

The Light and Orientation End Resonance Frequency Shifts in Alkaline Atoms Vapors

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In a case of circular polarized light alkali atoms pumping Stark shift of the ground state sublevels appears in resonance frequency light shift which contains three components – scalar, vector and tensor. Absolute value of each component depends on pumping source properties and alkali atoms choice. Rubidium and Cesium isotopes are most spread in double resonance based devices. In this paper we report the results of so-called end resonance frequency shift investigation. This type of resonance provides significant growth of alkali vapor laser pumped atomic clock Q-factor. We found that most important role in frequency shift belongs to the vector component, which depends on pumping light polarization sign and therefore on the light direction relatively C-field vector. Linear polarized laser usage provides an order of magnitude improvement in the light and orientation shifts for both D_1 and D_2 lines since in this case vector component is absent. Nevertheless it leads to noticeable atoms polarization losses.