Repair of
Luminosity banks in the DB 2002 - 2003

DQ-Meeting, 28.05.03

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- **Reminder**
- **Memory shift (-3 words) repair**
- **Statistics of recovered runs**
- **Remaining problems**

Reminder

LUMO bank problems in 2002 - 2003

1. Memory shift ✓

(meanwhile repaired)

2. Overwriting

(repair is still going on ...)

(for details see talk in DQM 20.03.03)

Memory shift (-3 words) in LUMO bank

Run 337330, from 20.01.03

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Run and Event:  337330 201
LUMO:  Length, table header   241      239     1
  PD Energy Trigger bunch Rates, 0.1 Hz, last 10s average
  1- 10:    12716   11324   11170   10629    8889   10745   11904     386    9933    9083
 11- 20:    12098    9005    9701   10977    9662   11672   12136   12329     502   10088
 21- 30:    11093    9972   11904   11866   11634   12832   12987   10938   12175     386
 31- 40:    10358   11982   11286   12136   14069   11440   11711   12059   10590   12677
 41- 50:      154   11750   12871   11363   12059   11982   12987   12755   11750   14301
 51- 60:    14223     850   13953   14996   15383   15035   14494   13760   14146   13760
 61- 70:        0       0       0       0       0       0      38   12677   13528   11672
 71- 80:    12755   11711   12175   12291   10474   12561   14185     386   13412   12291
 81- 90:    15112   12484   11943   12175   12832   13064   14417   15035     270   11479
 91-100:    14069   11518   13334   13296   13102   14069   12252   10513   13450     386
101-110:    10822   11634   11209   11518   12020   11131   12368   11440   11402   12716
111-120:      425   11324   12407   13257   12716   12677   12136   13412   12445   11286
121-130:    11247     309   11402   10861   11209   12407   11324   11247   11479   12716
131-140:        0       0       0       0       0       0       0    6106    9972   10204
141-150:    11170   11054   11866   10822   10513    9044   11286     425    7962   11556
151-160:    11363   12252   12252   11982   10513   11402   10320   13373     386   11943
161-170:    12871   11634   11440   11131   12252   13257   13605   11788   12600     386
171-180:    10822   12291   13141   10822   13296   14649   12600   13876   13760   14687
181-190:      502   11015   13644   14880   14958   14107   13644   12639   13605   13837
191-200:    13914     231   13141    9624   13334   11131   12329   13566   14185   13373
201-210:        0       0       0       0       0       0       0       0       0       0
211-220:        0       0       0       0       0      38       0 ******* ******* *******
  Word 221: Total PD Rate, same unit and average          276018 hex.     43632
 Words 222-223, Time stamps          140687            22202
 Words 224-225, Luminosity            20753        171439520
 Words 226-227, Int. Luminosity       166729392        162865856
 Words 228-230, Int. Luminosity             975              2921                0
 Words 231-232, Accept, L-Fill                0                 0
              Words 234-239, spares
