

## Department of the Air Force Scientific Advisory Board FY 2025 Study

### Quantum Systems for the Department of the Air Force *Draft Terms of Reference*

#### Background

The Department of the Air Force (DAF) is currently locked in a great power innovation competition highlighted by the relentless drive for new technologies, systems and algorithms. While the DAF has always led the drive to advance science and technology, the current environment is significantly different from the past. The DAF no longer leads the world in all aspects of military related science and technology. Global competitors challenge the DAF daily and lead the world in many key areas. Quantum physics has long been viewed as one of the last great frontiers of science and offers promise for significant military advantage; however, quantum physics is frequently mis-represented, poorly understood by non-specialists, and often presents counter intuitive outcomes with many requiring significant developments before practical systems can be realized. At the same time, the DAF uses quantum phenomena every day without a passing thought. The goal for this study is to separate the hype of quantum technology from reality, enabling the DAF to evaluate where/when quantum phenomena can/should be leveraged, as well as to systematically develop and transition quantum systems into the hands of the warfighter.

#### Charter

The study will:

- Assess promise and maturity of quantum systems for DAF applications.
- Survey military and commercial S&T in quantum technologies including:
  - Quantum computing
  - Quantum communications and networking, to include the impact on data encryption security
  - Quantum sensors, including precision navigation, time, and ISR
- Assess the potential utility to the DAF of each identified technology.
  - Compare current and projected performance achievable with quantum-based systems to performance from more conventional technologies.
- Assess opportunities for DAF to close development gaps and transition quantum technologies into military capabilities.
- Develop roadmaps for technologies with promising DAF applications.
  - Provide recommendations on:
    - What technologies to develop into systems.
    - What technologies to continue investing in S&T and areas for DAF focus.
    - What technologies to observe and follow advancements made in academia and industry.

## **Study Products**

Briefing to SAF/OS in April 2025. Published report in September 2025.