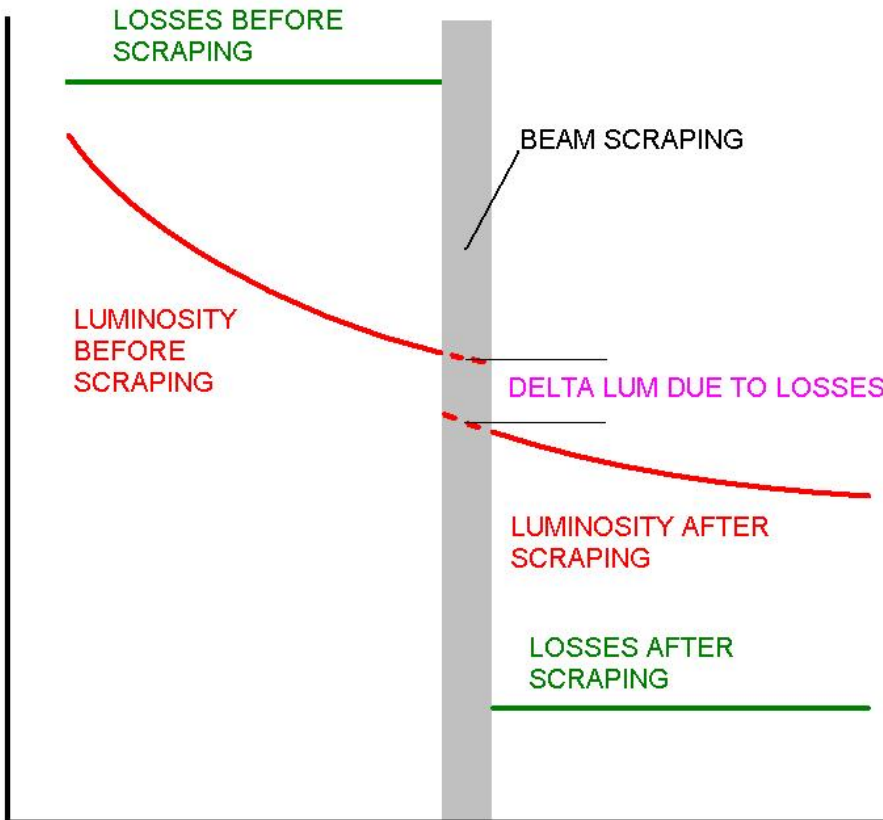


Impact of Losses on Luminosity measurement

Roberto Rossin

GP meeting 6/23/04

Method 1

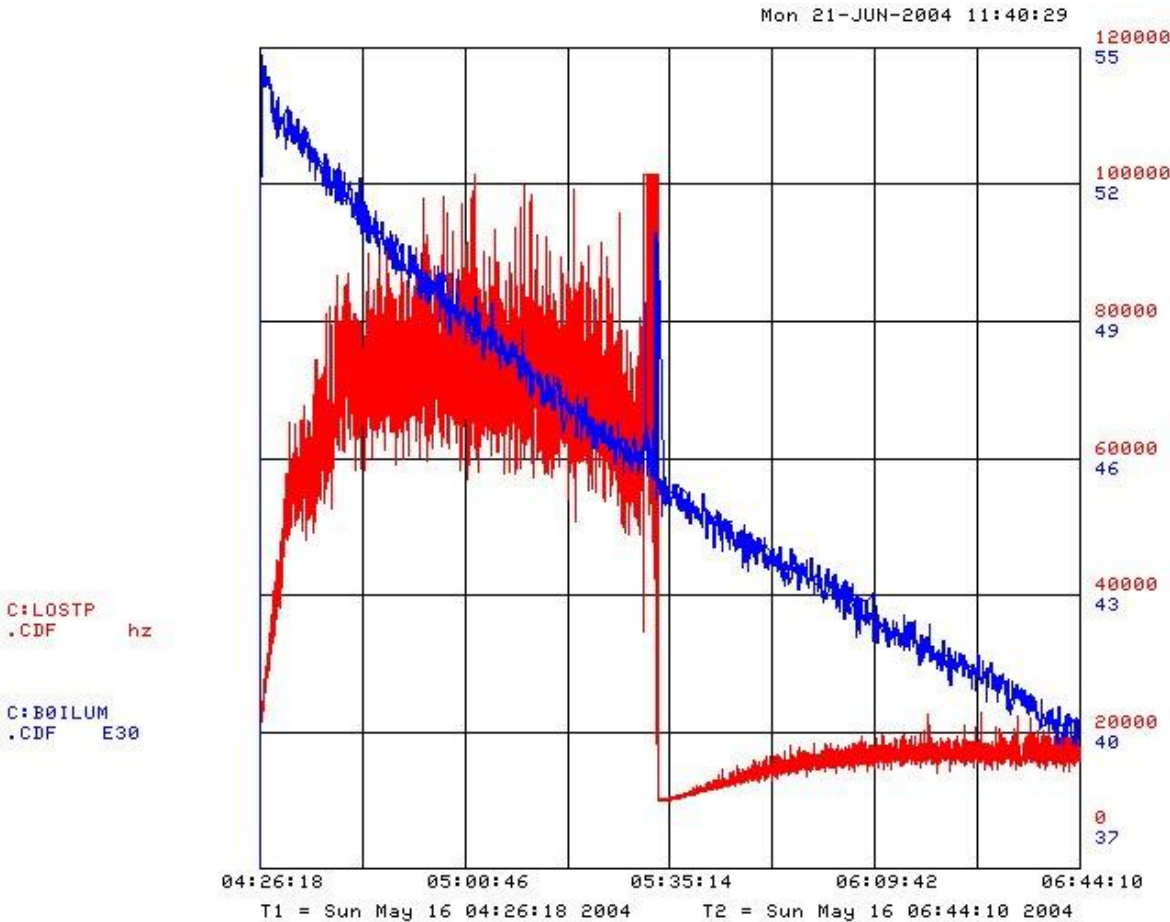


We consider one store with large variation of **proton losses**, due to a rescraping during the store itself.