Spares:       0       0       0       0       0       0     260
```

Memory shift
Why did it happen?

- **Hardware error on the RIO2 board:**
  - **Shift of the VME Addresses versus Data by 3 units.**
  - **This causes the data to be written wrongly into the Dual Port Memory .**
    ⇒ Correct BOS structure (no BSE!) but -3 words data shift.
  - **Shift happens at random times, is stable after the shift**
    ⇒ does not jump back
    ⇒ RIO2 board had to be rebooted

Effect of Memory shift

If whole run is affected

$\Rightarrow$ **Int. Lumi in LH1R is 0**

If only part of run is affected

$\Rightarrow$ **Int. Lumi in LH1R is wrong**

H1EP: Runs labeled as Poor

How to recover ?

Repair Method
of memory shift

1. **shift LUMO content +3 words**
2. **first 3 bunch rates are lost**
3. **replace with**
   average over bunches of same type
   (either colliding, or empty, or pilot)

LH1R, LH1T can be restored.

Check Repair-Method with "healthy" runs

1. shift LUMO content artificially -3 words
2. shift back +3 words, according to repair method
3. compare old (correct!) and new lumi (LH1R, LH1T)

Difference is on ‰ level

⇒ repair of memory shifted runs can be done without extra systematic errors!

NDB, H1EP, GMP-files are updated for all runs with memory shift

(see HN message 16.04.03)

Recovered runs for 2002

Run #	Quality	Old Int.Lumi	New Int.Lumi	Comments
=====	=======	============	============	========
322691	P	1086.9	660.6	
322693	P	20.1	96.2	
322696	P	6674.6	1575.9	
322697	P	0.1	5.1	
322698	P	571.2	456.0	
322700	P	0.1	4.3	
322703	P	5185.2	1334.1	
322705	P	5839.7	1377.0	
322708	P	51.1	124.7	
322709	P	3706.3	1099.7	
323134	P	0.0	2635.2	
232138	P	0.0	123.2	
323140	P	0.0	11222.5	
323141	P	0.0	29874.0	
326066	P	687.7	871.5	
326067	P	4260.9	3300.2	
326073	P	6773.2	6284.6	
330889	M	37316.0	10256.9	(was Poor)
330915	M	5410.7	5411.4	(was Poor)
330917	M	0.0	1043.6	(was Poor)
330918	M	0.0	5351.7	(was Poor)

330919	M	0.0	1151.6	(was Poor)
331476	P	0.0	71.1	
331477	P	0.0	3.1	
332196	P	0.0	9813.2	
332197	P	0.0	941.4	
332198	P	0.0	14060.7	
332284	P	0.0	1.8	
332287	P	0.0	303.4	
332288	P	0.0	3644.8	
332290	P	0.0	4956.3	
332291	M	0.0	26582.7	(was Poor)
332293	P	0.0	210.4	
332295	P	0.0	6835.1	
332297	M	0.0	26689.6	(was Poor)
332298	M	0.0	13218.3	(was Poor)
332299	M	0.0	11266.3	(was Poor)
333324	P	1035.3	469.0	
333328	P	0.0	2865.6	
333330	P	0.0	491.2	
334256	M	0.0	84.0	(was Poor)
334257	M	0.0	10154.8	(was Poor)
334258	M	0.0	1691.6	(was Poor)
334259	M	0.0	3092.5	(was Poor)
334260	M	0.0	1931.8	(was Poor)
334261	M	0.0	532.6	(was Poor)

334262	M	0.0	2470.4	(was Poor)
334266	M	0.0	837.6	(was Poor)
334267	M	0.0	4772.4	(was Poor)
334269	M	0.0	2322.4	(was Poor)
334271	M	0.0	9863.8	(was Poor)
334273	M	0.0	18715.5	(was Poor)
334274	M	0.0	11105.3	(was Poor)
334472	M	0.0	15552.6	(was Poor)
334474	M	0.0	4869.4	(was Poor)
334477	M	0.0	7922.0	(was Poor)
334478	M	0.0	2109.0	(was Poor)
334480	M	0.0	8335.1	(was Poor)
334851	P	0.0	1538.8	
334853	P	0.0	33.1	
334855	P	0.0	1039.9	
334859	M	0.0	1522.7	(was Poor)
334860	M	0.0	186.4	(was Poor)
