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## Aliasing in Atomic Clocks

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Atomic clocks execute periodic corrections of a ‘classical’ quartz crystal oscillator, by comparison to an atomic quantum reference, namely a precise hyperfine transition frequency. This periodic calibration has a surprising noise-inducing effect called **aliasing**. In fact, this sampling effect is mathematically identical to visual digital aliasing. Many of the standard visual anti-aliasing techniques are not applicable to the atomic clock problem or experimentally tenable. A new technique is proposed where previous samples are incorporated to boost correction on certain portions of the noise spectral density and dampen sensitivity on the aliased portion. We find scenarios for realistic parameters where our multiple window technique improves the accuracy of the atomic clock correction by reducing aliasing. Ultimately, this may help your GPS tell you to “turn right now” more accurately.

**Abstract content** **&nbsp;** **(Max 300 words)** **<a href="http://events.saip.org.za/getFile.py/?target="\_blank">Formatting &** **Special chars</a>**

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**Level for award** **&nbsp;** **(Hons, MSc, &nbsp;** **&nbsp;** **PhD)?**

PhD

**Main supervisor (name and email)** **<br>** **and his / her institution**

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**Would you like to** **submit a short paper** **for the Conference** **Proceedings (Yes / No)?**

No

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**Track Classification:** Track G - Theoretical and Computational Physics