 – S002**

**Download:** line9.gz

**Contents:** outRun17 Collected 25<sup>th</sup> to 28<sup>th</sup> May 2006 3.2GB => 154MB

**Total Events:** 7346

**outRun17**

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	105.709	76.437	1.92	6923
2	32	103.726	76.176	2.27	8182
3	30	101.743	75.915	2.50	9000
4	26	97.778	75.393	3.03	10909
5	24	95.795	75.132	3.70	13333
6	20	91.829	74.610	3.85	13846
7	16	87.863	74.088	4.55	16364
8	13	84.889	73.697	4.76	17143
9	9	80.923	73.175	8.00	28800
10	6	77.949	72.783	9.00	32400
11	4	75.966	72.522	10.00	36000
12	0	72.000	72.000	10.00	36000
				63.58	

## Line 9 – S003

**Download:** line9.gz

**Contents:** outRun22 Collected 2<sup>nd</sup> to 5<sup>th</sup> Nov 2006 2.9GB => 170MB

**Total Events:** 8115

### outRun22

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	98.709	73.637	1.92	6923
2	32	96.726	73.376	2.27	8182
3	30	94.743	73.115	2.50	9000
4	26	90.778	72.593	3.03	10909
5	24	88.795	72.332	3.70	13333
6	20	84.829	71.810	3.85	13846
7	16	80.863	71.288	4.55	16364
8	13	77.889	70.897	4.76	17143
9	9	73.923	70.375	8.00	28800
10	7	71.940	70.114	9.00	32400
11	5	69.957	69.853	10.00	36000
12	0	65.000	69.200	10.00	36000
					63.58

## Line 10 – S002

**Download:** line10.gz

**Contents:** outRun29 Collected 20<sup>th</sup> to 23<sup>rd</sup> June 2006 96MB

**Total Events:** 10095

### outRun29

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	58.991	40.587	0.96	3462
2	32	59.756	42.435	1.14	4091
3	30	60.522	44.283	1.25	4500
4	26	62.052	47.978	1.52	5455
5	24	62.817	49.826	1.85	6667
6	20	64.348	53.522	2.00	7200
7	16	65.878	57.217	2.17	7826
8	14	66.643	59.065	2.27	8182
9	10	68.174	62.761	2.38	8571
10	8	68.939	64.609	5.00	18000
11	7	69.322	65.533	5.50	19800
12	6	69.704	66.457	6.00	21600
					32.04

## Line 10 – S003

**Download:** line10.gz

**Contents:** outRun23 Collected 5<sup>th</sup> to 6<sup>th</sup> Nov 2006 1.5GB => 75MB

**Total Events:** 3591

### outRun23

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	51.991	37.787	0.96	3462
2	32	52.756	39.635	1.14	4091
3	30	53.522	41.483	1.25	4500
4	26	55.052	45.178	1.52	5455
5	24	55.817	47.026	1.85	6667
6	20	57.348	50.722	2.00	7200
7	16	58.878	54.417	2.17	7826
8	14	59.643	56.265	2.27	8182
9	10	61.174	59.961	2.38	8571
10	8	61.939	61.809	5.00	18000
11	7	62.322	62.733	5.50	19800
12	6	62.704	63.657	6.00	21600
				32.04	

## Line 11 – S002

**Download:** line11.gz

**Contents:** outRun25 Collected 14<sup>th</sup> to 15<sup>th</sup> June 2006 1.4GB => 68MB

**Total Events:** 3237

### outRun25

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	35	54.503	41.687	0.94	3396
2	33	55.503	43.420	1.14	4091
3	31	56.503	45.152	1.25	4500
4	29	57.502	46.884	1.43	5143
5	27	58.502	48.616	1.52	5455
6	15	64.501	59.009	2.50	9000
7	11	66.501	62.473	3.13	11250
8	9	67.501	64.205	3.85	13846
9	7	68.501	65.937	5.00	18000
10	5	69.500	67.670	5.00	18000
				25.74	

## Line 11 – S003

**Download:** line11.gz

**Contents:** outRun24 Collected 7<sup>th</sup> to 8<sup>th</sup> Nov 2006 1.1GB => 20MB

**Total Events:** 2029

### outRun24

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	35	47.503	38.887	0.94	3396
2	33	48.503	40.620	1.14	4091
3	31	49.503	42.352	1.25	4500
4	29	50.502	44.084	1.43	5143
5	27	51.502	45.816	1.52	5455
6	15	57.501	56.209	2.50	9000
7	11	59.501	59.673	3.13	11250
8	9	60.501	61.405	3.85	13846
9	7	61.501	63.137	5.00	18000
10	5	62.500	64.870	5.00	18000
				25.74	

