

51st IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) –
The Next Steps (A4)
SETI 2: SETI and Society (2)

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SETI SPACE TELESCOPE MISSION CONCEPTS DESIGNED AROUND UPCOMING
FULLY-REUSABLE LAUNCH VEHICLES

Abstract

Space-based radio telescopes would be highly desirable for conducting SETI observations. A primary reason for this is that such telescopes, if placed in a high Earth orbit or ideally on the Moon's far side, would experience far less Radio Frequency Interference (RFI) than ground-based observatories. Unfortunately, the cost of launching such an instrument has historically been prohibitively high. With current launch vehicles, such a mission would perhaps be possible but only if the instrument was very small and lightweight, limiting its utility. However, over the next few years fully-reusable launch systems like SpaceX's Starship may fundamentally change the tradeoffs and costs involved in designing and launching space telescopes. It may soon be cheaper to launch 100 tons of payload with Starship than any amount of mass with any other rocket. This suggests that we design space telescopes not to be as small as possible, but rather around the payload capacity of the Starship rocket. In this paper, we discuss possible mission designs for a space-based radio telescope for SETI built around the Starship launch vehicle.