	Issue Date	**:**	**23 June 2011**
	Issue	**:**	**1.0**

Title **:** **GOCE L1b Data Quality Control Report**
February 2011

Author **:** **GOCE Quality Control Team**

Distribution **:** GOCE Users Community

DOCUMENT CHANGE RECORD

Issue	Date	Reason for Change	Changed Pages/Paragraphs
1.0	23/06/2011	First issue	

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Purpose and Scope

This document contains the Quality report for GOCE L1b data for February 2011.

The latest version of this document is available on the GOCE Data Quality portal at:

http://earth.esa.int/GOCE/ → "Level 1b QC" → "Monthly"

The GOCE Data Quality portal is the principal source for any quality-related information on GOCE products.

http://earth.esa.int/GOCE/ → "Level 1b QC".

1.2 Glossary

The following acronyms and abbreviations have been used in this report.

ABBREVIATION	MEANING
EGG	Electrostatic Gravity Gradiometer
DFACS	Drag Free and Attitude control system
SST-I	Satellite-to-satellite tracking instrument
CTR	Control Voltages
STR	Star Tracker
Trace SD	Trace Spectral Density
ICM	Inverse Calibration Matrix
GAR	Gradiometer Angular Rates
FPM	Fine Pointing Mode

2. FEBRUARY 2011 OVERVIEW

- Beam Out event at UTC 01/02/2011 07:05:39.

- Spacecraft contingency: routine science operations were interrupted on 8th Feb by a gradiometer anomaly GAIEU watchdog triggered at 05:46:59 and commanding of the EGG to Acquisition/Science. Drag-free mode was maintained, such that the problems did not have a major impact on the mission. Regarding the processing, a gap in the data occurred with consequent and expected Kalman filter reinitialization occurrence. A power cycle of the EGG was performed on 9th of February at 14:38 to recover the FEEU desynchronisation occurred on the 8th of February. A gap of 94 seconds occurred from 14:38 onwards causing a Kalman filter reinitialization.

- SSTI-A back in the loop at 13:03:15 of 10th of February, SSTI-B off at 13:03:34. EGG was put in science mode from 07:15:00. Kalman filter reinitialization occurred at time 13:03:30 due to Gap in SSTI and STR data from 13:03:33 to 13:04:31.

- Routine mission operations were resumed on 11th of February.

- Beam Out event at UTC 13/02/2011 23:24:12.

- Anomalous oscillation found in Uyy component on 14th of February at 11:01:17 with impacts on trace. The same oscillation is present in all the components of L0 CTRs.

- Beam Out event at UTC 19/02/2011 16:13:19.

- Small oscillation found on 20th of February at UTC 11:45:42, visible in Uyy component and in DM acceleration component 14_Y, 25_Y, 36_Y, 25_X, 36_X, 25_Z. No relevant impacts on performance.

- Beam Out events at UTC 23/02/2011 13:53:06 and 17:18:50.

- Small oscillation found in Uzz component on 27th of February 12:44:42, no impacts on performance.

-

2.1 Instruments Quality summary tables

Feb `01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28`

Table 1 February 2011 EGG QC Status

Feb `01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28`

Table 2 February 2011 SST QC Status

- GAP (details within Monthly Report)
- NOT USABLE
- Special Event
- Nominal
- Calibration
- EGG in Acquisition Mode
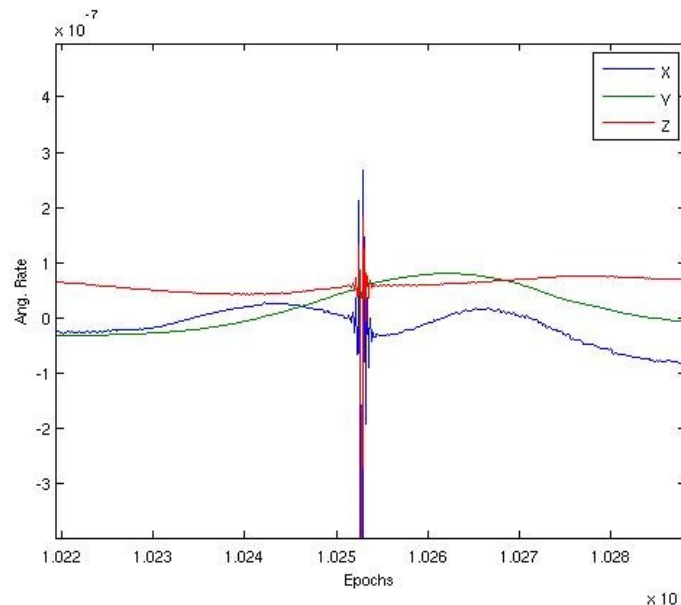- Not yet released

