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标题: Sr-88(+) 445-THz Single-Ion Reference at the 10(-17) Level via Control and Cancellation of Systematic Uncertainties and Its Measurement against the SI Second
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摘要: We describe experiments and measurements on a trapped and laser-cooled single ion of Sr-88(+) which, when probed on its reference 5s(2)S(1/2) --> 4d(2)D(5/2) transition at 445 THz, provides an optical frequency standard of evaluated accuracy outperforming the current realization of the SI second. Studies are presented showing that micromotion-associated shifts of the standard can be reduced to the 10(-18) level and uncertainties in the blackbody-induced shifts for the current system are at the low 10(-17) level due to the relatively well-known polarizability of the strontium ion system and careful choice of the trap structure. The current evaluated systematic shifts for the ion transition are at a fractional uncertainty of 2 x 10(-17). An absolute frequency measurement performed over a two-month period relative to a maser referenced to the SI second via Global Positioning System time transfer has determined the center frequency for the transition at nu(SD) = 444 779 044 095 485.5 +/- 0.9 Hz (1 sigma).
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