Towards Clock Ties for a Global Geodetic Observing System

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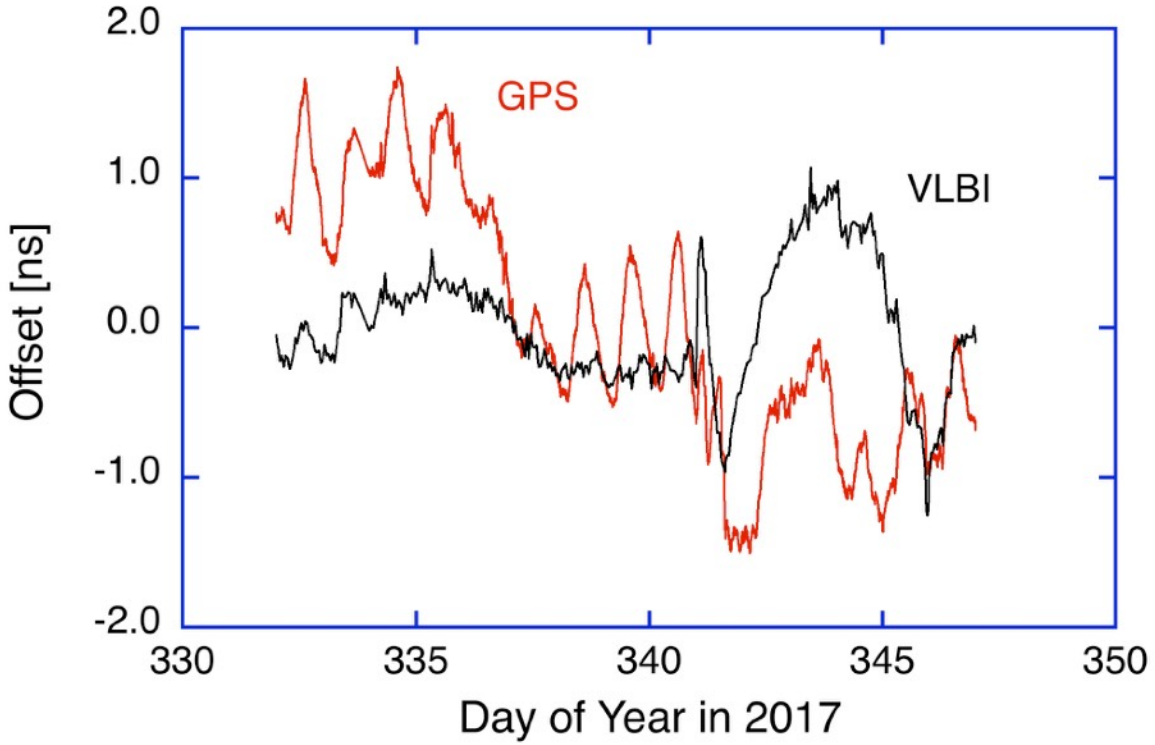
