

Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Mitigating aliasing in atomic clocks HERMANN UYS, National Laser Centre, Council for Scientific and Industrial Research, Pretoria, South Africa, ISMAIL AKHALWAYA, Department of Applied Mathematics, University of Johannesburg, South Africa, JARRAH SASTRAWAN, MICHAEL BIERCUK, School of Physics, University of Sydney, Sydney, Australia — Passive atomic clocks periodically calibrate a classical local oscillator against an atomic quantum reference through feedback. The periodic nature of this correction leads to undesirable aliasing noise. The Dick Effect, is a special case of aliasing noise consisting of the down-conversion of clock noise at harmonics of the correction frequency to a frequency of zero. To combat the Dick effect and aliasing noise in general, we suggest an extension to the usual feedback protocol, in which we incorporate information from multiple past measurements into the correction after the most recent measurement, approximating a crude low pass anti-aliasing filter of the noise. An analytical frequency domain analysis of the approach is presented and supported by numerical time domain simulations.

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Date submitted: 30 Jan 2015

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