## Line 12 – S002

**Download:** line12.gz

**Contents:** outRun29 Collected 20<sup>th</sup> to 23<sup>rd</sup> June 2006 1.6GB => 106MB

**Total Events:** 5048

### outRun29

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	51.305	45.023	0.96	3462
2	32	52.523	46.610	1.14	4091
3	30	53.740	48.197	1.25	4500
4	26	56.175	51.371	1.52	5455
5	24	57.392	52.958	1.85	6667
6	20	59.827	56.131	2.00	7200
7	16	62.261	59.305	2.17	7826
8	14	63.479	60.892	2.27	8182
9	10	65.913	64.066	2.38	8571
10	8	67.131	65.653	5.00	18000
11	7	67.739	66.446	5.50	19800
12	6	68.348	67.239	6.00	21600
				32.04	

## Line 12 – S003

**Download:** line12.gz

**Contents:** outRun25 Collected 8<sup>th</sup> to 10<sup>th</sup> Nov 2006 1.6GB => 73MB

**Total Events:** 3466

### outRun25

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	44.305	42.223	0.96	3462
2	32	45.523	43.810	1.14	4091
3	30	46.740	45.397	1.25	4500
4	26	49.175	48.571	1.52	5455
5	24	50.392	50.158	1.85	6667
6	20	52.827	53.331	2.00	7200
7	16	55.261	56.505	2.17	7826
8	14	56.479	58.092	2.27	8182
9	10	58.913	61.266	2.38	8571
10	8	60.131	62.853	5.00	18000
11	7	60.739	63.646	5.50	19800
12	6	61.348	64.439	6.00	21600
				32.04	

## Line 13 – S002

**Download:** line13.gz

**Contents:** outRun30 Collected 23<sup>rd</sup> to 27<sup>th</sup> June 2006 1.8GB => 94MB

**Total Events:** 4484

### outRun30

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	35	38.192	62.943	0.94	3396
2	33	40.124	63.461	1.14	4091
3	31	42.056	63.978	1.25	4500
4	29	43.988	64.496	1.43	5143
5	27	45.920	65.013	1.52	5455
6	15	57.511	68.118	2.50	9000
7	11	61.375	69.154	3.13	11250
8	9	63.307	69.671	3.85	13846
9	7	65.238	70.189	5.00	18000
10	6	66.204	70.447	6.00	21600
11	5	67.170	70.706	7.00	25200
				33.74	



## Line 13 – S003

**Download:** line13.gz

**Contents:** outRun26 Collected 13<sup>th</sup> to 16<sup>th</sup> Nov 2006 1.9GB => 64MB

**Total Events:** 3029

### outRun26

step	Radius (mm)	x	y	Time (h)	Time (s)
1	35	31.192	60.143	0.94	3396
2	33	33.124	60.661	1.14	4091
3	31	35.056	61.178	1.25	4500
4	29	36.988	61.696	1.43	5143
5	27	38.920	62.213	1.52	5455
6	15	50.511	65.318	2.50	9000
7	11	54.375	66.354	3.13	11250
8	9	56.307	66.871	3.85	13846
9	7	58.238	67.389	5.00	18000
10	6	59.204	67.647	6.00	21600
11	5	60.170	67.906	7.00	25200
				33.74	

## Line 14 – S002

**Download:** line14.gz

**Contents:** outRun30 Collected 23<sup>rd</sup> to 27<sup>th</sup> June 2006 1.8GB => 81MB

**Total Events:** 3863

### outRun30

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	85.009	40.587	0.96	3462
2	32	84.244	42.435	1.14	4091
3	30	83.478	44.283	1.25	4500
4	26	81.948	47.978	1.52	5455
5	20	79.652	53.522	2.00	7200
6	16	78.122	57.217	2.27	8182
7	13	76.974	59.989	2.63	9474
8	9	75.444	63.685	3.85	13846
9	8	75.0609	64.609	4.17	15000
10	6	74.296	66.457	7.00	25200
11	5	73.913	67.380	8.00	28800
				34.78	

## Line 14 – S003

**Download:** line14.gz

**Contents:** outRun26 Collected 13<sup>th</sup> to 16<sup>th</sup> Nov 2006 2.2GB => 74MB

**Total Events:** 3507

### outRun26

step	Radius (mm)	x	y	Time (h)	Time (s)
1	34	78.009	37.787	0.96	3462
2	32	77.244	39.635	1.14	4091
3	30	76.478	41.483	1.25	4500
4	26	74.948	45.178	1.52	5455
5	20	72.652	50.722	2.00	7200
6	16	71.122	54.417	2.27	8182
7	13	69.974	57.189	2.63	9474
8	9	68.444	60.885	3.85	13846
9	8	68.061	61.809	4.17	15000
10	6	67.296	63.657	7.00	25200
11	5	66.913	64.580	8.00	28800
				34.78	

