FREQUENCY COMPARISON (H_MASER 40 0889) - (LNE-SYRTE-FOM)
From MJD 54249 to MJD 54269

The primary frequency standard LNE-SYRTE-FOM was compared to the hydrogen Maser (40 0889) of the laboratory, from MJD 54249 to MJD 54269.

The mean frequency differences measured between the hydrogen Maser 40 0889 and fountain FOM during this period is given in table 1.

Period (MJD)	$y(HMaser_{40\ 0889} - FOM)$	u_B	u_A	$u_{link\ /\ maser}$
54249 – 54269	**-12316.8**	**9.3**	**4.4**	**1.4**

Table 1: Results of the comparison in 1×10^{-16}.

Figure 1 collects the measurements of fractional frequency differences during the 29th May to 28th June 2007 period averaged by interval of 12 hours from MJD 54249 to 54269.
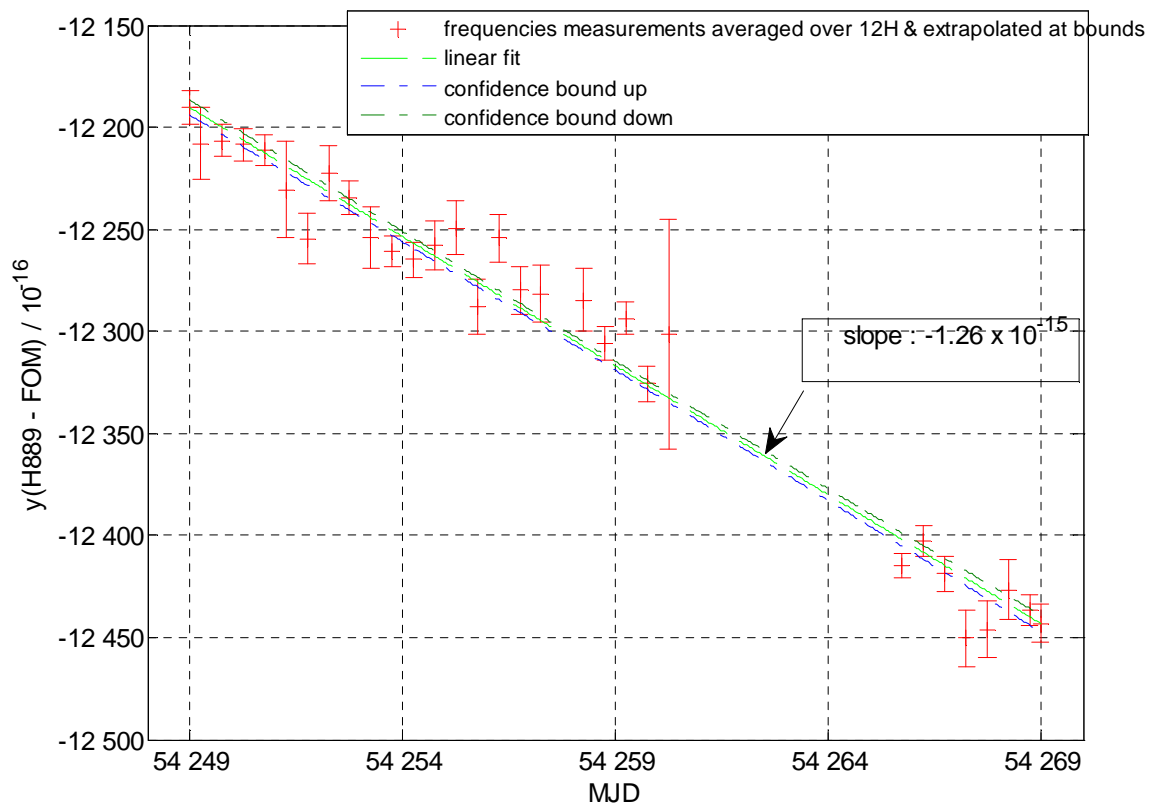

Figure 1: Fractional Frequency averaged over 12H and associated uncertainty of H889-FOM during the period 54249 to 54269. The weighted linear fit and, the confidence bounds up and low at $\pm 1\sigma$ were represented in dashed lines.

Table 2 gives the results of the frequency estimate for the middle date of the period, and the associated statistical uncertainty, using a linear fit weighted by the statistical uncertainties of the data measurements.

.Dates of measurements .Duration & .Measurement Rate	Mean normalized frequency difference $y_{Maser} - y_{FO2}$	type A uncertainty σ_{Stat}	Uncertainty due to the dead times $\sigma_{deadTime}$
Start date MJD UTC **54249.702** End date MJD UTC **54269,195** Length of interval 19.493 d Measurement Rate: 58.16%	Mean by linear fit at middle date 54259 $\overline{y}$ = **- 12316.76 x 10^{-16}**	Uncertainty of linear fit **4.41 x 10^{-16}**	$\sigma_{deadTime}$ = **0.97 10^{-16}**

Table 2: Statistics of measurements

Uncertainties budget of systematic effects in the FOM fountain

During this period FOM has operated in an autonomous way: the clock signal is delivered by a quartz oscillator frequency locked on the hyperfine resonance. The results presented here correspond to the phase comparison between the quartz oscillator and the H-maser.

Systematic effects taken into account are the quadratic Zeeman, the Black Body, the cold collision and cavity pulling, the microwave leakage and the 1st Doppler effects, the Ramsey Rabi pulling, the recoil, the 2nd Doppler and the background collisions. The red shift effect is also included in the systematic uncertainty budget. Systematic uncertainty is estimated by the sum of quadratic systematic uncertainties. The following table summarizes the budget of systematic effects and their associated uncertainties.

	Correction (10^{-16})	Uncertainty (10^{-16})
Quadratic Zeeman effect	- 210.2	1.1
Black body radiation	160.45	0.6
Cold collisions and cavity pulling	39.5	6.7
Microwave power dependence	0	6
Ramsey & Rabi pulling	0	< 0.1
Microwave recoil	0	< 1.4
Second order Doppler effect	0	< 0.1
Background gas collisions	0	<1.0
Total		**9.25**
Red shift	- 68	1.0
Total with red shift		**9.3**

Table 3: budget of systematic effects and uncertainties for SYRTE-FOM fountain

For the June 2007 period it gives:

$$u_B = 9.3 \times 10^{-16}$$