Date: February, 3 , 2011

Dear Dr. Arias, BIPM,

Attached is the report on the frequency measurement by NMIJ-F1, a cesium atomic fountain frequency standard of NMIJ, during **MJD 55559-55589.** The uncertainty evaluation was the same as that in the last publication.

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Frequency comparison between H-Maser(405002) and Cs Fountain(NMIJ-F1) during MJD 55559-55589

The frequency of our Hydrogen maser HM(Clock # 405002) have been measured using NMIJ-F1 during MJD 55559-55589 (30 days). The results are shown in tables 1.

Table 1. Results of the comparison in $1\text{x}10^{-15}$ unit.

Period	**55559-55589**
Measurement ratio	97.4%
Y(NMIJ-F1)-Y(Maser 405002)	-173.6
u_A	0.7
u_B	3.9
$u_{link/lab}$	0.3

1. Type A uncertainty u_A

The frequency stability $\sigma_y(\tau)$ is $1\times10^{-12}\ \tau^{-1/2}$. This equation has been used for the estimation of type A uncertainty on the basis of white FM noise. The measurement uncertainty is 0.7×10^{-15}.

2. Uncertainty of the link in the laboratory $u_{link/lab}$

The uncertainty of the link in the laboratory, $u_{link/lab}$, is written as,

$$u_{link/lab} = \sqrt{u_{dead\ time}{}^2 + u_{link/maser}{}^2} \qquad (1)$$

where $u_{link/maser}$ is the uncertainty due to the phase noise of the synthesis chain between the fountain and HM, $u_{dead\ time}$ is the uncertainty due to the operational dead time of the fountain. ($u_{link/maser}$, $u_{dead\ time}$) are evaluated to be $(2\times10^{-16}, 2\times10^{-16})$.

3. Type B uncertainty u_B

The value of type B uncertainty is the same as the last publication, as is shown in table 2.

Table 2: Frequency biases and uncertainties in NMIJ-F1 during the period MJD 55559-55589 in 1×10^{-15} unit.

Source of uncertainty	Bias	Uncertainty
2^{nd} order Zeeman	292.0	0.5
Blackbody radiation	-18.0	1.4
Gravitation	1.6	0.1
Cold collisions	0.0	3.3
Distributed cavity phase	0.0	1.2
Microwave power dependence	0.0	0.7
Total	275.6	3.9