3. FEBRUARY 2011 DATA QUALITY ANALYSIS

3.1 Anomalous oscillation in Uyy component on 14 of February

An anomalous oscillation in Uyy component of the gravity gradient tensor occurred at UTC 14/02 11:01:17 as reported below:
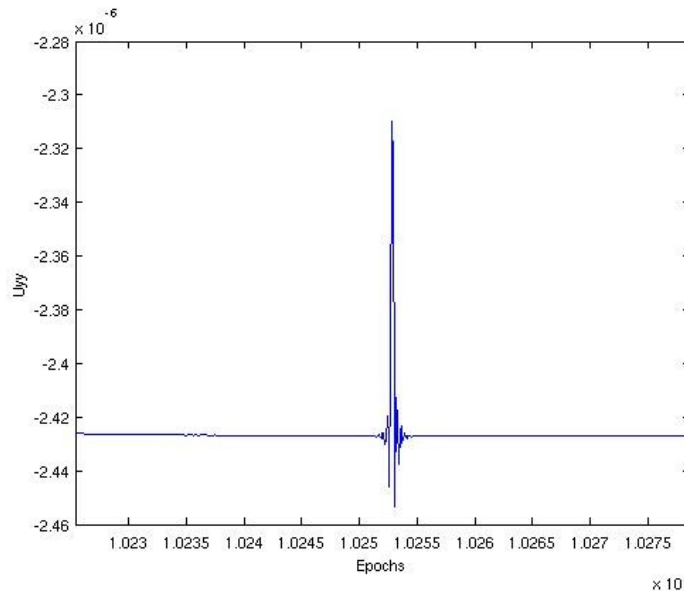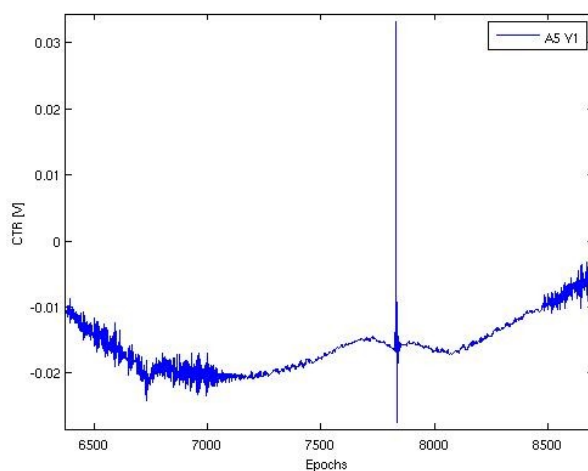

Figure 1 Uyy Anomaly (14/02 11:01:17)

The same anomaly is present also in the angular rate components, as reported below:

Figure 2 Anomaly in angular rates components

The oscillation is evident also in L0 CTR datasets for all the eight components of all the six accelerometers (below is reported the oscillation for the component A5_Y1):

