

RECOMMENDATION CCL 2c (2003)

The Consultative Committee for Length **proposes** that the International Committee for Weights and Measures adopt the following updated values for existing recommended radiations:

Part I of the list

Absorbing molecule $^{13}\text{C}_2\text{H}_2$, $P(16)$ ($\nu_1 + \nu_3$) transition

The values $f = 194\,369\,569\,385$ kHz

$\lambda = 1\,542\,383\,712.37$ fm

with a relative standard uncertainty of 5×10^{-11} , apply to the radiation of a laser stabilized using the third harmonic detection technique to an external $^{13}\text{C}_2\text{H}_2$ cell within an enhancement cavity and subject to the following conditions:

- C_2H_2 -pressure range from 1.3 Pa to 5.3 Pa;
- frequency modulation width, peak-to-peak (1.5 ± 1.0) MHz* (for $3f$ detection cases);
- one-way intracavity beam power density of (25 ± 13) W cm^{-2} .

Absorbing ion $^{88}\text{Sr}^+$, $5^2S_{1/2} - 4^2D_{5/2}$ transition

The values $f = 444\,779\,044\,095.5$ kHz

$\lambda = 674\,025\,590.863\,1$ fm

with a relative standard uncertainty of 2.2×10^{-13} , apply to the radiation of a laser stabilized to the transition observed with a trapped and cooled strontium ion. The values correspond to the centre of the Zeeman multiplet.

Absorbing ion $^{171}\text{Yb}^+$, $^2S_{1/2}(F = 0, m_F = 0) - ^2F_{7/2}(F = 3, m_F = 0)$ transition

The values $f = 642\,121\,496\,772.3$ kHz

$\lambda = 466\,878\,090.060\,7$ fm

with a relative standard uncertainty of 1.6×10^{-12} , apply to the octupole transition after correction for the ac Stark shift and second-order Zeeman shift.

* In this Recommendation, for the specification of operating conditions such as temperature, modulation width and laser power, the symbols \pm refer to a tolerance, not to an uncertainty.

Part II of the list

Absorbing molecule $^{127}\text{I}_2$, a_3 component, $P(13)$ 43-0 transition

The values $f = 582\,490\,603\,442$ kHz

$$\lambda = 514\,673\,466.368 \text{ fm}$$

with a relative standard uncertainty of 1.8×10^{-11} , apply to the radiation of a laser stabilized to an external iodine cell and subject to the following conditions:

- cold point temperature (-5 ± 2) °C, corresponding to a I_2 pressure of (2.4 ± 0.5) Pa;
- saturating beam intensity < 40 mW cm^{-2} .

Absorbing molecule $^{127}\text{I}_2$, b_{10} component, $R(106)$ 28-0 transition

The values $f = 551\,580\,162\,400$ kHz

$$\lambda = 543\,515\,663.608 \text{ fm}$$

with a relative standard uncertainty of 4.5×10^{-11} , apply to the radiation of a laser stabilized to an external iodine cell and subject to the following conditions:

- cold point temperature (0 ± 2) °C;
- frequency modulation width, peak-to-peak (2.0 ± 0.5) MHz.