

## **Doubly Resonant Power Enhancement Optical Cavity**

### **Disclosure Number**

201202867

### **Technology Summary**

The invention includes a novel method and apparatus of a doubly resonant power enhancement optical cavity. The invention enables simultaneous locking of an optical cavity to multiple wavelength light waves including either two single frequency light sources, a single frequency light source with mode-locked pulsed light source that contains an equidistant frequency lines, or two mode-locked pulsed light sources. The invention can be applied to arbitrary wavelength bands and does not depend on the size or configuration of the cavity. The system can be used to enhance power of light waves that have a special temporal structure, e.g. pulses only last for a very short time interval ( $\ll 1$  ms), which would be otherwise impossible to recycle with an optical cavity due to its difficulty of error signal generation. The system can also be used for cavity ring down spectroscopy that involves two groups of spectrum bands and therefore provide a high sensitive low ambiguity measurement of particular gaseous samples. The invention has been verified with both theoretical design and experimental demonstration. A prototype has been implemented and successfully tested in the laboratory.

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