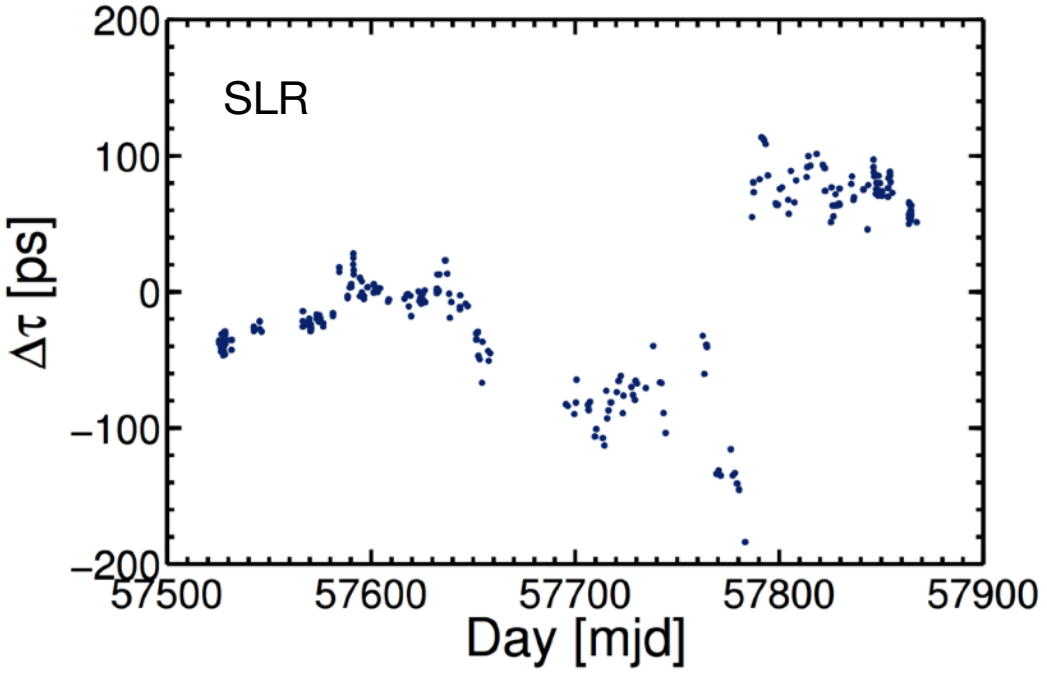
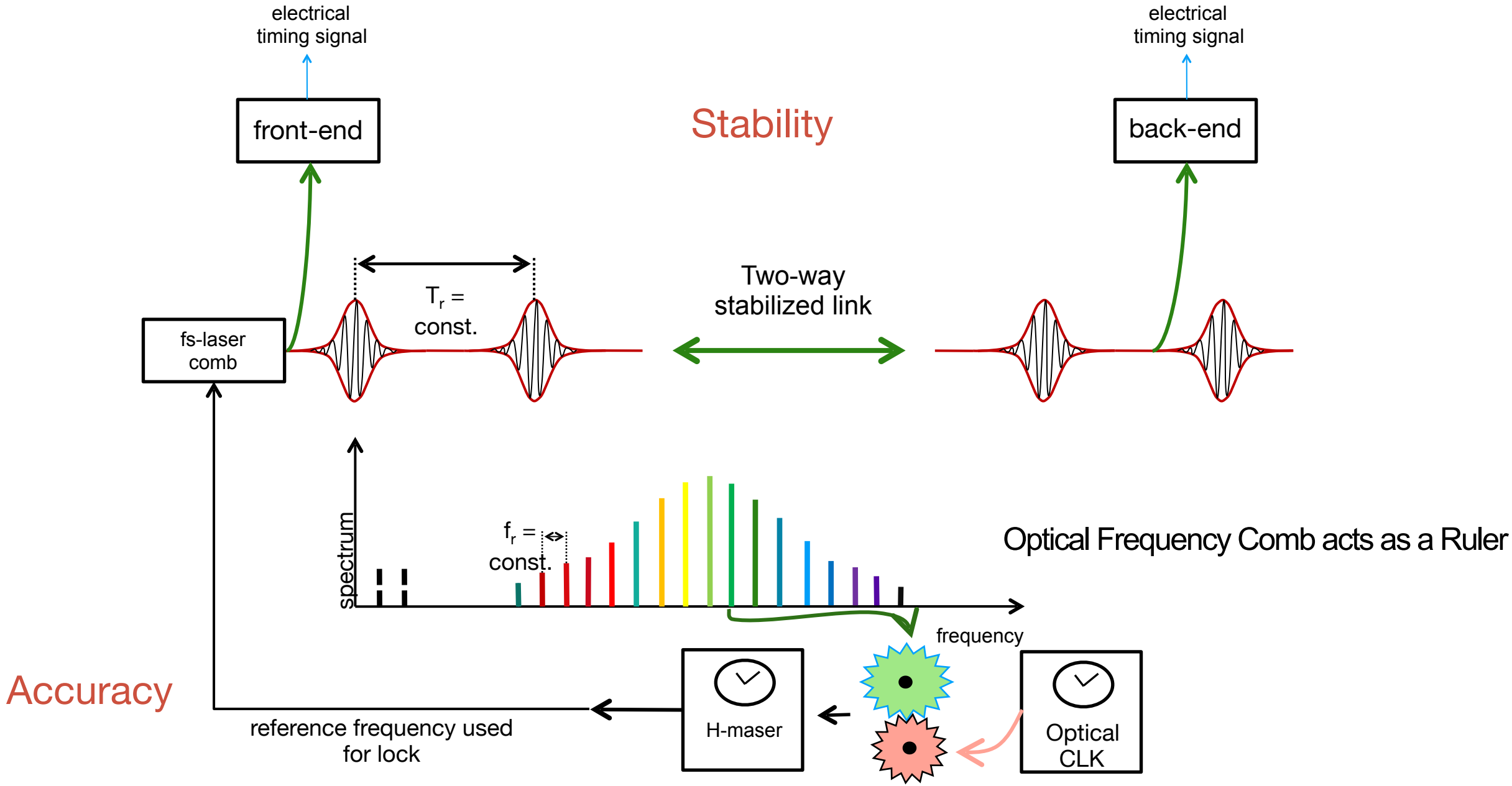
Maser Comparison: Wettzell - Matera