Figure 3 the anomaly in CTR L0 data

The effect is evident also in DFACS and CM/DM datasets. This oscillation has significant impacts on performance as visible in the computed trace PSD below:
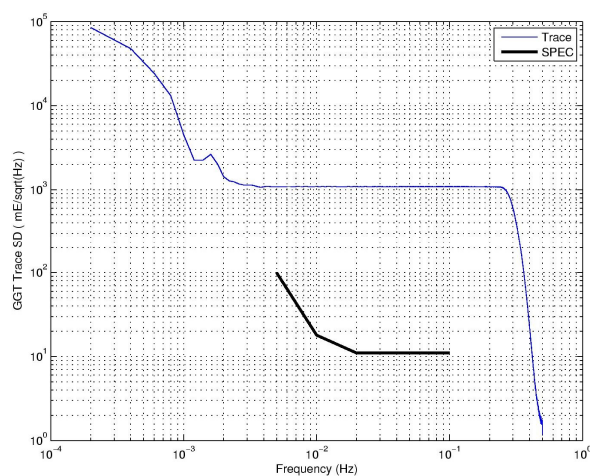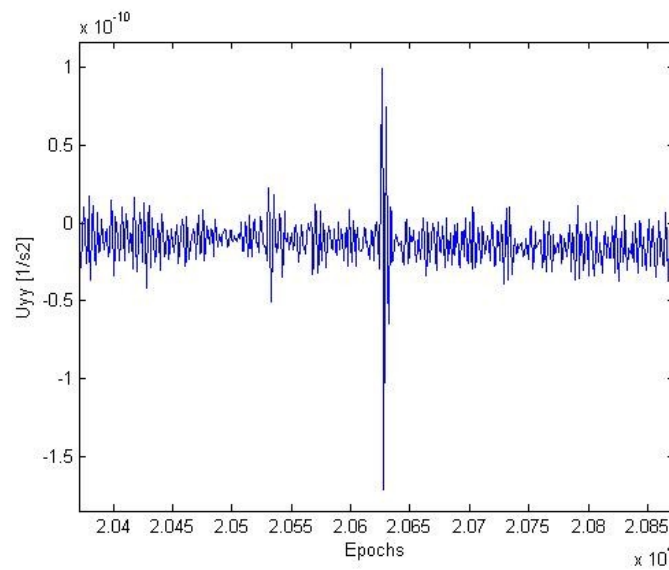

Figure 4 Anomalous trace PSD on 14thg of February

3.2   20th February oscillation

A small oscillation occurred at UTC 11:45:42 of 20th of February, visible in Uyy component and in DM acceleration component 14_Y, 25_Y, 36_Y, 25_X, 36_X, 25_Z.

Below is reported the first derivative of the Uyy time series which shows the anomaly:
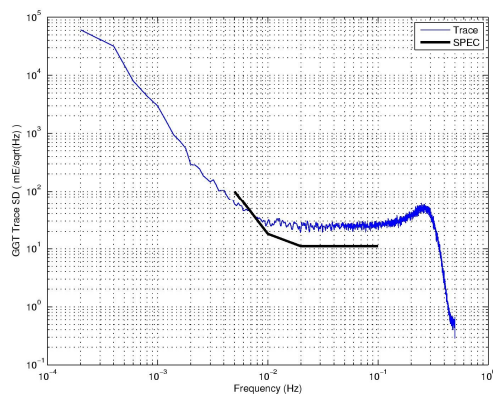
Figure 5 Uyy anomaly

