

laser beams is not competitive with advanced onboard propulsion concepts for missions in the solar system.

One other calculation, however, is of interest for this x-ray laser propulsion concept, as suggested in Ref. 1. Equation (20) shows that the equivalent specific impulse is limited only by the feasible beam and sail diameters. Consequently, if highly collimated, x-ray laser beams are found to be possible, a laser-propelled vehicle could be developed to reach interstellar distances faster than with any other propulsion concept studied.

Calculations show, for example, that  $\alpha$ -Centauri (4 light years) could be reached in 10 yr with an equivalent specific impulse of  $10^6$  sec. For  $d_s/d = 1.0$  (higher ratios yield too high a vehicle mass) the sail diameter (and beam diameter) to

achieve this value would be about 1000 m, and the beam power would be about  $10^6$  Mw, which exceeds the current electric power consumption of the world. The vehicle mass propelled would be about  $10^5$  kg. Thus, some future generation of mankind, with a somewhat different ordering of priorities than ours, and much more available power, could conceivably explore other stars and other solar systems with highly sophisticated unmanned spacecraft capable of relaying information in elapsed times of the order of decades.

#### Reference

- <sup>1</sup> Marx, G., "Interstellar Vehicle Propelled by Terrestrial Laser Beam," *Nature*, Vol. 211, No. 5044, July 2, 1966, pp. 22-23.

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### Announcement: 1972 Author and Subject Indexes

The indexes of the four AIAA archive journals (*AIAA Journal*, *Journal of Spacecraft and Rockets*, *Journal of Aircraft*, and *Journal of Hydronautics*) will be combined and mailed separately early in 1973. Subscribers are entitled to one copy of the index for each subscription which they had in 1972. Extra copies of the index may be obtained at \$5 per copy. Please address your request for extra copies to the Circulation Department, AIAA, Room 280, 1290 Avenue of the Americas, New York, New York 10019. **Remittance must accompany the order.**

Ruth F. Bryans  
*Director, Scientific Publications*