

Attachment 1 – DAGSI Research Topic Template

NOTE: Under the Cooperative Agreement, Technical Directorates have three options for topics. First, a topic can strictly be considered in the pool for the state allocation of funding. DAGSI will work across the TDs for this allocation. Second, the TD can be prepared to be a funding partner with the State of Ohio. This would include: providing additional funds to support additional recipients of a topic, or expand the proposers team to include additional members on a topic. Third, the TD may elect to fully fund a topic not selected for State of Ohio funding or to pursue University teams outside the State of Ohio. Contact lindsay.kotouch.2@us.af.mil for questions.

- 1. Research Title:** Rotating Detonation Engine Foundational Research
- 2. Individual Sponsor:**
Dr. Brent A. Rankin, AFRL/RAPC
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- 3. Academic Area/Field and Education Level**
Aerospace Engineering / Mechanical Engineering / Chemical Engineering / Chemistry / Physics (MS or PhD)
- 4. Objectives:** Develop advanced tools and provide foundational knowledge useful for guiding the design and development of rotating detonation engines (RDEs).
- 5. Description:** Improving foundational understanding of rotating detonation engines is important for many propulsion and power applications with significant impact and broad relevance to next-generation Air Force systems. Rotating detonation engines provide the potential for enhancing the range, speed, and affordability of ramjet, rocket, and gas turbine engines. The primary objective involves developing advanced experimental or computational tools and providing foundational knowledge useful for guiding the design and development RDEs. The experimental or computational research should focus on one of the following areas:
 - (a) Investigate fundamental phenomena associated with detonation propagation, fuel-air mixing, turbulence, or chemical kinetics in RDEs operating in relevant regimes.
 - (b) Quantify thermodynamic loss mechanisms associated with RDEs such as combustion efficiency, inlet dynamics, or exit dynamics.
 - (c) Develop and apply intrusive or non-intrusive diagnostic techniques for measuring combustion efficiency, fuel-air mixing, pressure, temperature, or velocity in RDEs.
 - (d) Develop and apply large eddy simulations to RDEs for providing new insights, interpreting experimental observations, or guiding the design of RDEs.The research is expected to be conducted in collaboration with the Air Force Research Laboratory Air Warfare Directorate Platform Systems and Propulsion Division Combustors Branch. The Combustors Branch provides access to state-of-the-art experimental and computational resources including the Combustion Research Complex, High Pressure

Combustion Research Facility, and Department of Defense High Performance Computing Centers.

6. **Research Classification/Restrictions:** Open to U.S. citizens only. Some aspects of this research may include ITAR restrictions.

7. **Eligible Research Institutions:** DAGSI Universities

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