RQ16-28

1. **Research Title:** *Generating Curved Plasma Channels in Air for Active Flow Control About Flight Vehicles*

2. **Individual Sponsor:**

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3. **Academic Area/Field and Education Level.** Optics, Lasers, Plasma Physics (MS or Ph.D. level)

4. **Objectives:** Research Curved Plasma Channels in Air by Means of Ultra-Intense, Short-Pulsed, Non-Symmetric Laser Beams

5. **Description:** The proposed project will develop and characterize curved plasma channels in air using ultra-intense non-symmetric laser beams for flow control applications. Research using short pulsed lasers has demonstrated the ability to create straight channels of ionized air that can be projected for significant distances. The use of these channels is being investigated for flow control applications and results to date look promising. The ability to create and control curved channels may enlarge the application possibilities allowing for the shaping or sculpturing of energy deposition at precise locations in space and time; for example, the controlled plasma-energy deposition coincident on shock wave - shock boundary layer interaction to decrease heat transfer to aircraft structure. Curved plasma channels have been observed experimentally by creating Airy beams with femtosecond lasers. Formed in air, they were non-symmetric, had a curved path deflected ~4mm over a length of ~ 12cm with a beam diameter of ~130 micrometers. The topic research should address basic physics of curve beam formation, beam spatial-temporal placement and sustainment through modeling and ground test approaches for development and validation.

6. **Research Classification/Restrictions:** No restrictions anticipated.

7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided

[Yes] DAGSI (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati). Distribution A – Public Release (88ABW-2013-3050)

[Yes] AFIT

[No] USAFA