The plots below show the same anomaly in the Differential mode accelerations components 14_Y and 25_Z as example:
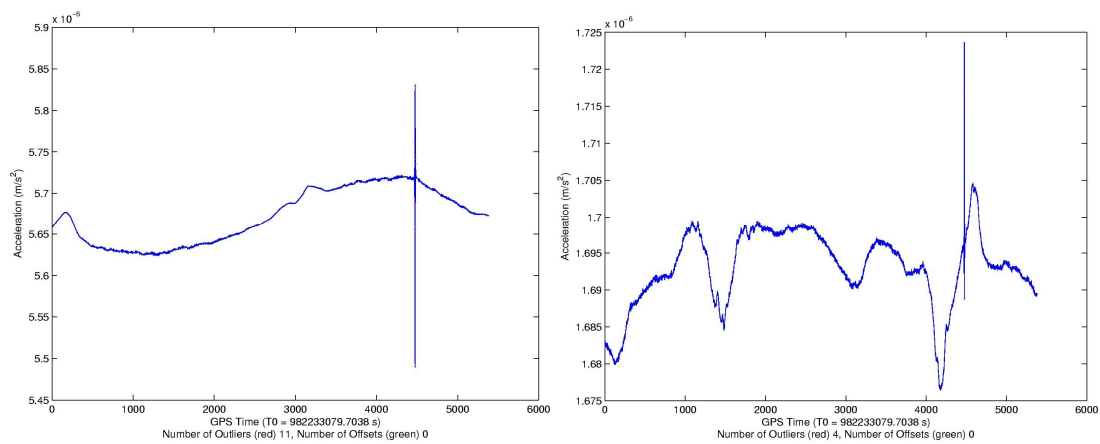
Figure 6 The anomaly in DM acceleration component 14_Y (left) and 25_Z (right)
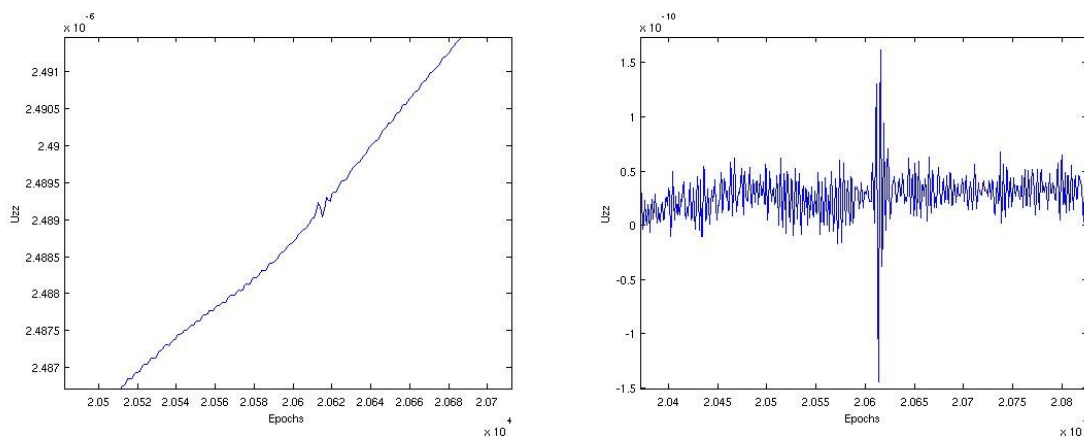
The anomaly has no impacts on performance as confirmed by the trace below, computed over the 20th of February reference period:

Figure 7 Trace PSD over the 20th of February

3.3 Uzz oscillation on 27th Of February

A small oscillation has been found in Gradient component Uzz at UTC 12:44:42 as reported below:

Figure 8 Uzz oscillation (left) and its first derivative (right)

The oscillation has no impacts on performance as shown in the computed trace below:
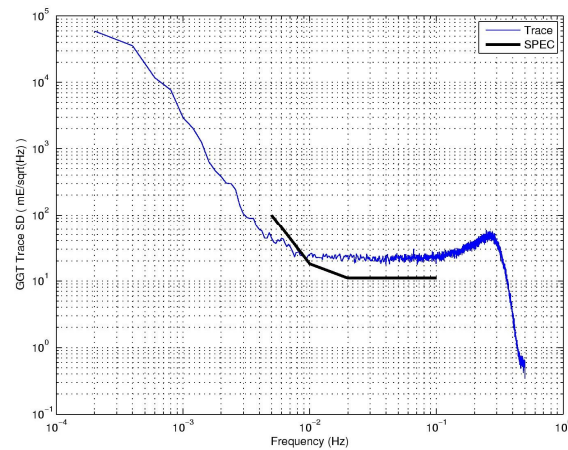
Figure 9 Trace PSD computed over the 27th of February time period

3.4 Beam Outs events

Five Beam Out events occurred at the following UTC time during February 2011 reference frame:

EVENT NUMBER	UTC TIME
1	2011-02-01T07:05:39
2	2011-02-13T23:24:12
3	2011-02-19T16:13:19
4	2011-02-23T13:53:06
5	2011-02-23T17:18:50

