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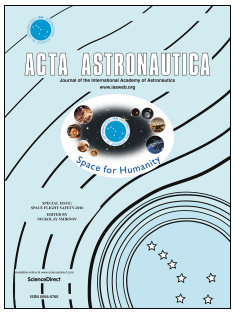

Benchmarking inscribed matter probes

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Benchmarking inscribed matter probes

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Abstract

We have explored the optimal frequency of interstellar photon communications and benchmarked other particles as information carriers in previous papers of this series. We now compare the latency and bandwidth of sending probes with inscribed matter. Durability requirements such as shields against dust and radiation, as well as data duplication, add negligible weight overhead at velocities $v < 0.2\,\mathrm{c}$. Probes may arrive in full, while most of a photon beam is lost to diffraction. Probes can be more energy efficient per bit, and can have higher bandwidth, compared to classical communication, unless a photon receiver is placed in a stellar gravitational lens. The probe's advantage dominates by order of magnitude for long distances (kpc) and low velocities ($< 0.1\,\mathrm{c}$) at the cost of higher latency.

1. Introduction

Sending a physical artifact can be the most energy-efficient choice for interstellar communications, because it can be done at almost arbitrarily low velocities, and thus low energies. An artifact can arrive at the destination in total, in contrast to a particle beam which is wider than the receiver in all

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