Date: November, 6, 2006

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 53994-54009** and **MJD 54024-54034**. The uncertainty evaluation was the same as that in the last publication.

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Frequency comparison between H-Maser(405014) and Cs Fountain(NMIJ-F1) during MJD 53994-54009 and MJD 54024-54034

The frequency of our Hydrogen maser HM(Clock # 405014) have been measured using NMIJ-F1 during MJD 53994-54009 (15 days) and MJD 54024-54034 (10days). The results are shown in tables 1 and 2.

Table 1. Results of the comparison in $1x10^{-15}$ unit.

Period	**53994-54009**
Measurement ratio	82.6 %
Y(NMIJ-F1)-Y(Maser 405014)	-35.2
u_A	0.9
u_B	3.9
$u_{link\,/\,lab}$	0.5

Table 2. Results of the comparison in $1x10^{-15}$ unit.

Period	**54024-54034**
Measurement ratio	99.1 %
Y(NMIJ-F1)-Y(Maser 405014)	-42.5
u_A	1.1
u_B	3.9
$u_{link\,/\,lab}$	0.5

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 1.0×10^{-15} (MJD 53994-54009) and 1.1×10^{-15} (MJD 53994-54009), respectively.

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 (3.3×10^{-16}, 3.3×10^{-16}) for the period of MJD 53994-54009 and (5.0×10^{-16}, 0.7×10^{-16}) for the period of MJD 54024-54034, respectively.

3. Type B uncertainty u_B

The value of type B uncertainty is the same as the last publication, as is shown in tables 3 and 4.

Table 3: Frequency biases and uncertainties in NMIJ-F1 during the period MJD 53994-54009 in 1×10^{-15} unit.

Source of uncertainty	Bias	Uncertainty
2nd order Zeeman	185.0	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	168.6	3.9

Table 4: Frequency biases and uncertainties in NMIJ-F1 during the period MJD 54024-54034 in 1×10^{-15} unit.

Source of uncertainty	Bias	Uncertainty
2nd order Zeeman	184.0	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	167.6	3.9