Email sent by Wolgang Hoefle to FOM on March 29th 2011:

The SPS transverse damper has been fully set-up for the CNGS and LHC beam in week 12. However, the LHC beam set-up has only been checked with one batch of 75 ns spaced bunches. A check with 4 batches, and the full number of bunches at 25 ns is still outstanding and should be done on Friday, 1st of April. As the amplifier on the H1 damper is being changed tomorrow, the delay setting for the H1 damper needs to readjusted, also to be done on Friday.

Details:

Earlier problems this year were tracked down to the combined effect of

1) a bug in the pick-up selection and
2) a modification on the horizontal tetrode amplifiers that was necessary following frequent trips last year.

The horizontal amplifiers use different tubes (TH561) than the vertical amplifiers (RS2048 CJC). Last year it was observed that newly delivered tubes for the horizontal damper made the amplifiers trip frequently and also the tubes had a very low lifetime. After consultation with Thales the input circuit for the amplifiers was changed in the shutdown 2010/2011 to drain the offending current (not present in the past) emitted from the control grid of the tube, as recommended by Thales. The change of circuit made the DC supply voltage for the control grid floating and increased the lower cut-off frequency. These modifications were thought to have no influence, the cut-off frequency still being much lower than the first betatron frequency.

During the unsuccessful attempts to set-up the dampers in week 10 the vertical spare amplifier was installed in position at the damper H1 to check if the problems observed were related to the amplifier. With this spare amplifier a correct setting-up could be done for the 75 ns beam (even with the incorrect pick-ups, i.e. before the pick-up selection bug was found). For the 25 ns beam there were still problems, but this is now thought to have been caused by the e-cloud effect perturbing the pick-up signals (i.e. due to the bug of not selecting the correct pick-ups and signal processing insensitive to the e-cloud). Note that for 1 batch 75 ns there is no ecloud.

Following the tests with the vertical spare amplifier on the H1 damper it was therefore advised to further modify the input circuits of the horizontal amplifiers normally used with the horizontal dampers. This was done the week before last week (in-situ addition of two capacitors) for one amplifier and brought back the H2 amplifier lower cut-off frequency to the low values of the previous runs, as well as grounding RF wise the shielding of the cable supplying the DC biasing for the tetrode on the control grid in the amplifier. With this modification H2 could be correctly set-up (in the meantime the pick-up selection bug was also fixed).

In order to come back to the standard situation the amplifier now installed on H1 (the vertical spare amplifier) will be changed for the original horizontal amplifier, for which then the same fix (two capacitors) will be applied as for H2 (which proved to work last week). This change of amplifiers scheduled for this afternoon requires that the loop delay for H1 is re-adjusted, first thing when the beam comes back.

We should then be in a normal situation again.

It should be noted that the pick-up selection bug slipped in together with a modification done in the shutdown aimed at improving the controllability of the damper and eradicating the MMI RF control system: The control for the phase of the damper was moved to LSA and the pick-up selection no longer uses the MMI but is driven directly by the hardware selecting the cycles.