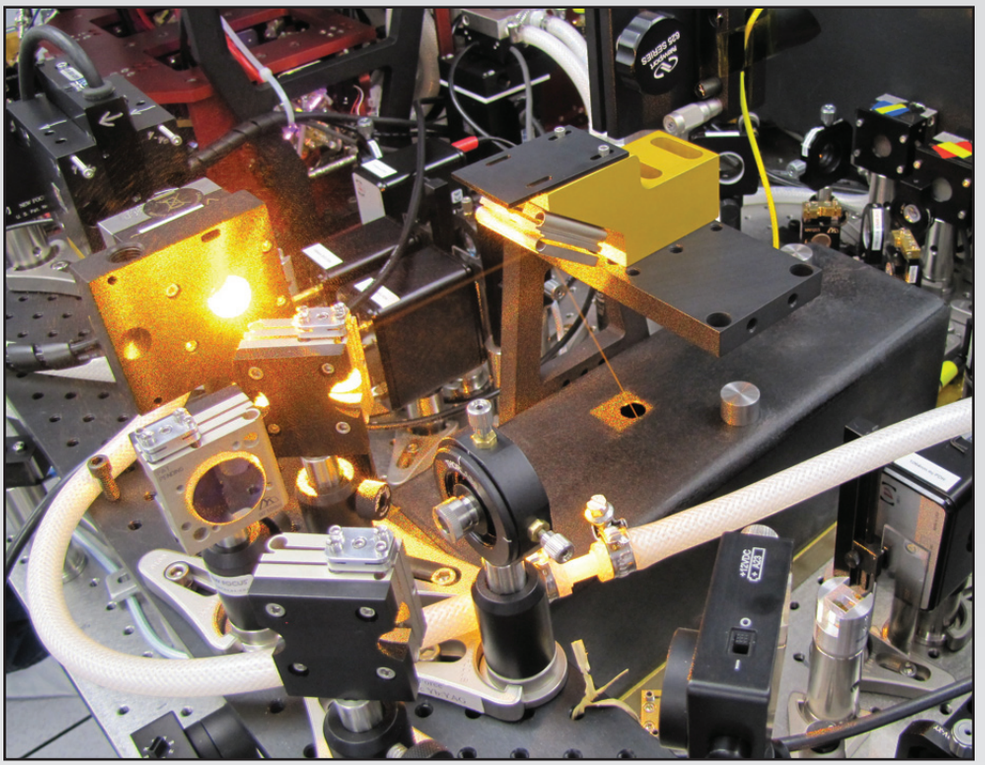
Guidestar Laser Reaches, Surpasses Wattage Goal



Resonant 'bowtie' Frequency Addition Source of Optical Radiation (FASOR) cavity, achieving 55W, which ensures adequate system performance during more nights of the year. The exiting port carries 55W of power with near perfect beam quality. (AFRL Image)

The Air Force Research Laboratory's experimental guidestar laser system has achieved its design goal of 50 watts, providing sufficient power to enable operation of the adaptive optics system. Laser guidestars are used to adapt a telescope's optics to more clearly image space objects. This breakthrough, eclipsing the previous output power of 12W, enhances 24-hour space situational awareness (SSA) operations and advanced research, and enables better detection of small space objects. This technology, coupled with AFRL's ground-based telescopes, helps provide Air Force Space Command with real-time, high-resolution imaging of space objects for SSA, collision avoidance, and satellite health and status assessments.

In order to measure the atmospheric turbulence for adaptive optic wavefront correction, a reference star is required. The reference has to be very close to the object being imaged to obtain good correction. AFRL's Directed Energy Directorate Frequency Addition Source of Optical Radiation (FASOR) team used a 589 nanometer laser, enabling the creation of an artificial reference star over a broad area of the sky to provide superior imaging of objects for SSA.

Additionally, 50W is the design threshold that provides nominal power to ensure adequate guidestar return from the sodium layer to operate the adaptive optics system, compensate telescope images, and meet current test objectives during most of the year.

Even better, the team repeatedly reached 55W, which meets the objective level of performance and ensures adequate system performance during more nights of the year (because of natural fluctuations in the sodium layer thickness). This will improve the ability to meet science and technology research and customer test objectives more rapidly, thus reducing test nights and cost.