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ARTIFICAL SINGULARITY POWER ENGINES: A BASIS FOR DEVELOPING AND DETECTING ADVANCED SPACEFARING CIVILIZATIONS

Abstract

Artificial Singularity Power (ASP) engines generate energy through the evaporation of modest sized (108-1011 kg) black holes created through artificial means. This paper discusses the design and potential advantages of such systems for powering large space colonies, terraforming planets, and propelling starships. The possibility of detecting advanced extraterrestrial civilizations via the optical signature of ASP systems is examined.

We consider a 1e8 kg ASP engine. According to equations put forward by Stephen Hawking in 1974, it would produce a power of 1.08e8 Gigawatts. Such an engine, if left along, would only have a lifetime of 2.65 years, but it could be maintained by a constant feed of about 3 kg/s of mass. We surround it with a spherical shell of graphite with a radius of 40 km and a thickness of 1.5 m to attenuate the hard radiation, turning it into heat. At a distance of 40 km, the intensity of the radiation will be about 5 MW/m2, which the graphite sphere can radiate into space with a black body temperature of 3000 K. The light will then radiate out further, dropping in intensity with the square of the distance, reaching Earth sunlight intensities of 1 kW/m2 at a distance of 3000 km. Proxima Centauri is a type M red dwarf with a surface temperature of 3000 K. It therefore has a black body spectrum similar to our proposed ASP mini-sun. However it has about 1 million times the power, so that an ASP engine placed 4.2 light years from Earth would have the brightness of Proxima Centauri positioned 4,200 light years away. Our ASP engine would have a visual magnitude of magnitude 31 at 42 light years. The limit of detection of the Hubble Space Telescope is magnitude 31. So HST would be able to see our proposed ASP engine out to about 42 light years, within which there are about 1,000 stellar systems. Consequently ASP engines may already have been imaged by Hubble, appearing on photographs as unremarkable dim objects assumed to be far away. These should be studied to see if any of them exhibit parallax. If so, this would show that they are actually nearby objects of much lower power than stars. Further evidence of artificial origin could be provided if they exhibit a periodic Doppler shift, as would occur if they were in orbit around a planetary body. I suggest we have a look.