

Abstract Submitted  
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### **Results**

**from a prototype telescope for a space-based gravitational-wave observatory** SHANNON SANKAR, NASA/CRESST/USRA, JEFFREY LIVAS, NASA — Space-based gravitational-wave observatories will enable the study of a multitude of astrophysical sources emitting gravitational waves at frequencies between 0.1 mHz and 1Hz. These long-baseline laser interferometers rely on specifically-designed telescopes to efficiently exchange laser beams between spacecraft housing freely floating proof masses. Each telescope simultaneously transmits and receives the laser light at the ends of the million kilometer arms. The telescopes are in the measurement path, and so must be dimensionally stable within the observatory measurement band. Furthermore, simultaneous transmission and reception introduces constraints on the permissible scattered light. We discuss our efforts to design, simulate, construct and measure the performance of a prototype telescope for a future gravitational-wave observatory in space. We also outline key lessons learned from this study.

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