We fit the online **luminosity** measurement in the two regions and calculate the JUMP before and after rescraping.

Delta luminosity is an overestimation of the beam losses contribution (luminosity NEVER increases during rescraping).

May 16, store 3500



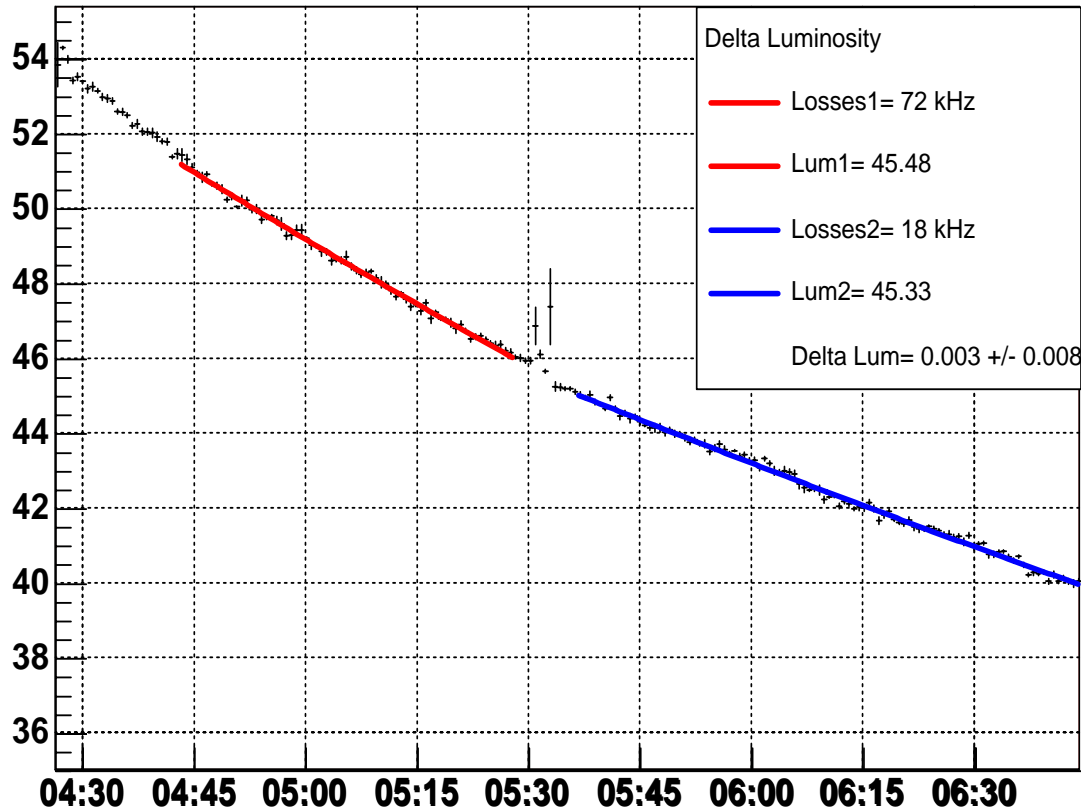
Between 04:45 and 05:30 proton losses had been permanently above **70kHz**.

