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(54) **TECHNIQUE FOR OPTICALLY PUMPING ALKALI-METAL ATOMS USING CPT RESONANCES**

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(58) **Field of Classification Search** **372/69-72**
See application file for complete search history.

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(57) **ABSTRACT**

Systems and methods for optically pumping alkali-metal atoms using Coherence Population Trapping (CPT) resonances are disclosed. An illustrative push-pull optical pumping system for inducing CPT resonances in a resonance cell containing an admixture of alkali-metal atoms and one or more buffer gasses may include a laser assembly adapted to produce alternating orthogonally polarized light, and at least one DC current source adapted to output a constant-intensity carrier current signal for inducing laser emission from the laser assembly at a carrier wavelength of the alkali-metal atoms. An RF modulated signal outputted from an RF modulation source can be rectified, split, and phase-shifted for inducing a time-dependent polarization of the laser light that can be used to enhance CPT resonances. The alternating orthogonally polarized light from the laser assembly can then be used to optically pump the alkali-metal atoms within the vapor cavity, producing a dark state that can be detected with a photodetector or the like.

20 Claims, 7 Drawing Sheets

