JB's internal Memo

AMBER

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Subject : **AMBER versus FINITO timing using the vis2**

Presents :

Scope of this memo

I summarize here an attempt to check the timing between AMBER and FINITO frames but comparing the vis2 (AMBER) and the phase rms (FINITO). Data comes from the nights 2007-11-28, where a visiting astronomer observed several stars with FINITO during the night. Simultaneous FINITO data have been acquired with the scripts from PHA (user's request). In this memo, I focus on the observations:`AMBER.2007-11-28T00:36:32.733_OIDATA_RAW.fits` for AMBER (DIT= 50ms) and `ADU_2007-11-28_00-36-40.txt` for FINITO (DIT= 1ms).

Conclusions

1: The timing difference between the MJD tag of each AMBER frame (as reported in the reduced OI_FITS file) and the ESO timestamp of the FINITO frames is less than $\pm$10ms. This is conservative value considering that we found a timing difference of 0 ± 5ms.
2: A correlation is clearly visible between the frame-to-frame AMBER vis2 and the FINITO phase RMS (computed over each single AMBER frame). Yet, this correlation is not perfect, meaning that it has an important dispersion. Possible "jittering correction" based on FINITO should be investigated, especially its impact on the AMBER transfer function stability when FINITO is used.

Data reduction and analysis

I extract the AMBER vis2 frame-by-frame with the standard `amdlib` package. In the resulting OI_FITS fits, each frame is tagged with the MJD. I extract the FINITO phase from the ADU file produced by the PHA's script. I compute the FINITO phase RMS over each AMBER frame, assuming the AMBER mjd tag represents the end of each frame. I use the `yorick` function 'digitize' instead of just counting 50 FINITO frames per AMBER frames,

so that a small de-synchronization between AMBER and FINITO along the exposure will be compensated automatically.

To check the timing, I compute the RMS frame-by-frame assuming different time offsets between AMBER and FINITO, ranging from −75ms to +75ms, by step of 5ms. Figure 1 shows the resulting correlation between AMBER vis2 (for intermediate base, so CH2 of FINITO) with the FINITO CH2 phase RMS in each frame, and for the different offsets. Curves are fit by the theoretical expression: $v^2.\exp(-rms^2)$, v^2 being a free parameter. Resulting Chi2 versus delay is plotted in the last system. Best offset (minimum chi2) is represented in red, and corresponds to offset$= 0 \pm 5$ms, so a good timing.

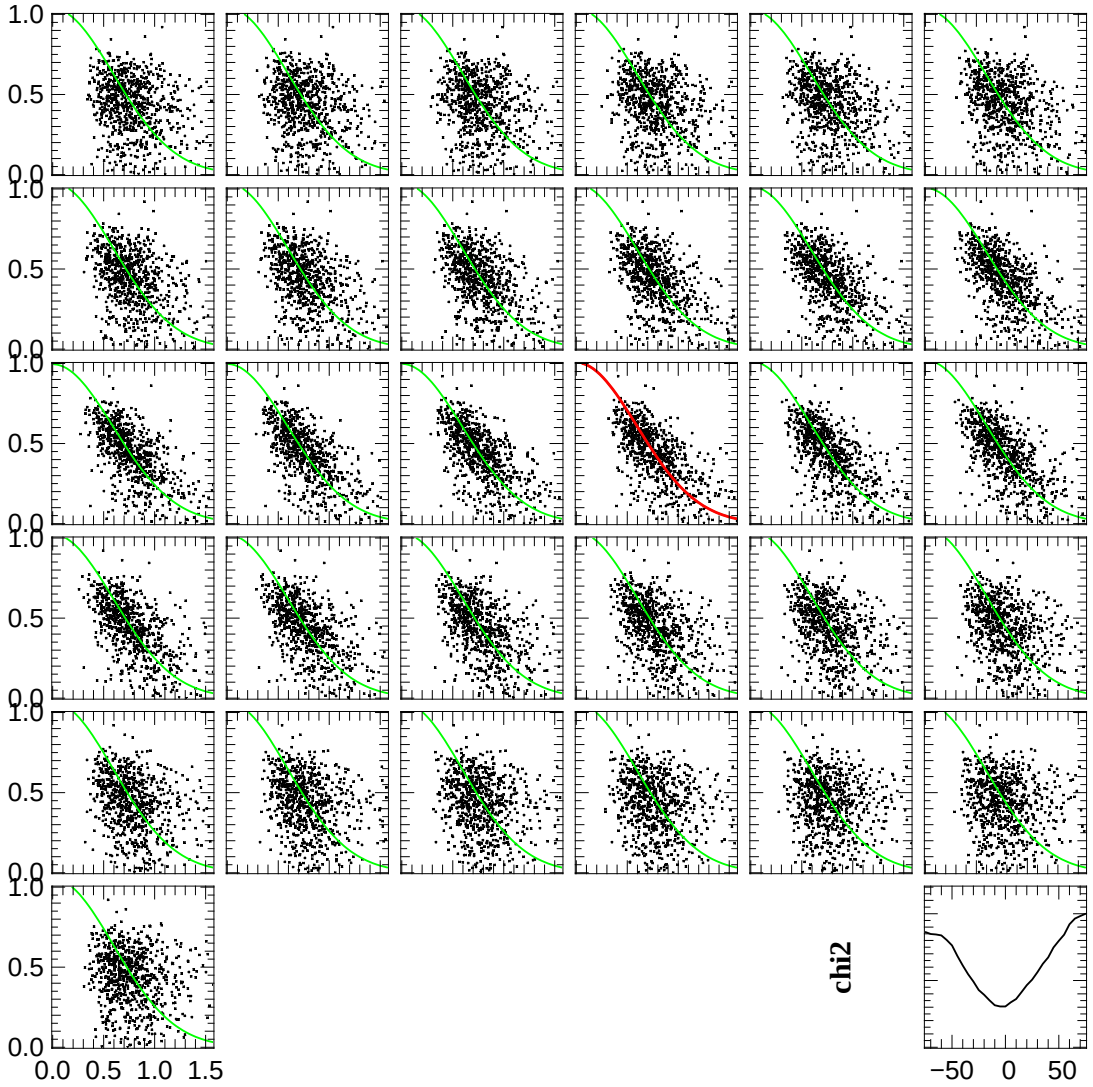

Figure 1*: AMBER vis2 for baseline G0-H0 versus the FINITO CH2 phase RMS over the AMBER frames, assuming different timing offset between the instruments: −75ms in top-left and +75ms in bottom-right. Lines are best fit with the theoretical expression: $\alpha.\exp(-rms^2)$, v^2 being a free parameter. Resulting chi2 are plot in last systems (bottom-right).*