RQ15-29

1. **Research Title:** Numerical Simulation of Aerospace Plasmas
2. **Individual Sponsor:**

Dr. Jonathan Poggie, AFRL/RQHF

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3. **Academic Area/Field and Education Level:** Engineering Physics, Applied Physics, Mechanical Engineering, Aerospace Engineering (MS and/or Ph.D. level)
4. **Objectives:** Develop numerical tools to study the operation of plasma-based flow control and combustion-enhancement technologies
5. **Description:** In recent years, a number of plasma-based technologies have been proposed for flow control and combustion enhancement in applications on high-speed air vehicles. Accurate computational modeling of these devices remains elusive because of the extremely complex, multi-disciplinary physics involved. The present topic aims to address this deficiency, focusing on the enhancement of AFRL in-house codes for electrical discharge modeling. Possible research topics include:
    - Develop and implement a reduced-order plasma-enhanced combustion model
    - Carry out numerical simulations of microwave discharges for flow control and combustion enhancement
    - Study the thermal energy balance in transient discharges

    A prospective student will need to have strong programming skills, and an interest in applied physics.

6. **Research Classification/Restrictions:** US citizen or US permanent resident. Candidate will require access to DoD computer systems and export-controlled software.
7. **Eligible Research Institutions:** Indicate to what organizations this topic should be provided

[X] **DAGSI** (Wright State University, AFIT, Ohio State University, University of Dayton, Miami University, Ohio University, University of Cincinnati) NOTE: Topics submitted to DAGSI must be approved for public release. Need PA Approval #

[ ] **AFIT** (only)

☐ **USAFA** (only)

If you are submitting a topic for the USAFA, indicate if you are also interested in sponsoring a USAF Cadet in summer 2015 (Average cost for USAF Cadet for 33 days is $5000)

☐ Yes ☐ No