Beam rescraping at 05:33

After rescraping, losses were below **20kHz**.

May 16, store 3500

Luminosity versus Losses



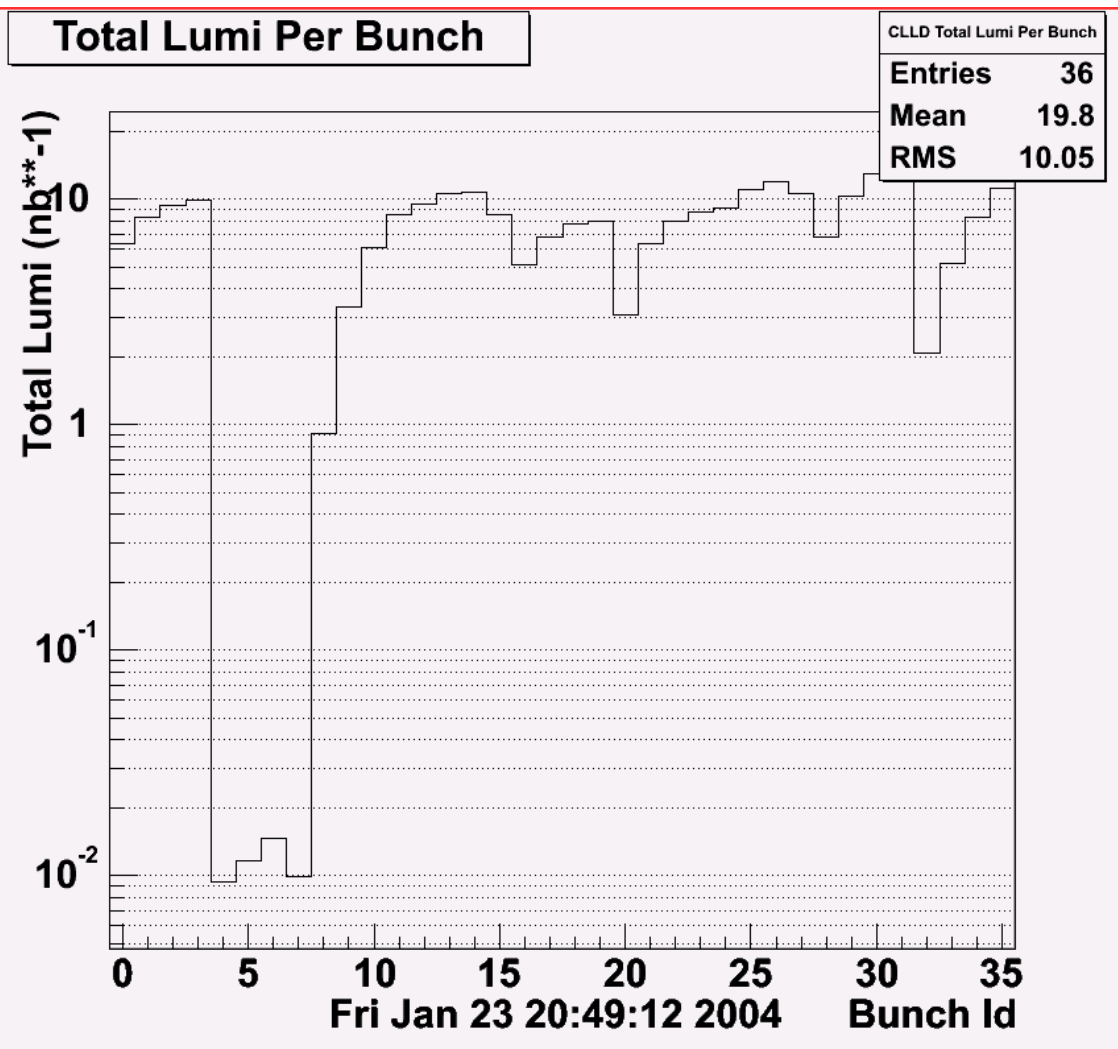
Losses changed by a factor 4 before and after beam rescraping.