## Line 15 – S002

**Download:** line15.gz

**Contents:** outRun30 Collected 23<sup>rd</sup> to 27<sup>th</sup> June 2006 106MB

**Total Events:** 5066

### outRun30

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	96.045	96.038	0.96	3462
2	32	94.631	94.624	1.14	4091
3	30	93.216	93.210	1.25	4500
4	26	90.388	90.382	1.52	5455
5	24	88.973	88.968	1.85	6667
6	19	85.437	85.433	2.00	7200
7	17	84.023	84.019	2.17	7826
8	15	82.608	82.605	2.38	8571
9	10	79.072	79.070	3.33	12000
10	8	77.658	77.656	4.17	15000
11	7	76.950	76.949	5.00	18000
12	6	76.243	76.242	6.00	21600
13	5	75.536	75.535	7.00	25200
				38.77	

## Line 15 – S003

**Download:** line15.gz

**Contents:** outRun27 Collected 16<sup>th</sup> to 21<sup>st</sup> Nov 2006 1.8GB => 104MB

**Total Events:** 4962

### outRun27

step	Radius (mm)	x	y	Time (h)	Time (s)
1	34	89.045	93.238	0.96	3462
2	32	87.631	91.824	1.14	4091
3	30	86.216	90.410	1.25	4500
4	26	83.388	87.582	1.52	5455
5	24	81.973	86.168	1.85	6667
6	19	78.437	82.633	2.00	7200
7	17	77.023	81.219	2.17	7826
8	15	75.608	79.805	2.38	8571
9	10	72.072	76.270	3.33	12000
10	8	70.658	74.856	4.17	15000
11	7	69.950	74.149	5.00	18000
12	6	69.243	73.442	6.00	21600
13	5	68.536	72.735	7.00	25200
				38.77	

## Line 16 – S002

**Download:** line16.gz

**Contents:** outRun28 Collected 19<sup>th</sup> to 20<sup>th</sup> June 2006 1.1GB => 74MB

**Total Events:** 3534

### outRun28

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	37	104.039	39.955	0.91	3273
2	34	101.442	42.553	0.96	3462
3	30	97.978	46.018	1.25	4500
4	26	94.514	49.482	1.52	5455
5	24	92.782	51.214	1.85	6667
6	18	87.587	56.411	2.08	7500
7	10	80.659	63.339	2.17	7826
8	8	78.927	65.071	5.00	18000
9	6	77.196	66.804	5.00	18000
10	4	75.464	68.536	5.00	18000
				25.74	

## Line 16 – S003

**Download:** line16.gz

**Contents:** outRun27 Collected 16<sup>th</sup> to 21<sup>st</sup> Nov 2006 1.2GB => 59MB

**Total Events:** 2786

### outRun27

step	Radius (mm)	x	y	Time (h)	Time (s)
1	37	97.04	37.16	0.91	3276
2	34	94.44	39.75	0.96	3456
3	30	90.98	43.22	1.25	4500
4	26	87.51	46.68	1.52	5472
5	24	85.78	48.41	1.85	6660
6	18	80.59	53.61	2.08	7488
7	10	73.66	60.54	2.17	7812
8	8	71.93	62.27	5.00	18000
9	6	70.20	64.00	5.00	18000
10	4	68.46	65.74	5.00	18000
				25.74	

## Line 17 – S002

**Download:** line17.gz

**Contents:** outRun32 Collected 29<sup>th</sup> to 30<sup>th</sup> June 2006 1.5GB => 61MB

**Total Events:** 2921

### outRun32

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	105.709	67.563	0.91	3273
2	30	101.743	68.085	0.96	3462
3	26	97.778	68.607	1.25	4500
4	20	91.829	69.390	1.52	5455
5	18	89.846	69.651	1.85	6667
6	16	87.863	69.912	2.08	7500
7	10	81.914	70.695	2.17	7826
8	8	79.932	70.956	5.00	18000
9	6	77.949	71.217	5.00	18000
10	5	76.957	71.347	5.00	18000
				25.74	

## Line 17 – S003

**Download:** line17.gz

**Contents:** outRun27 Collected 16<sup>th</sup> to 21<sup>st</sup> Nov 2006 1.2GB => 61MB

**Total Events:** 2898

### outRun27

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	98.709	64.763	0.91	3273
2	30	94.743	65.285	0.96	3462
3	26	90.778	65.807	1.25	4500
4	20	84.829	66.590	1.52	5455
5	18	82.846	66.851	1.85	6667
6	16	80.863	67.112	2.08	7500
7	10	74.914	67.895	2.78	10000
8	8	72.932	68.156	5.00	18000
9	6	70.949	68.417	5.00	18000
10	5	69.957	68.547	5.00	18000
				26.35	