334863	M	0.0	252.9	(was Poor)
334865	M	0.0	646.7	(was Poor)
334867	P	0.0	22.1	

Recovered runs for 2003

Run #	Quality	Old Int.Lumi	New Int.Lumi	Comments
=====	=======	============	============	========
337246	P	0.0	12164.7	
337248	P	0.0	16342.5	
337257	P	0.0	17.3	
337259	P	0.0	162.3	
337280	P	0.0	13220.8	
337317	P	0.0	21090.6	
337322	P	0.0	3756.6	
337330	P	0.0	17.0	
337338	P	0.0	10.0	
337366	P	0.0	5892.1	
337775	P	0.0	14193.0	
337776	P	0.0	308.1	
337777	P	0.0	337.1	
337779	P	0.0	8691.0	
337780	P	0.0	9063.4	
338653	M	0.0	980.6	(was Poor)
338658	M	0.0	1670.1	(was Poor)
338659	M	0.0	1871.2	(was Poor)
338660	M	0.0	2648.9	(was Poor)
338661	M	0.0	1962.0	(was Poor)
338662	M	0.0	3391.8	(was Poor)

338663	M	0.0	2291.3	(was Poor)
338665	M	0.0	1616.5	(was Poor)
338708	M	0.0	3031.7	(was Poor)
338709	M	0.0	1037.5	(was Poor)
338711	M	0.0	723.8	(was Poor)
338713	M	0.0	517.8	(was Poor)
338715	M	0.0	3628.9	(was Poor)
338717	M	0.0	2112.0	(was Poor)
338719	M	0.0	2048.8	(was Poor)
338720	M	0.0	2031.8	(was Poor)
338722	P	0.0	4.7	
339940	M	91971.5	2604.3	(was Poor)
339941	M	0.0	355.1	(was Poor)
339942	M	0.0	185.8	(was Poor)
339943	M	0.0	1424.3	(was Poor)
339944	M	0.0	2756.8	(was Poor)
339945	M	0.0	414.7	(was Poor)
339947	P	0.0	11.0	
339949	P	0.0	20.5	
339951	M	0.0	424.0	(was Poor)
339952	M	0.0	1365.2	(was Poor)
339953	M	0.0	1402.5	(was Poor)
339954	M	0.0	478.7	(was Poor)
339955	M	0.0	3280.7	(was Poor)
339956	M	0.0	3447.1	(was Poor)

339958	P	0.0	56.4	
339960	M	0.0	2433.1	(was Poor)
339961	M	0.0	69.6	(was Poor)
339962	M	0.0	425.7	(was Poor)
339963	M	0.0	296.9	(was Poor)
339966	M	0.0	1758.7	(was Poor)
339967	M	0.0	704.5	(was Poor)
339968	M	0.0	369.6	(was Poor)
339971	M	0.0	1707.7	(was Poor)
340184	M	6113.4	6113.4	(was P,no cor.LUMO)
340186	M	19566.8	19566.8	(was P,no cor.LUMO)
340192	M	981.4	981.4	(was P,no cor.LUMO)
340194	M	50.4	60.4	(was P,no cor.LUMO)
340199	M	606.4	606.4	(was P,no cor.LUMO)
340200	M	27.1	27.1	(was P,no cor.LUMO)
340203	M	691.0	691.0	(was P,no cor.LUMO)
340204	M	2339.5	2339.5	(was P,no cor.LUMO)
340205	M	790.1	790.1	(was P,no cor.LUMO)
340206	M	672.7	672.7	(was P,no cor.LUMO)
340207	M	5888.6	5888.6	(was P,no cor.LUMO)
340208	M	263.0	263.0	(was P,no cor.LUMO)
340209	M	2495.3	2495.3	(was P,no cor.LUMO)
340210	M	1269.6	1269.6	(was P,no cor.LUMO)
340211	M	199.8	199.8	(was P,no cor.LUMO)
340212	M	1179.9	1179.9	(was P,no cor.LUMO)

340214	M	46.5	46.5	(was P,no cor.LUMO)
340232	M	158.0	158.0	(was P,no cor.LUMO)
340233	M	2480.8	2480.8	(was P,no cor.LUMO)
340234	M	941.0	941.0	(was P,no cor.LUMO)
340235	M	315.7	315.7	(was P,no cor.LUMO)
340237	M	5648.5	5648.5	(was P,no cor.LUMO)
340238	M	492.3	492.3	(was P,no cor.LUMO)
340242	M	641.6	641.6	(was P,no cor.LUMO)
340244	M	371.1	371.1	(was P,no cor.LUMO)
340247	M	780.9	780.9	(was P,no cor.LUMO)
340248	M	1341.0	1341.0	(was P,no cor.LUMO)
340252	M	1320.6	1320.6	(was P,no cor.LUMO)
340257	M	0.0	1005.7	(was Poor)
340258	M	0.0	490.9	(was Poor)

Remaining problems

and
to do list

(as far as Memory shift is concerned)

Hardware repair

- **Replace RIO2**
- **Introduce BBL3 alarm**
- **Introduce Auto-recovery**