Relative change in luminosity is compatible with 0.

Maximum level of losses for good silicon data is 20kHz.

$$\Delta Lum = \frac{Lum1 - Lum2}{Lum2} = \frac{45.48 - 45.33}{45.33} = 0.3\% \pm 0.8\%$$

Method 2, empty bunches



Jan 23, store 3187, run 178339

4 anti proton bunches lost during injection.

Store with 36x32.

Contribution on the 4 missing bunches to integrated luminosity at the end of the run is **>300** times smaller than the real luminosity.

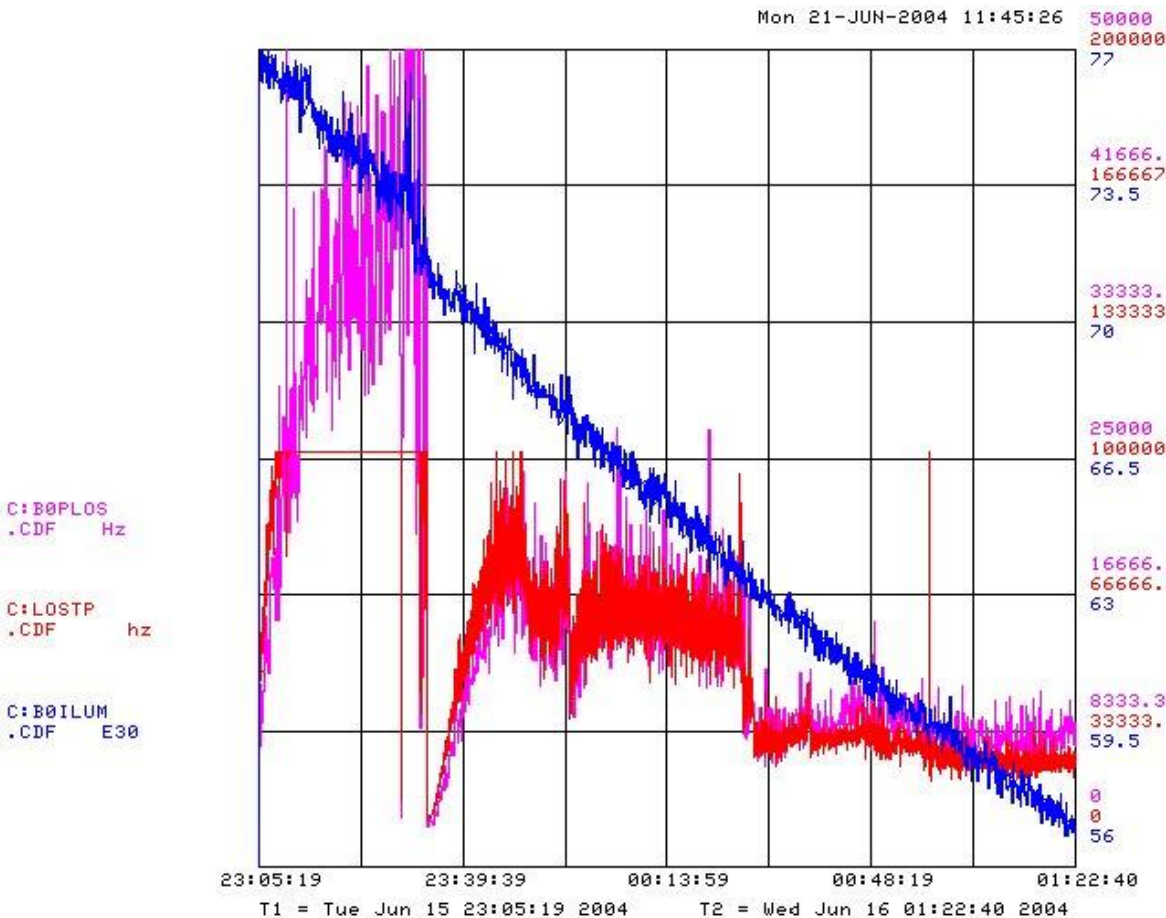
Conclusions

Two different methods have been used to extract the contribution of proton losses to luminosity measurement.

From both the estimations this contribution appears to be less than 1%.

Backup

Jun 15, store 3576



Between 23:10 and 23:28 proton losses had been around **150kHz**.

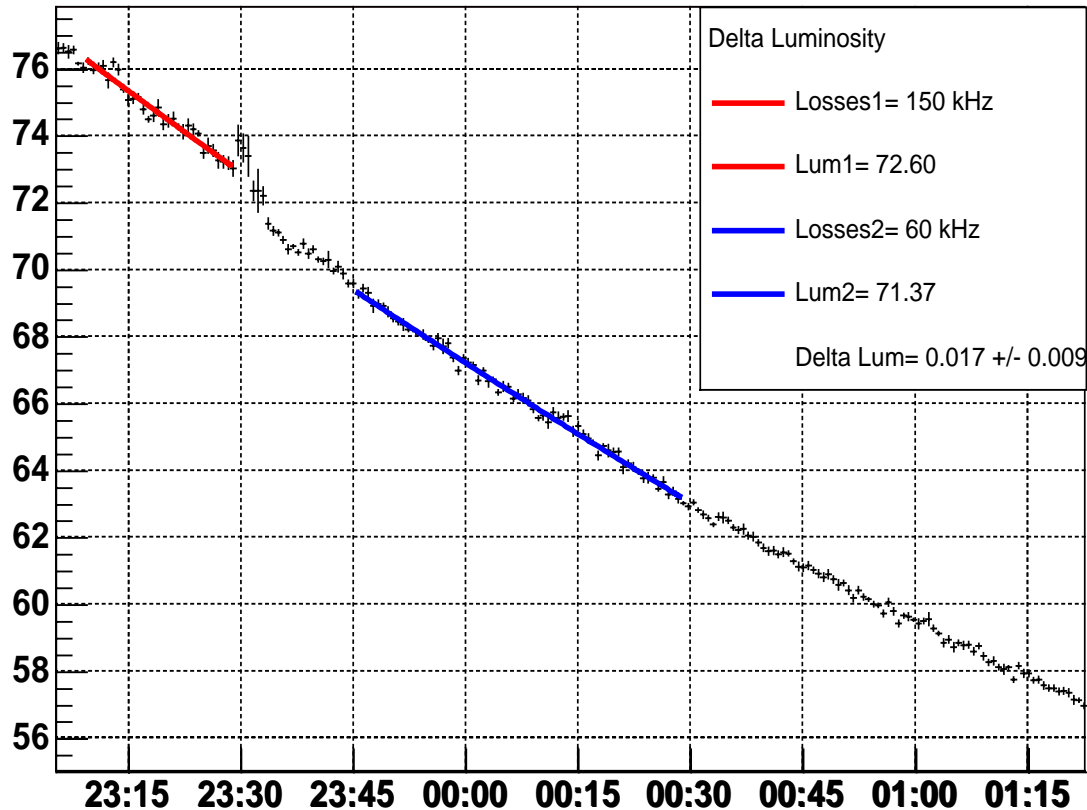
Beam rescraping at 23:30

After rescraping, losses increased again to **60kHz** (23:45 – 00:28).

