

## AFRL RESEARCH TOPIC CALL FOR FY14

## ATTACHMENT 1

1. **Research Title:** "Novel Mid-IR Solid-State Laser Isolators"
2. **Individual Sponsor:**  
Dr. Gary Cook, AFRL/RVDH  
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3. **Academic Area/Field and Education Level:** Electro-Optics, Optical Engineering or Engineering Physics (MS or Ph.D. level)
4. **Objectives:** The main thrust of this research is development and maturation of innovative solid-state lasers optical isolators operating in the 2-5  $\mu\text{m}$  wavelength region and possessing a wide range of operational attributes. Infrared countermeasures (IRCM), laser radar, remote sensing and communications are just a few of the drivers of high-power solid-state mid-IR laser development. The nature of these applications shapes the laser operational requirements such as output power, tunability, beam quality and room temperature operation. Lasers are required which operate with pulse formats from continuous-wave (CW) to sub-picosecond and do so over a quickly tunable range of wavelengths.
5. **Description:** Laser development for this project is aimed at producing novel no-magnets optical isolators for the mid infra-red based on phase coupled Bragg reflectors. This concept uses a phase shifted component of a reflected beam to constructively and destructively interfere with a transmitted beam to eliminate back reflections. The approach will be demonstrated in bulk materials with a goal of developing versatile fiber based isolation through the use of fast laser inscription. A key challenge will be to develop broad band versions of the isolation concept. The same technology may be used to develop methods for the coherent combination of multiple lasers.
6. **Research Classification/Restrictions:** The research performed on this project is anticipated to be fundamental in nature, with no inherent publication or presentation restrictions. There may be aspects of requirements analysis or comparison to state-of-the-art devices and components that are deemed FOUO and have public release or ITAR restrictions.
7. **Eligible Research Institutions:** Place an X in all that apply.  
 Universities (DAGSI)       AFIT (only)       USAFA
8. **Interest in Summer USAFA Cadet (Avg Cost for USAF Cadet for 33 days was \$5000):**  
If we have the funds, yes.
9. **Qualifications:** Senior undergrad and above. Experience of optical field modeling is an advantage.