## Line 18 – S002

**Download:** line18.gz

**Contents:** outRun35 Collected 04<sup>th</sup> to 05<sup>th</sup> July 2006 1.1GB => 45MB

**Total Events:** 2132

### outRun35

step	Radius (mm)	x (mm)	y (mm)	Time (h)	Time (s)
1	34	93.855	98.046	1.00	3600
2	26	88.712	91.917	1.80	6480
3	14	80.999	82.725	2.50	9000
4	9	77.785	78.894	3.00	10800
5	7	76.500	77.362	5.00	18000
6	6	75.857	76.596	8.00	28800
				21.30	

## Line 18 – S003

**Download:** line18.gz

**Contents:** outRun27 Collected 16<sup>th</sup> to 21<sup>st</sup> Nov 2006 0.9GB => 50MB

**Total Events:** 2366

### outRun27

step	Radius (mm)	x (mm)	y (mm)	Time (s)	Time (s)
1	34	86.855	95.246	1.00	3600
2	26	81.712	89.117	1.80	6480
3	14	73.999	79.925	2.50	9000
4	9	70.785	76.094	3.00	10800
5	7	69.500	74.562	5.00	18000
6	6	68.857	73.796	8.00	28800
				21.30	

## Azimuthal Scan 24mm – S002

**Download:** azim\_24mm.gz

**Contents:** outRun12 Collected 09<sup>th</sup> to 17<sup>th</sup> May 2006 10.6GB => 1.1GB

**Total Events:** 50885

### outRun12

step	Angle (°)	Time (h)	Time (s)
1	0.00	5	18000
2	9.55	5	18000
3	19.10	5	18000
4	28.65	5	18000
5	38.20	5	18000
6	47.75	5	18000
7	57.29	5	18000
8	66.84	5	18000
9	76.39	5	18000
10	85.94	5	18000
11	95.49	5	18000
12	105.04	5	18000
13	114.59	5	18000
14	124.14	5	18000
15	133.69	5	18000
16	143.24	5	18000
17	152.78	5	18000
18	162.33	5	18000
19	171.88	5	18000
20	181.43	5	18000
21	190.98	5	18000
22	200.53	5	18000
23	210.08	5	18000
24	219.63	5	18000
25	229.18	5	18000
26	238.73	5	18000
27	248.27	5	18000
28	257.82	5	18000
29	267.37	5	18000
30	276.92	5	18000
31	286.47	5	18000
32	296.02	5	18000
33	305.57	5	18000
34	315.12	5	18000
35	324.67	5	18000
36	334.22	5	18000
37	343.76	5	18000
		185	

## Azimuthal Scan 24mm – S003

**Download:** azim\_24mm.gz

**Contents:** outRun11 Collected 23<sup>rd</sup> Sep to 1<sup>st</sup> Oct 2006 9.4GB => 785MB

**Total Events:** 37657

### outRun11

step	Angle (o)	Time (h)	Time (s)
1	0.0	5.00	18000
2	9.5	5.00	18000
3	18.9	5.00	18000
4	28.4	5.00	18000
5	37.9	5.00	18000
6	47.4	5.00	18000
7	56.8	5.00	18000
8	66.3	5.00	18000
9	75.8	5.00	18000
10	85.2	5.00	18000
11	94.7	5.00	18000
12	104.2	5.00	18000
13	113.6	5.00	18000
14	123.1	5.00	18000
15	132.6	5.00	18000
16	142.1	5.00	18000
17	151.5	5.00	18000
18	161.0	5.00	18000
19	170.5	5.00	18000
20	179.9	5.00	18000
21	189.4	5.00	18000
22	198.9	5.00	18000
23	208.3	5.00	18000
24	217.8	5.00	18000
25	227.3	5.00	18000
26	236.8	5.00	18000
27	37.9	5.00	18000
28	37.9	5.00	18000
29	37.9	5.00	18000
30	37.9	5.00	18000
31	37.9	5.00	18000
32	37.9	5.00	18000
33	37.9	5.00	18000
34	37.9	5.00	18000
35	37.9	5.00	18000
36	37.9	5.00	18000
37	37.9	5.00	18000
		185.00	