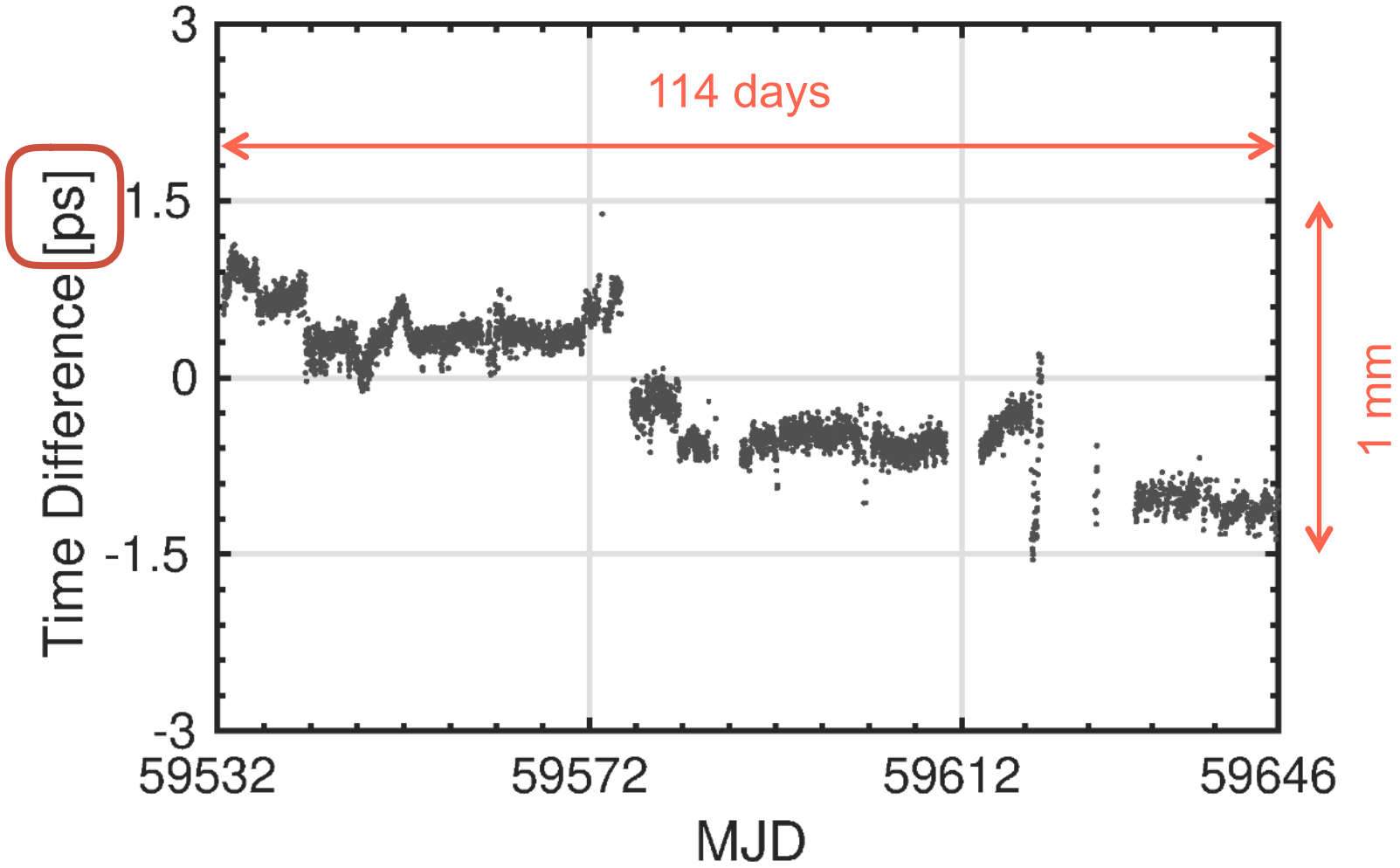
Calibration Stability



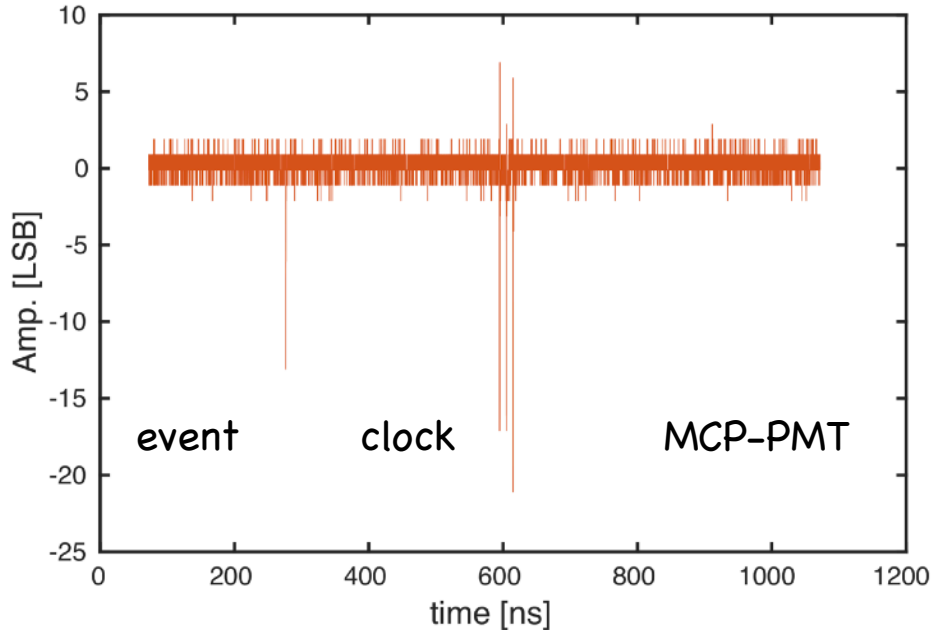
The delay stability of the measurement systems is a key problem

