Report to the 21st Session of the CCTF

Activities of the Working Group on Primary and Secondary Frequency Standards from 1 Sep 2015 to 1 June 2017.

Steve Jefferts, Chair

Gerard Petit, Secretary

The past several years have seen the first submission of an optical standard to the group for inclusion into the TAI calculations. This standard, based on Sr from the group at SYRTE is an exciting and hopeful development for the future.

Rigorous discussions have been held over the past several years regarding re-evaluation by the working group in the event of a significant decrease in stated frequency uncertainty of a given standard. Finally the consensus of the group seems to be that the standard should be reevaluated by the group in the event of a significant reduction in uncertainty, but, so far, no consensus regarding the definition of a significant reduction has been forthcoming. This might be something to explore again in the future.

The Sr standard submitted by SYRTE has been accepted for publication in Circular-T by the working group, however because the recommended value of the Sr transition frequency seems to be in error, inclusion into TAI is awaiting a possible redefinition by the CCL-CCTF Frequency Standards WG.

All information on the activities above is recorded in the web page of the working group, accessible to working group members at http://www.bipm.org/wg/CCTF/WGPSFS/Restricted/welcome.jsp).

At the present time the reported (fractional) systematic uncertainties in PFS range from 1.5×10^{-16} to 3.9×10^{-15}, and a statistical analysis (see FIG 1) seems to indicate that the PFSs are within reasonable statistical agreement. Currently 11 PFS and one secondary standard report to TAI reasonably regularly.

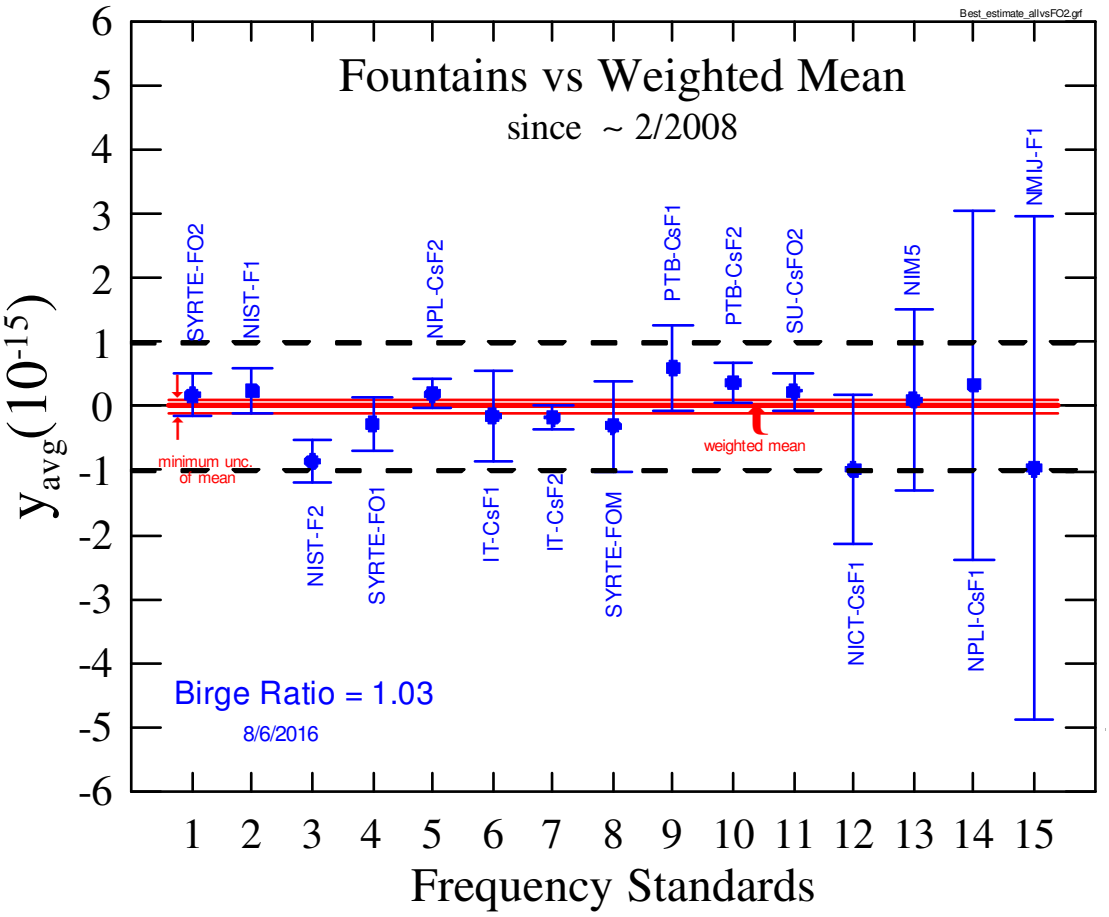

Figure 1 –Primary frequency standards compared to the weighted mean of all of those standards since early 2008. The Birge ratio is 1.03, indicating quite good agreement among the Primary frequency standards and with the stated uncertainties (current as of August 2016).