PHASE MODULATION FOR REDUCED VIBRATION SENSTIVITY IN LASER-COOLED CLOCKS IN SPACE

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The standard interrogation technique in atomic beam clocks is square-wave frequency modulation, which suffers a first-order sensitivity to vibrations as changes in the transit time in the atoms translates to perceived frequency errors. Phase modulation interrogation eliminates sensitivity to this noise. We present a particular scheme utilizing independent phase control of the two cavities. The technique is being considered for use with the Primary Atomic Reference Clock in Space (PARCS), a laser-cooled cesium clock scheduled to fly aboard the International Space Station in 2005. In addition to eliminating first-order sensitivity to vibrations, the minimum attack time now in this scheme is the Rabi pulse time (t), rather than the Ramsey time (T). This helps minimize dead time and the degradation of stability due to aliasing.

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