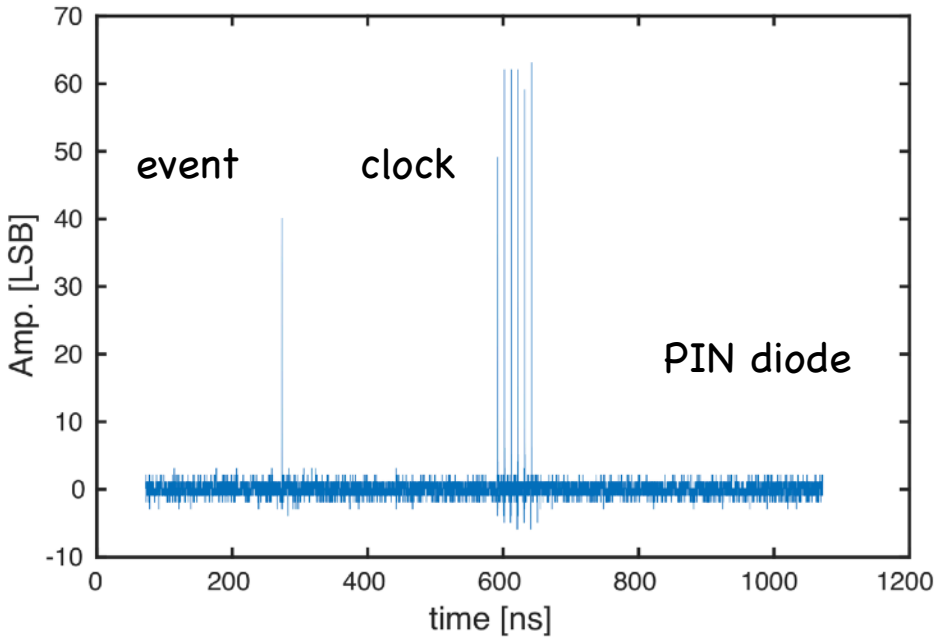

electrical
timing signal
front-end
Stability
electrical
timing signal
back-end
fs-laser
comb
T_r =
const.
Two-way
stabilized link
spectrum
f_r =
const.
Optical Frequency Comb acts as a Ruler
frequency
Accuracy
reference frequency used
for lock
H-maser
Optical
CLK

Time and frequency distribution stability between a front-end and a back-end



We can maintain the phase coherence of the time and frequency distribution to within 1 mm over more than 100 days.

