

**FREQUENCY COMPARISON Hydrogen MASER 40 0890 with LNE-SYRTE-FOM
From MJD 54189 to MJD 54219**

The primary frequency standard LNE-SYRTE-FOM was compared to the hydrogen Maser (40 0890) of the laboratory during the 30th March to 29th April 2007 period, from MJD 54189 to MJD 54219.

The mean frequency differences measured between the hydrogen Maser 40 0890 and fountain FOM during this period is given in Table 1.

Period (MJD)	y(HMaser _{40 0890} - FOM)	u_B	u_A	$u_{link / maser}$
54189 – 54219	-3829.6	12.3	1.9	1.0

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

Figure 1 collects the measurements of fractional frequency differences during the 30th March to 29th April 2007 period averaged by interval of 12 hours from MJD 54189 to 54219, and figure 2 shows the shot by shot frequency fluctuations during this period of integration.

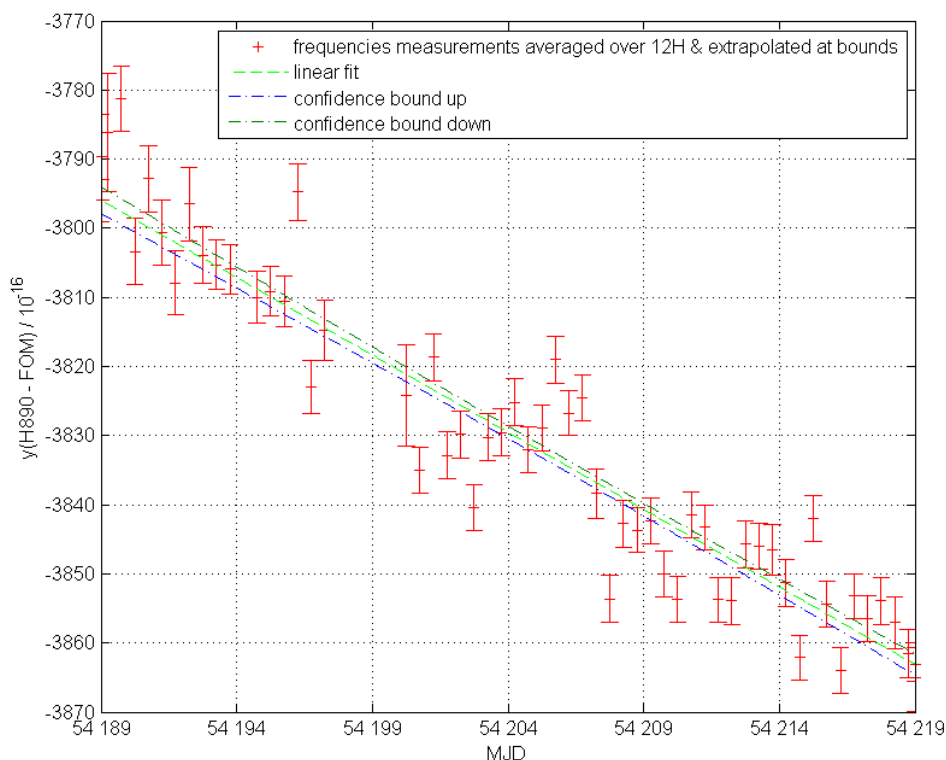


Figure 1 : Fractional frequency averaged over 12H with associated statistical uncertainty of H890-FOM during the period MJD 54189 to MJD 54219. The weighted linear fit with the confidence bounds up and low of 1σ are represented in dashed lines.

Table 2 gives a statistical synthesis of measurements and the results of the average calculation using different methods. Linear fit method was selected to estimate the average and the statistical uncertainty associated.

Dates Duration & Measurement Rate	Mean frequency difference normalized $y_{Maser} - y_{FOM}$	type A uncertainty $\sigma_{Stat} & \sigma_{Collision}$	Uncertainty due to the dead times $\sigma_{deadTime}$
BIPM interval Start date MJD UTC 54189,0 Stop date MJD UTC 54219,0 Length of interval 30 d Measurement Rate: 87,59% mean duration between measurements $\tau_0 = 43200$ s	Mean by linear fit at middle date of BIPM interval 54204: $\bar{y} = -3829,56 \times 10^{-16}$ Mean by polynomial fit order 5: $\bar{y} = -3829,43 \times 10^{-16}$	Uncertainty of linear fit $\sigma_A = 1.86 \times 10^{-16}$ Allan Deviation at T with assumption of White Frequency Noise $\sigma_y = 0.2 \times 10^{-16}$	$\sigma_{deadTime} = 0,57 \times 10^{-16}$

Table 2: Statistics resume of SYRTE-FOM fountain measurements.

The following table summarizes the budget of systematic effects and their associated uncertainties. More details on systematic effects and uncertainty due to the dead time are developed in the last TAI calibration by FOM in November 2006.

	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	10
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		12.22
Red shift	- 68	1.0
Total with red shift		12.26

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