

Abstract Submitted
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New Method for Light Shift Elimination in Optical Pumping Systems BART MCGUYER, YUAN-YU JAU, WILLIAM HAPPER, Princeton University — We present a new method to eliminate the light shift in atomic frequency standards and other optical pumping systems. This method uses only frequency modulation of a radio frequency or microwave source in order to simultaneously lock the source frequency to an atomic resonance and lock the pumping light to eliminate the light shift. In contrast, conventional stabilization of both sources requires two individual modulation schemes and feedback loops, adding complexity. Our method kills two birds with one stone. The method uses fewer additional components and offers improved performance, reduced cost, and easier miniaturization than previous methods. In particular, few modifications are required for implementation in conventional vapor-cell atomic clocks. We believe this technique will be useful for atomic frequency standards and other optical pumping systems that experience the light shift. We will present experimental results validating this method in a vapor-cell clock, and will also present numerical results verifying this method.

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