

**RECOMMENDATION 2 (CI-2009):  
Updates to the list of standard frequencies**

The International Committee for Weights and Measures (CIPM),

**considering** that

- a common list of “Recommended values of standard frequencies for applications including the practical realization of the metre and secondary representations of the second” has been established;
- the CCL-CCTF Frequency Standards Working Group (FSWG) has reviewed several promising candidates for inclusion in the list;

**recommends**

that the following transition frequencies shall be included or updated in the list of recommended standard frequencies:

- the unperturbed optical transition  $5s^2\ ^1S_0 - 5s\ 5p\ ^3P_0$  of the  $^{87}\text{Sr}$  neutral atom with a frequency of  $f = 429\ 228\ 004\ 229\ 873.7$  Hz and a relative standard uncertainty of  $1 \times 10^{-15}$  (this radiation is already endorsed by the CIPM as a secondary representation of the second);
- the unperturbed optical transition  $5s^2\ ^1S_0 - 5s\ 5p\ ^3P_0$  of the  $^{88}\text{Sr}$  neutral atom with a frequency of  $f = 429\ 228\ 066\ 418\ 012$  Hz and a relative standard uncertainty of  $1 \times 10^{-14}$ ;
- the unperturbed optical transition  $4s\ ^2S_{1/2} - 3d\ ^2D_{5/2}$  of the  $^{40}\text{Ca}^+$  ion with a frequency of  $f = 411\ 042\ 129\ 776\ 393$  Hz and a relative standard uncertainty of  $4 \times 10^{-14}$ ;
- the unperturbed optical transition  $^2S_{1/2} (F = 0) - ^2F_{7/2} (F = 3, m_F = 0)$  of the  $^{171}\text{Yb}^+$  ion with a frequency of  $f = 642\ 121\ 496\ 772\ 657$  Hz and a relative standard uncertainty of  $6 \times 10^{-14}$ ;
- the unperturbed optical transition  $6s^2\ ^1S_0 (F = 1/2) - 6s\ 6p\ ^3P_0 (F = 1/2)$  of the  $^{171}\text{Yb}$  neutral atom with a frequency of  $f = 518\ 295\ 836\ 590\ 864$  Hz and a relative standard uncertainty of  $1.6 \times 10^{-13}$ .