## Azimuthal Scan 27mm – S002

**Download:** azim\_27mm.gz

**Contents:** outRun14 Collected 17<sup>th</sup> to 19<sup>th</sup> May 2006 3.6GB => 316MB

**Total Events:** 15123

### outRun14

step	Angle (°)	Time (h)	Time (s)
1	0.0	2.7	9720
2	8.5	2.7	9720
3	17.0	2.7	9720
4	25.5	2.7	9720
5	34.0	2.7	9720
6	42.4	2.7	9720
7	50.9	2.7	9720
8	59.4	2.7	9720
9	67.9	2.7	9720
10	76.4	2.7	9720
11	84.9	2.7	9720
12	93.4	2.7	9720
13	101.9	2.7	9720
14	110.3	2.7	9720
15	118.8	2.7	9720
16	127.3	2.7	9720
17	135.8	2.7	9720
18	144.3	2.7	9720
19	152.8	2.7	9720
20	161.3	2.7	9720
21	169.8	2.7	9720
		56.76	

## Azimuthal Scan 27mm – S003

**Download:** azimuth\_27mm.gz

**Contents:** outRun10      Collected 20<sup>th</sup> to 23<sup>rd</sup> Sep 2006      4.0GB => 271MB

**Total Events:** 12977

### outRun10

step	Angle (o)	Time (h)	Time (s)
1	0.0	2.7	9730
2	8.5	2.7	9730
3	17.0	2.7	9730
4	25.5	2.7	9730
5	34.0	2.7	9730
6	42.4	2.7	9730
7	50.9	2.7	9730
8	59.4	2.7	9730
9	67.9	2.7	9730
10	76.4	2.7	9730
11	84.9	2.7	9730
12	93.4	2.7	9730
13	101.9	2.7	9730
14	110.3	2.7	9730
15	118.8	2.7	9730
16	127.3	2.7	9730
17	135.8	2.7	9730
18	144.3	2.7	9730
19	152.8	2.7	9730
20	161.3	2.7	9730
21	169.8	2.7	9730
		56.76	

## Azimuthal Scan 31mm – S002

**Download:** azim\_31mm.gz

**Contents:** outRun15 Collected 19<sup>th</sup> to 23<sup>rd</sup> May 2006 5.3GB => 499MB

**Total Events:** 23930

### outRun15

step	Angle (°)	Time (h)	Time (s)
1	0.00	2.2	7992
2	9.55	2.2	7992
3	19.10	2.2	7992
4	28.65	2.2	7992
5	38.20	2.2	7992
6	47.75	2.2	7992
7	57.29	2.2	7992
8	66.84	2.2	7992
9	76.39	2.2	7992
10	85.94	2.2	7992
11	95.49	2.2	7992
12	105.04	2.2	7992
13	114.59	2.2	7992
14	124.14	2.2	7992
15	133.69	2.2	7992
16	143.24	2.2	7992
17	152.78	2.2	7992
18	162.33	2.2	7992
19	171.88	2.2	7992
20	181.43	2.2	7992
21	190.98	2.2	7992
22	200.53	2.2	7992
23	210.08	2.2	7992
24	219.63	2.2	7992
25	229.18	2.2	7992
26	238.73	2.2	7992
27	248.27	2.2	7992
28	257.82	2.2	7992
29	267.37	2.2	7992
30	276.92	2.2	7992
31	286.47	2.2	7992
32	296.02	2.2	7992
33	305.57	2.2	7992
34	315.12	2.2	7992
35	324.67	2.2	7992
36	334.22	2.2	7992
37	343.76	2.2	7992
		82.1	

## Azimuthal Scan 31mm – S003

**Download:** azim\_31mm.gz

**Contents:** outRun12 Collected 1<sup>st</sup> to 5<sup>th</sup> Oct 2006 4.5GB => 183MB

**Total Events:** 19202

### outRun12

step	Angle (°)	Time (h)	Time (h)
1	0.0	2.2	7992
2	9.5	2.2	7992
3	18.9	2.2	7992
4	28.4	2.2	7992
5	37.9	2.2	7992
6	47.4	2.2	7992
7	56.8	2.2	7992
8	66.3	2.2	7992
9	75.8	2.2	7992
10	85.2	2.2	7992
11	94.7	2.2	7992
12	104.2	2.2	7992
13	113.6	2.2	7992
14	123.1	2.2	7992
15	132.6	2.2	7992
16	142.1	2.2	7992
17	151.5	2.2	7992
18	161.0	2.2	7992
19	170.5	2.2	7992
20	179.9	2.2	7992
21	189.4	2.2	7992
22	198.9	2.2	7992
23	208.3	2.2	7992
24	217.8	2.2	7992
25	227.3	2.2	7992
26	236.8	2.2	7992
27	246.2	2.2	7992
28	255.7	2.2	7992
29	265.2	2.2	7992
30	274.6	2.2	7992
31	284.1	2.2	7992
32	293.6	2.2	7992
33	303.0	2.2	7992
34	312.5	2.2	7992
35	322.0	2.2	7992
36	331.5	2.2	7992
37	340.9	2.2	7992
		82.14	