Table 3 Beam out event

Below, the effects of the Beam Out in the common mode acceleration, component 14_x, are displayed, for the five events.
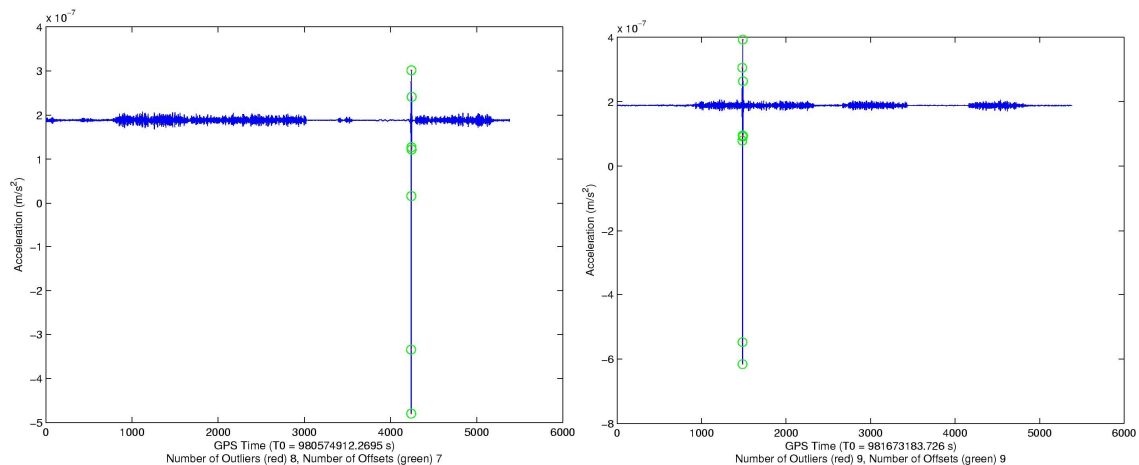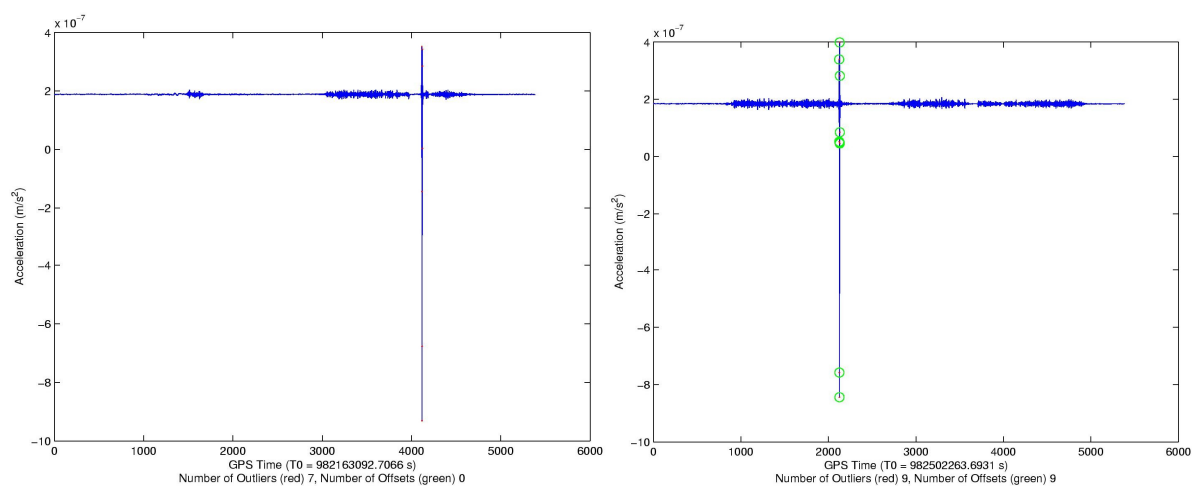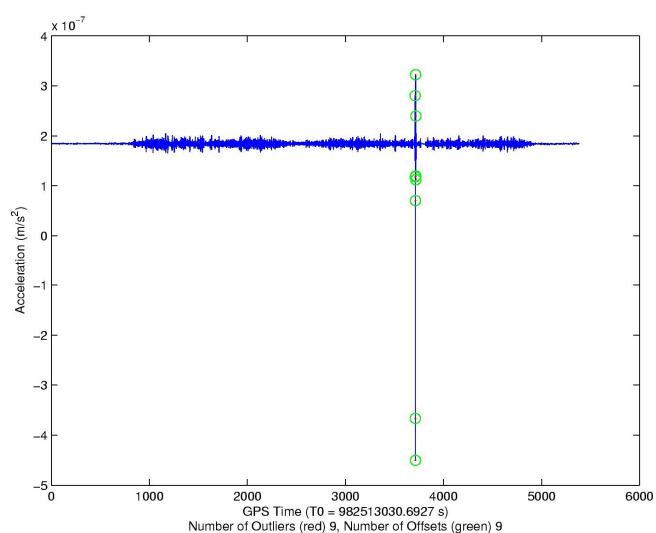