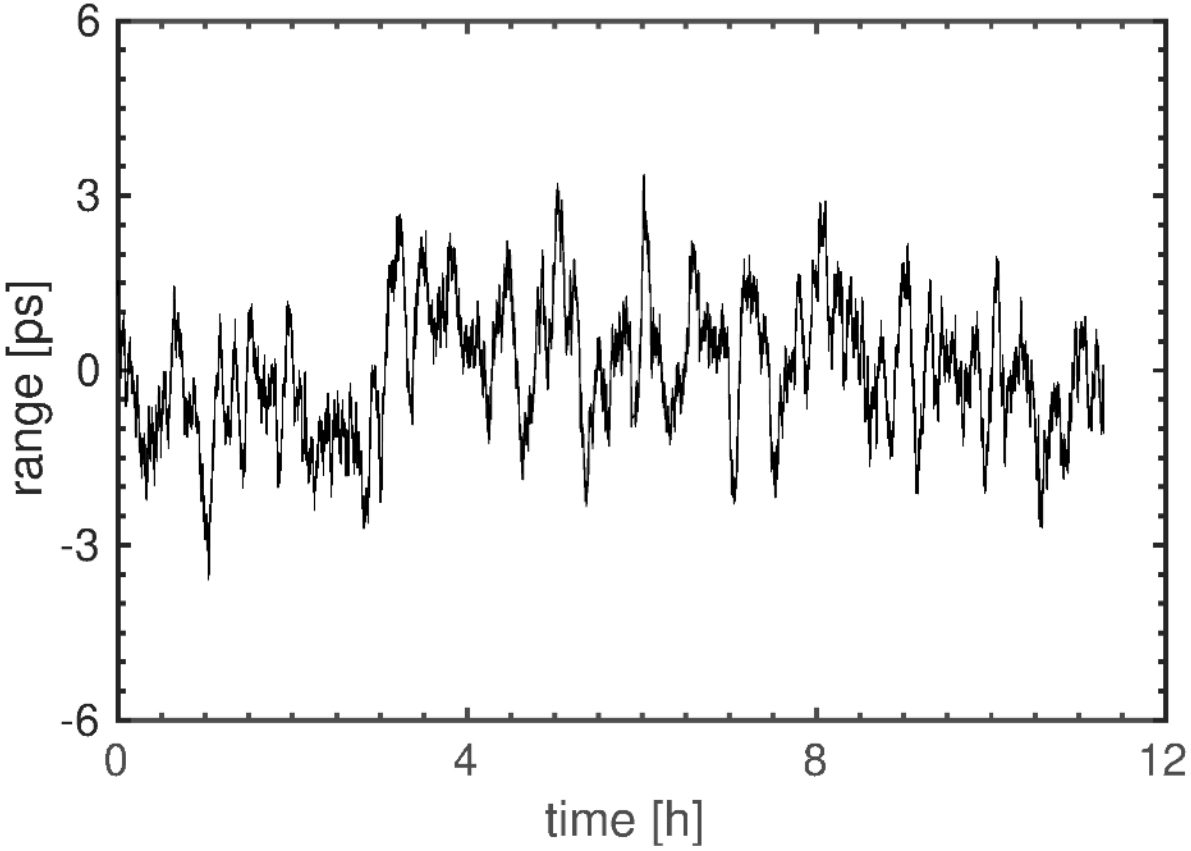


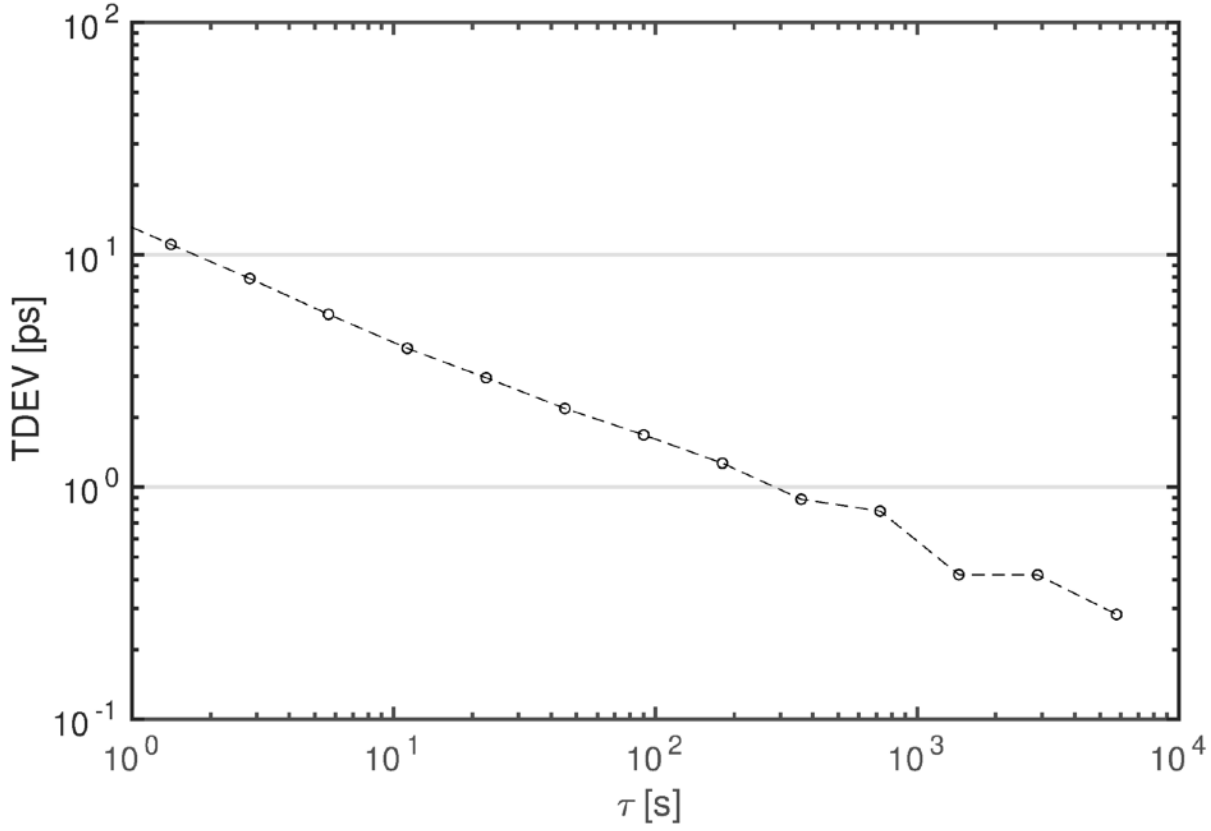


All Optical Event Timing eliminates the systematic delays

- We inject the optical pulses from the timing system onto the range detector
- We do high speed sampling to capture both, the return signal and the clock pulses
- In the post processing we estimate the offset between the range return and the clock pulses
- –
- There are still limitations for the repetition rate and the dynamic range

The back-end stability is replicated by the optical event timing





Summary: We can use time coherence for efficient delay compensation!