## Azimuthal Scan 20mm – S002

**Download:** azim\_20mm.gz

**Contents:** outRun33 Collected 30<sup>th</sup> June to 2<sup>nd</sup> July 2006 2.1GB => 169MB

**Total Events:** 8069

### outRun33

step	Angle (°)	Time (h)	Time (s)
1	0.0	2.38	8571
2	18.9	2.38	8571
3	37.9	2.38	8571
4	56.8	2.38	8571
5	75.8	2.38	8571
6	94.7	2.38	8571
7	113.6	2.38	8571
8	132.6	2.38	8571
9	151.5	2.38	8571
10	170.5	2.38	8571
11	189.4	2.38	8571
12	208.3	2.38	8571
13	227.3	2.38	8571
14	246.2	2.38	8571
15	265.2	2.38	8571
16	284.1	2.38	8571
17	303.0	2.38	8571
18	322.0	2.38	8571
19	340.9	2.38	8571
20	359.9	2.38	8571
		47.62	

## Azimuthal Scan 20mm – S003

**Download:** azimuth\_20mm.gz

**Contents:** outRun13      Collected 5<sup>th</sup> to 7<sup>th</sup> Oct 2006      2.2GB => 164MB

**Total Events:** 7828

### outRun13

step	Angle (°)	Time (h)	Time (s)
1	0.0	2.38	8571
2	18.9	2.38	8571
3	37.9	2.38	8571
4	56.8	2.38	8571
5	75.8	2.38	8571
6	94.7	2.38	8571
7	113.6	2.38	8571
8	132.6	2.38	8571
9	151.5	2.38	8571
10	170.5	2.38	8571
11	189.4	2.38	8571
12	208.3	2.38	8571
13	227.3	2.38	8571
14	246.2	2.38	8571
15	265.2	2.38	8571
16	284.1	2.38	8571
17	303.0	2.38	8571
18	322.0	2.38	8571
19	340.9	2.38	8571
20	359.9	2.38	8571
		47.62	

## Appendix 1 – MTsort setup

The following page summarizes the \*FORMATS and \*DATA sections required for analysis of the MTsort pre-sorted data. The group numbers are displayed in blue.

\*FORMATS !#####

posxy[255] (x,y,nstep)	! Position Table
fadc[260:350] (info)	! GRT4 (14 bits 80MHz)
silena[64:128] (energy)	! Silena ADC channels
grt[1:63] (e1,e2)	! Read GRT4 energy value from MWD

\*DATA !#####

valuearray chanmap[1:40]	! GRT channels mapped to 1-37
1 2 3 4 5 6 7 8 9 10 11 12	
13 14 15 16 17 18 19 20 21 22 23 24	
25 26 27 28 -1 30 31 32 33 34 35 36	
-1 37 29 -1	! Channel 29 -> remapped

valuearray silenamap[1:32]	! Silena channel map
-1 16 -1 17 -1 -1 -1 -1 -1 -1 -1	! 0-11
-1 -1 -1 -1 1 2 4 5 7 8 9 10	! 12-23
11 12 3 6 13 14 15 -1	! 24-31

! -----Process the Silena ADCs-----!

!  
! 1 | BGO D1, B1, RHS, sadc.16  
! 2 | BGO D1, B2, RHS, sadc.17  
! 3 | BGO D1, B3, LHS, sadc.26  
! 4 | BGO D2, B1, RHS, sadc.18  
! 5 | BGO D2, B2, RHS, sadc.19  
! 6 | BGO D1, B3, LHS, sadc.27  
! 7 | BGO D3, B1, RHS, sadc.20  
! 8 | BGO D3, B2, RHS, sadc.21  
! 9 | BGO D4 + D5, B1, RHS, sadc.22  
! 10 | BGO D4 + D5, B2, RHS, sadc.23  
! 11 | BGO D6, B1, RHS, sadc.24  
! 12 | BGO D6, B2, RHS, sadc.25  
! 13 | NaI 1, LHS, sadc.28  
! 14 | NaI 2, LHS, sadc.29  
! 15 | NaI 3, LHS, sadc.30  
! 16 | AGATA Core, sadc.1  
! 17 | TAC, sadc.3

## Appendix 2 – Eurogam data configuration (example event)

```
{Input Buffer 1 len 65536 (event start=62043000 end=62053000  
ptr=62043018) ...  
Copy from 62043018 to 08062178 len 16384 ...
```