Figure 10 Beam Out event on 1st of February (left) and on 13th of February (right)
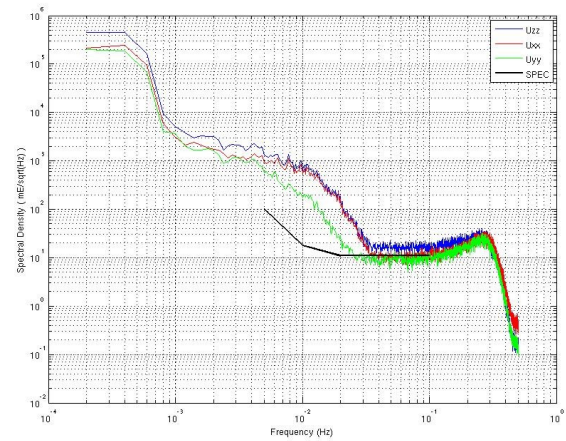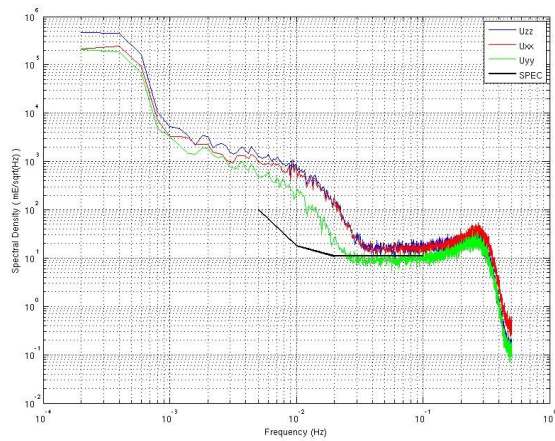
Figure 11 Beam Out event on 19th of February (left) and on 23rd of February (right)

Figure 12 Beam Out event on 23rd of February (second event)

This oscillation enters the gradients time series notably in the Uxx component.

This effect may be seen in the Gradients PSD graphs below:

Figure 13 Gradients PSD considering the Beam Out event of 01st of February (left), gradients PSD not considering the Beam Out event of 01st of February (right)

Uxx (red in the plots) has a higher value in the PSD above, when the beam-out is included (only the trace and gradients PSD for 01st of February are reported, plots for the other Beam Out events of February show similar behavior).

No relevant differences in terms of trace PSD are recognized, as reported in figure 14:
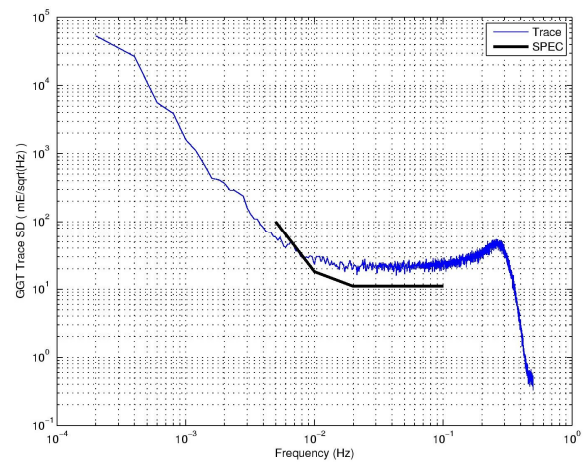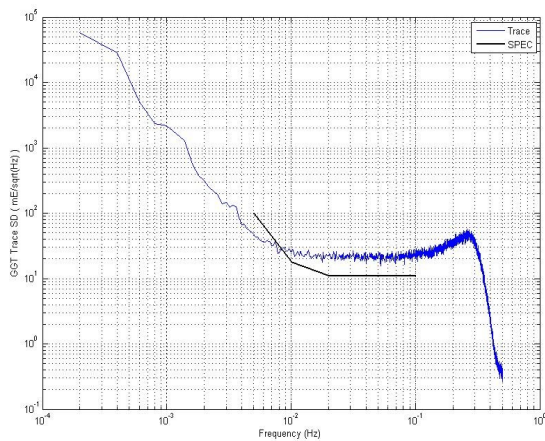
Figure 14 Trace PSD considering the Beam out event (left), trace PSD not considering the Beam out event (right)