sidebands **142**,**144**. Such interference causes a phenomenon of population trapping in the hyperfine ground state **148** wherein no transitions take place to the "P" state **150** and where a strong coherence is created at the ground state hyperfine transition frequency v. When this occurs, the atoms in the superposition state absorb very little light from the pulses of left and right circularly polarized light **84**,**86**. Atoms in any other state, in turn, will be excited by the pulsed light **84**,**86**, and thus no matter their initial state, will eventually be pumped into the superposition state or "dark state" of the system.

Having thus described the several embodiments of the present invention, those of skill in the art will readily appreciate that other embodiments may be made and used which fall within the scope of the claims attached hereto. Numerous advantages of the invention covered by this document have been set forth in the foregoing description. It will be understood that this disclosure is, in many respects, only illustrative. Changes can be made with respect to various elements described herein without exceeding the scope of the invention.

What is claimed is:

**1**. A push-pull optical pumping system for inducing coherence population trapping resonances in alkali-metal atoms, the optical pumping system comprising:

a resonance cell including a vapor cavity containing a source of alkali-metal atoms and one or more buffer gasses;

a laser assembly adapted to produce alternating orthogonally polarized light at a carrier wavelength of the alkali-metal atoms;

at least one DC current source adapted to output a carrier current signal for inducing laser emission from the laser assembly at said carrier wavelength, the at least one DC current source operatively connected to a servo mechanism for maintaining the intensity of the carrier current signal at a constant;

an RF modulation source adapted to output an RF modulated signal for modulating the carrier current signal outputted from the at least one DC current source;

a means for rectifying and phase-shifting the RF modulated signal outputted from the RF modulation source; and

a means for sensing the transmission of laser light through the vapor cavity.

**2**. The push-pull optical pumping system of claim **1**, wherein said laser assembly comprises two orthogonally polarized laser sources.

**3**. The push-pull optical pumping system of claim **2**, wherein said two orthogonally polarized laser sources are VCSEL's.

**4**. The push-pull optical pumping system of claim **3**, wherein each of the two orthogonally polarized laser sources includes an array of VCSEL's.

**5**. The push-pull optical pumping system of claim **1**, wherein said laser assembly comprises a single dual-polarized laser source.

**6**. The push-pull optical pumping system of claim **1**, wherein said means for rectifying and phase-shifting the RF modulated signal includes two antiparallel diodes.

**7**. The push-pull optical pumping system of claim **1**, further comprising a means for converting the alternating orthogonally polarized light emitted from the laser assembly into circularly polarized light.

**8**. The push-pull optical pumping system of claim **7**, wherein said means for converting the alternating orthogonally polarized light into circularly polarized light includes a quarter-wavelength plate.

**9**. The push-pull optical pumping system of claim **1**, wherein said optical pumping system is a microelectromechanical optical pumping system.

**10**. A push-pull optical pumping system for inducing coherence population trapping resonances in alkali-metal atoms, the optical pumping system comprising:

a resonance cell including a vapor cavity containing a source of alkali-metal atoms and one or more buffer gasses;

a first laser source configured to produce polarized light for pumping out a lower hyperfine multiplet of the alkali-metal atoms;

a second laser source configured to produce light polarized orthogonally with respect to the polarized light produced by the first laser source for pumping out an upper hyperfine multiplet of the alkali-metal atoms;

a first DC current source configured to output a carrier current signal for inducing laser emission from the first laser source at a carrier wavelength of the alkali-metal atoms, the first DC current source operatively connected to a first servo mechanism for maintaining the intensity of the carrier current signal supplied to the first laser source at a constant;

a second DC current source configured to output a carrier current signal for inducing laser emission from the second laser source at the carrier wavelength of the alkali-metal atoms, the second DC current source operatively connected to a second servo mechanism for maintaining the intensity of the carrier current signal supplied to the second laser source at a constant;

an RF modulation source for modulating the carrier current signals outputted from the first and second DC current sources and inducing sidebands on the carrier current signals separated by the hyperfine transition of the alkali-metal atoms;

a means for rectifying and phase-shifting the RF modulated signal outputted from the RF modulation source such that said second laser source is modulated 180 degrees out-of-phase with the first laser source; and

a means for sensing the transmission of laser light through the vapor cavity.

**11**. The push-pull optical pumping system of claim **10**, wherein said first and second laser sources are VCSEL's.

**12**. The push-pull optical pumping system of claim **10**, wherein each of the first and second laser sources includes an array of VCSEL's.

**13**. The push-pull optical pumping system of claim **10**, wherein said means for rectifying and phase-shifting the RF modulated signal includes two antiparallel diodes.

**14**. The push-pull optical pumping system of claim **10**, further comprising a means for converting alternating orthogonally polarized light emitted from the first and second laser sources into circularly polarized light.

**15**. The push-pull optical pumping system of claim **14**, wherein said means for converting the alternating orthogonally polarized light into circularly polarized light includes a quarter-wavelength plate.

**16**. The push-pull optical pumping system of claim **10**, wherein said optical pumping system is a microelectromechanical optical pumping system.

**17**. A method of optically pumping alkali-metal atoms contained in a vapor cavity using CPT resonances, the method comprising the steps of:

providing a first laser source adapted to emit a first laser beam into the vapor cavity;

providing a second laser source adapted to emit a second laser beam into the vapor cavity;

injecting a DC carrier current signal into each of the first and second laser sources for inducing laser emission from each laser source at the carrier wavelength of the