Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Strontium clock comparisons and prospects at LNE-SYRTE
ULRICH EISMANN, CHUNYAN SHI, MIKHAJ GUROV, RODOLPHE LE
TARGET, JÉRÔME LODEWYCK, YANN LE COQ, JOCELYNE GUÉNA,
MICHEL ABGRALL, PETER ROSENBUSCH, GIOVANNI-DANIELLE ROVERA,
SÉBASTIEN BIZE, PHILIPPE LAURENT, LNE-SYRTE, CNRS, UPMC, Observ-
atoire de Paris, 61 Avenue de l’Observatoire, 75014 Paris, France — Recently, the
cesium fountain clocks currently defining the SI second have been superseded in
both stability and accuracy by atomic clocks referenced to optical transitions. Here
we present frequency comparisons between two similar state-of-the-art strontium op-
tical lattice clocks. The clocks are in agreement within their accuracy budget with
a total uncertainty of $1.6 \times 10^{-16}$. A reproducible link is established between the
strontium clock frequency and the current definition of the SI second by consistent
comparisons of these clocks with three of the best cesium fountains. The measured
strontium clock frequency is $429 228 004 229 873$ Hz, with a total uncertainty of
$3.1 \times 10^{-16}$ henceforth limited by the accuracy of the microwave clocks. Furthermore,
we will discuss the prospects for improving the accuracy and stability of strontium
optical lattice clocks. Currently, the largest contribution to the error budget is the
light shift related to black-body radiation from the vacuum vessel surrounding the
trap. A new-generation vacuum vessel with a well controlled temperature will allow
to bring the accuracy into the low $10^{-17}$ range.

Ulrich Eismann
LNE-SYRTE, CNRS, UPMC, Observatoire de Paris,
61 Avenue de l’Observatoire, 75014 Paris, France

Date submitted: 04 Apr 2013

Electronic form version 1.4