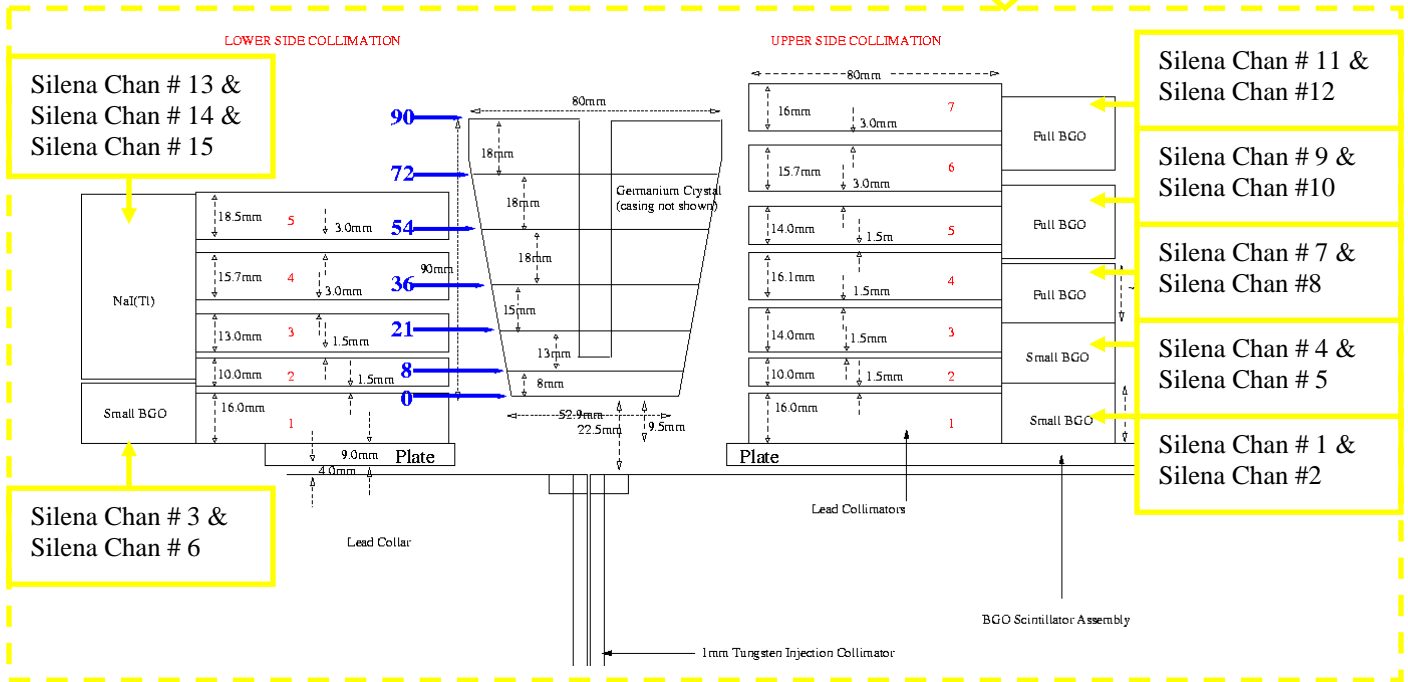
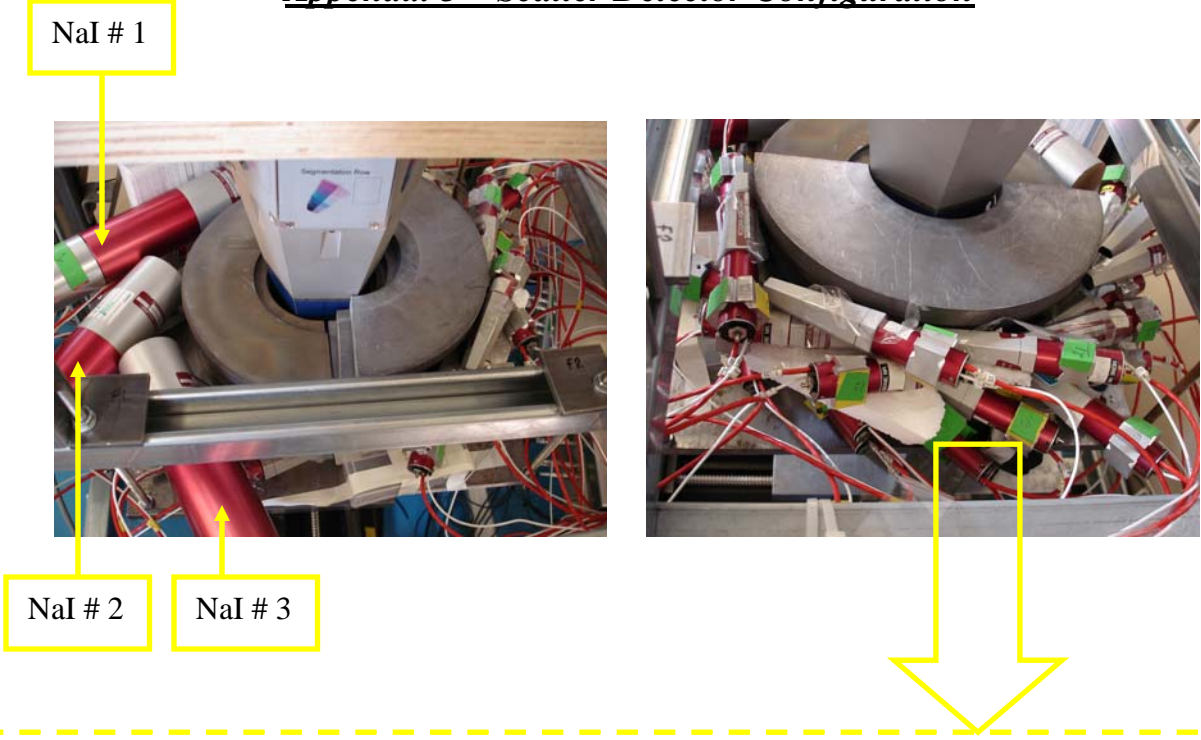
```
+0000: ffff Event start token  
+0002: 4b3c Event length 19260  
+0004: 45ff Group 255 Length 5 posxy  
+0006: 02d0 Data 720 posxy[255].x  
+0008: 0122 Data 290 posxy[255].y  
+000a: 0001 Data 1 posxy[255].nstep  
+000c: 0000 Data 0 unknown item  
+000e: 0000 Data 0 unknown item  
+0010: 80fe Extended Group 260 Length 254 fadcs  
+0014: Data 2f04 0000 2a62 2bee 251f 1c1f 211f 2elf ...  
+0210: 4204 Group 4 Length 2 grt  
+0212: 101e Data 4126 grt[4].e1  
+0214: fb26 Data 64294 grt[4].e2  
+0216: 0000 padding word  
+0218: 80fe Extended Group 261 Length 254 fadcs  
+021c: Data 2f05 0000 2a62 75e6 e91e e61e e31e f01e ...  
+0418: 4205 Group 5 Length 2 grt  
+041a: Offa Data 4090 grt[5].e1  
+041c: fc95 Data 64661 grt[5].e2  
+041e: 0000 padding word  
+0420: 80fe Extended Group 262 Length 254 fadcs  
+0424: Data 2f06 0000 2a62 d9de e91e e61e e31e dd1e ...  
+0620: 4206 Group 6 Length 2 grt  
+0622: Off9 Data 4089 grt[6].e1  
+0624: fae6 Data 64230 grt[6].e2  
+0626: 0000 padding word  
+0628: 80fe Extended Group 263 Length 254 fadcs  
+062c: Data 2f07 0000 2a62 36d7 ac1e a51e aele a91e ...  
+0828: 4207 Group 7 Length 2 grt  
+082a: OfE0 Data 4064 grt[7].e1  
+082c: f9fc Data 63996 grt[7].e2  
+082e: 0000 padding word  
+0830: 80fe Extended Group 264 Length 254 fadcs  
+0834: Data 2f08 0000 4bc4 a20c 1f1f 271f 2a1f 291f ...  
+0a30: 4208 Group 8 Length 2 grt  
+0a32: 101b Data 4123 grt[8].e1  
+0a34: f9e1 Data 63969 grt[8].e2  
+0a36: 0000 padding word
```

