Evaluation of the frequency of the H-maser 1401708 by the primary frequency standard NPL-CsF2

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The primary frequency standard NPL-CsF2 was used to measure the frequency of the H-maser HM2 identified by the clock code 1401708 during an evaluation campaign over a period of time in October and November 2014. The clock 1401708 is a physical realisation of UTC(NPL). The evaluation was performed by measuring mean frequency differences over the reporting periods.

No changes to the physics package of NPL-CsF2 have been introduced since the previously reported evaluation.

Results of the frequency measurements are listed in the table below. Frequency biases are given for information only. The given fractional frequency difference *y(CsF2 – HM2)* is a value corrected for those biases. Note that the values for the collisional shift and its uncertainty vary, and so vary the total type B uncertainties u_B for particular campaigns. The value of collisional shift is a time-averaged value for the high and low densities. The total uncertainty u_{total} of the measurement is defined as:

$$(u_{total})^2 = (u_A)^2 + (u_B)^2 + (u_{l/lab})^2$$

Period	(date)	24 Oct 2014 – 03 Nov 2014
Start	MJD	56954
Stop	MJD	56964
Duration	Days	10
duty cycle	%	63.5
Biases:	$\times 10^{-15}$	
2nd order Zeeman		336.63
BBR shift		−16.52
cold collisions		0.80
gravity		1.30
y(CsF2 - HM2)	$\times 10^{-15}$	**−0.08**
u_A	$\times 10^{-15}$	0.91
u_B	$\times 10^{-15}$	0.24
$u_{l/lab}$	$\times 10^{-15}$	0.42
$\boldsymbol{u_{total}}$	$\times 10^{-15}$	**1.03**

NOTES:

The reported period coincided with an international clock comparison campaign for the EMRP project ITOC.

A replacement laser had to be used as the master for cooling and detection and the optical pumping stage for accumulation of the $m_F=0$ populations was disabled. As a result the signal-to-noise was reduced and the type A uncertainty was higher than usual.