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FA9550-04-1-0011

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A. Patent Application No.(s)

11/279,455

☐ This document is being filed together with a new application.

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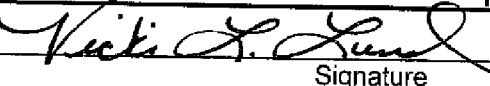
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## CONFIRMATORY INSTRUMENT

Application for: "Cavity-Enhanced Optical Parametric Amplification"  
Inventor(s): Fatih Omer Ilday and Franz X. Kaertner  
Serial Number: 11/279,455  
Filing Date: April 12, 2006  
Grant No.: FA9550-04-1-0011  
Contractor: MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
M.I.T. Case No.: 10963

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By



Lauren Trottier  
Patent Compliance Administrator  
Technology Licensing Office

77 Massachusetts Avenue, Room NE25-230, Cambridge, MA 02139

Date of Deposit: April 12, 2006

Attorney Docket No.: 23395-027

## CAVITY-ENHANCED OPTICAL PARAMETRIC AMPLIFICATION

### RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 60/670,441, filed on April 12, 2005, the entire teachings of which are incorporated herein by reference.

### 5 GOVERNMENT SUPPORT

This invention was made with government support under Contract No. AFOSR-FA9550-04-1-0011 awarded by the Air Force Office of Scientific Research. The government has certain rights in the invention.

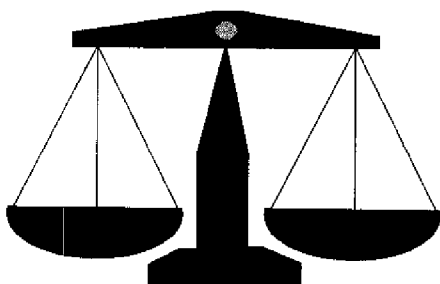
### BACKGROUND

10 Amplification by coherent addition of a pulse train using an enhancement cavity has been proposed theoretically. See B. Couillard, *et al.*, "High Power CW Sum-Frequency Generation Near 243 nm Using Two Intersecting Enhancement Cavities," *Opt. Commun.* **50**, 127-129 (1984); see also R. J. Jones, *et al.*, "Femtosecond Pulse Amplification by Coherent Addition in a Passive Optical Cavity," *Opt. Lett.* **27**, 1848-1850 (2002); both of these publications are  
15 incorporated herein by reference in their entirety.

More recently, addition of a relatively small number of picosecond pulses (approximately 100 pulses) has been demonstrated independently by two research groups. E. O. Potma, *et al.*, "Picosecond-Pulse Amplification with an External Passive Optical Cavity," *Opt. Lett.* **28**, 1835-1837 (2003); Y. Vidne, *et al.*, "Pulse picking by phase-coherent additive pulse generation in an  
20 external cavity," *Opt. Lett.* **28**, 2396-2398 (2003); both of these publications are incorporated herein by reference in their entirety.

In this approach, the pulses are extracted from the cavity by the use of an active switching device (*i.e.*, an acousto-optic modulator, AOM). Therefore, the duration and central wavelength of the amplified pulse is not altered in this process. A major shortcoming of this  
25 approach as applied to short pulses is the difficulty of constructing an enhancement cavity with sufficiently small dispersion for sub-picosecond pulses. Furthermore, the amplification factor is limited by the finesse of the cavity.

Optical parametric amplification is another well-established amplification technique suitable for a range of wavelengths. See R. A. Baumgartner, *et al.*, "Optical Parametric

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**Fax - 7360****To:** USPTO**From:** Raymond Marlow**Fax:** (571) 273-0140**Pages:** 04**Phone:****Date:** 29 Jun 06**Re:** Confirmatory License**CC:**☐ **Urgent**☐ **For Review**☐ **Please Comment**☐ **Please Reply**☐ **Please Recycle****• Comments:**