After further tuning at 00:30 losses decreased to **30kHz**.

Jun 15, store 3576

Luminosity versus Losses



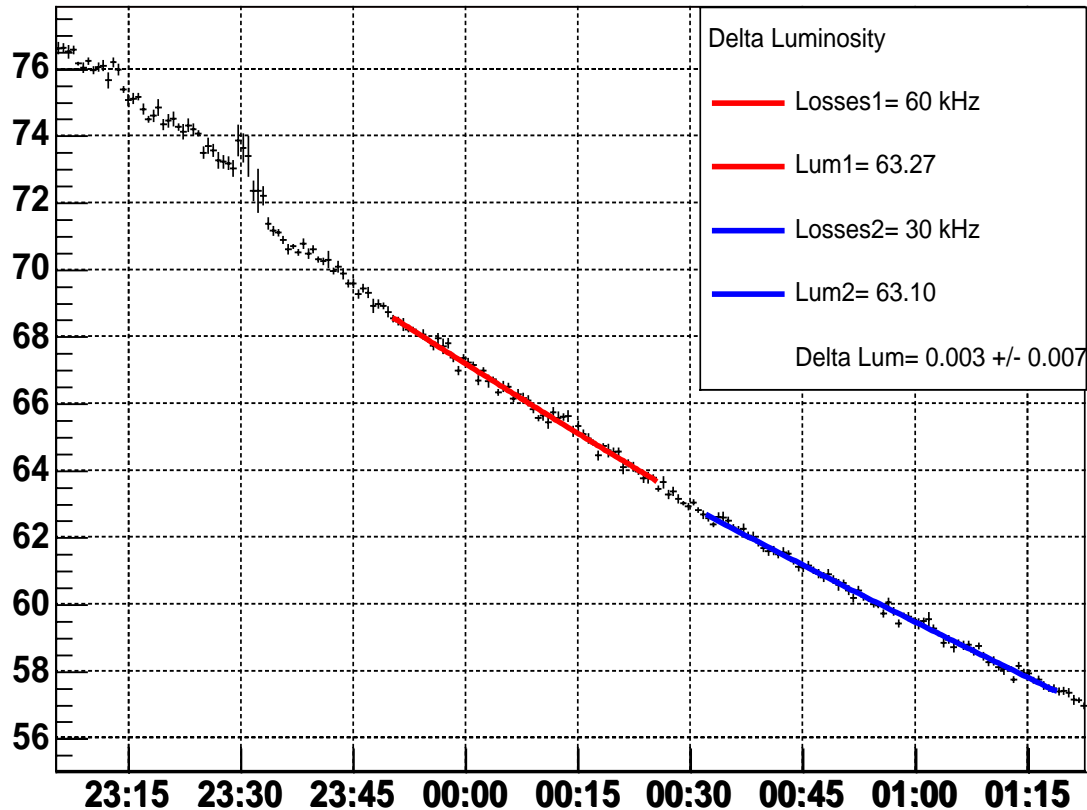
In the transition from **150kHz** to **60kHz** we observe a contribution to luminosity measurement about **1.7%**.