etc .....

```
+4b38: 4143 Group 67 Length 1 silena  
+4b3a: 013b Data 315 silena[67].energy
```



### Appendix 3 – Scatter Detector Configuration



*Note: The Silena channels listed in the schematic diagram above are labeled in terms of the remapping coefficients (see the bottom of Appendix 1).*

The following table lists the depths of the S002 AGATA crystal probed at the centre of each collimator gap. The measurements assume that the distance between the front face of the outer cryostat and crystal is 4.7mm.

Space	Lower			Upper		
	Width (mm)	Crystal Depth Hit (mm)	Depth Into Segment (mm)	Width (mm)	Crystal Depth Hit (mm)	Depth Into Segment (mm)
Pb Block 7	-	-		16.0	-	
Gap 6	-	-		3.0	86.8	14.8
Pb Block 6	-	-		15.7	-	
Gap 5	-	-		3.0	68.1	14.1
Pb Block 5	18.5	-		14.0	-	
Gap 4	3.0	52.7	16.7	1.5	51.9	15.9
Pb Block 4	15.7	-		16.1	-	
Gap 3	3.0	34.0	13.0	1.5	34.3	13.3
Pb Block 3	13.0	-		14.0	-	
Gap 2	1.5	18.8	10.8	1.5	18.8	10.8
Pb Block 2	10.0	-		10.0	-	
Gap 1	1.5	7.3	7.3	1.5	7.3	7.3
Pb Block 1	16.0	-		16.0	-	