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Solar Radiation for Protection of Solar Radiation on Spacecrafts and Lunar Settlements. Or the use of Miniature Magnetospheres Induced by the Photoelectric Effect

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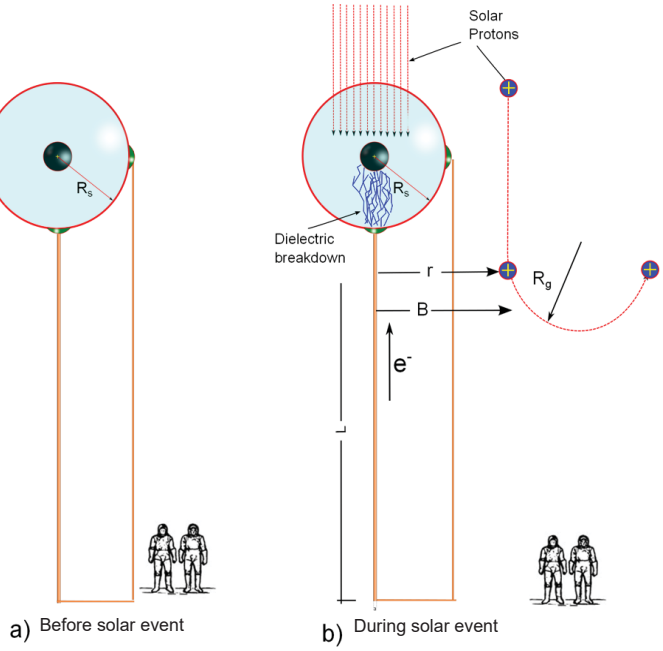
This manuscript is intended as a survey of the possibility of a novel idea by using solar radiation for protection against solar radiation on spacecrafts in interplanetary space as well as the moon and similar celestial bodies (which are devoid of atmosphere) by harnessing the photoelectric effect. The idea is conceptually simple: if a plate composed by a metal with a low work function -located in front of, say, a spacecraft, is under the action of solar light, then will have emission of electrons via photoelectric effect (photo electrons). Likewise, because this electron emission, the plate will get a positive charge which will increase with time until a certain saturation charge is attained which is limited by the specific stopping potential as well as the capacitance of the configuration which is a design parameter. Now, during a solar storm and solar flares events -when a large number of energetic ions and electrons can penetrate and damage electronics and human tissues, the electrostatic equilibrium in the plate is disrupted and as consequence dielectric breakdown occurs. The dielectric breakdown may generates a strong electronic current by discharging its accumulated charge which all in all can translate into the generation of a strong local magnetic field able to deflect the energetic radiation during the solar event. Utilizing a simplified geometrical model, the feasibility of generation of such miniature magnetospheres for solar flares protection on spacecrafts and lunar settlements was studied and mathematical expressions were derived as funtion of several parameters.

Keywords. *Solar flare, Radiation protection systems, interplanetary travel, Moon and Mars human lunar settlements.*



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