Maximum level of losses for good silicon data is 20kHz.

$$\Delta Lum = \frac{Lum1 - Lum2}{Lum2} = \frac{72.60 - 71.37}{71.37} = 1.7\% \pm 0.9\%$$

Jun 15, store 3576

Luminosity versus Losses

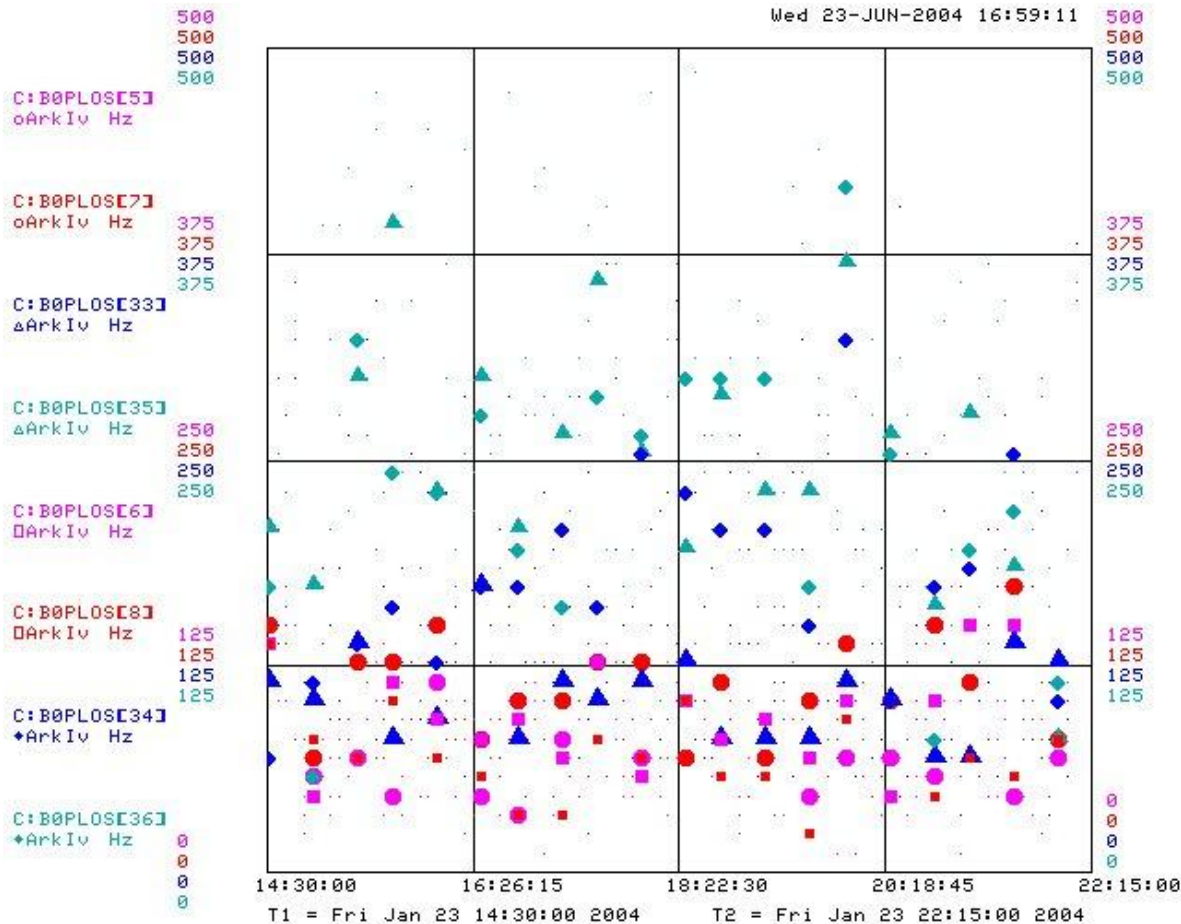


In the transition from **60kHz** to **30kHz** we observe a **NO** contribution to luminosity measurement.

Maximum level of losses for good silicon data is 20kHz.

$$\Delta Lum = \frac{Lum1 - Lum2}{Lum2} = \frac{63.27 - 63.10}{63.10} = 0.3\% \pm 0.7\%$$

Jan 23, store 3187, run 178339



Losses per bunch.

Proton losses in the 4 missing anti-proton bunches are in "hot" colors.

"Cold" colors are used for other 4 "control" bunches (all other bunches show a similar behaviour).

Jan 23, store 3187, run 178339

