

IAF SPACE POWER SYMPOSIUM (C3)
Solar Power Satellite (1)

Author: Dr. Omid Shekoofa

Satellite Research Institute, Iranian Space Research Center, Iran, o.shekoofa@isrc.ac.ir

Ms. Maryam Baghban Kondori

Satellite Research Institute, Iranian Space Research Center, Iran, maryam.kondori@gmail.com

Mr. Sajjad Ghazanfarinia

Satellite Research Institute, Iranian Space Research Center, Iran, s.ghazanfarinia@isrc.ac.ir

HONEYMOON ON PROXIMA B, ENGAGEMENT OF STARSHOT AND SBPP IDEAS

Abstract

There is more than a half-century that the concept of space-based power plants (SBPP) has been proposed as a potential solution for supplying sustainable clean energy in the global orders. The main idea of SBPP is to establish very large solar arrays and/or optical reflectors to harvest the solar energy in the space and transmit it to the earth via laser or microwave links. An increasingly number of concepts have been studied over the recent years to design and establish a cost-effective SBSS system, however, this idea has not been tested in orbit yet, due financial constraints, safety issues and immature technologies. One of the biggest concerns, is how to transmit the Gigawatts-level of power by laser or microwave beams. On the other hand, the first-ever serious concept for interstellar missions, called StarShot, was proposed in 2016 by the Breakthrough Starshot initiative. The goal of this project is to make a very low mass spacecraft equipped with a large enough sail that can be driven by laser beam, irradiated from the Earth. This modular spacecraft, made of a group of femtosatellites, is expected to reach the planet Proxima B which is located in the 4.3 light-year away from the earth within about 30 years. This big ambitious project is faced to several major challenges including the constructing and thermal controlling of a laser-beamer farm on the ground, continues power generation and storage for more than three decades, forgetting about the interferences on the laser beam caused by the Earth atmosphere, and the associated safety issues with the transmission of laser power from the Earth to the spacecraft. This paper is about how SBPP can make space projects, especially the interstellar missions, get their objectives. The idea which will be discussed in this talk is to combine the two concepts of SBPP and Starshot into one super-system concept. Such super-system will grantee the direct and uninterruptable supplying the spacecraft during the whole Starshot mission life without concerning about the above-mentioned safety issues. The overall efficiency of such SBPP system will be higher when it transmits the power to space, because the main part of the irradiated laser power doesn't need to be converted to electricity. Furthermore, a conceptual design of such SBPP system will be discussed and a rough cost estimation of the proposed concept will be given.