



The British Interplanetary Society

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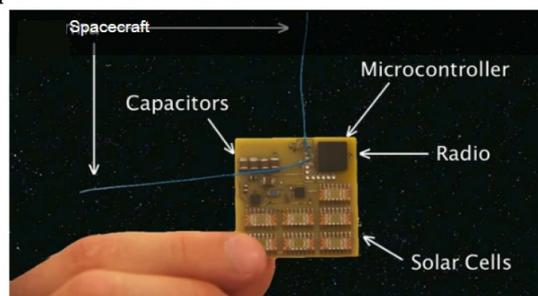
Letter to Members & Fellows BIS

Dear Members & Fellows,

As you well know, the British Interplanetary Society was founded in 1933 and is the oldest space organisation still in its original form. Throughout its history it has continued to inspire and advocate activities relating to the exploration of space. In particular, it has undertaken theoretical design projects and facilitated meeting opportunities between like-minded people, keen to push their ideas forward. Despite these very valuable contributions it has never put any hardware into Earth orbit itself. That is about to change. We are pleased to announce that The British Interplanetary Society has joined the KickSat.org project and intend to sponsor several ChipSats to place into orbit and form the first fleet of spacecraft for this mission. A design team is being assembled to work on some innovative engineering concepts. We are very excited about this project and further announcements with more details will be made by the BIS at a later date.

*KickSat is the initiative of **Zac Manchester**, a graduate student at Cornell University in the United States. The BIS are very grateful for the opportunity to participate in Zac's excellent project and we are pleased to support him in pioneering this technology.*

The essence of a ChipSat or Sprite is that it is a very small, ~cm sized, ~mm thick, square spacecraft with in built signal transmission circuitry. Each ChipSat will be constructed of a Silicon substrate, using a dipole antenna and have its own capacitor and integrated circuit technology. The Sprite will have solar cells to harvest energy and may have capacitors to store it.

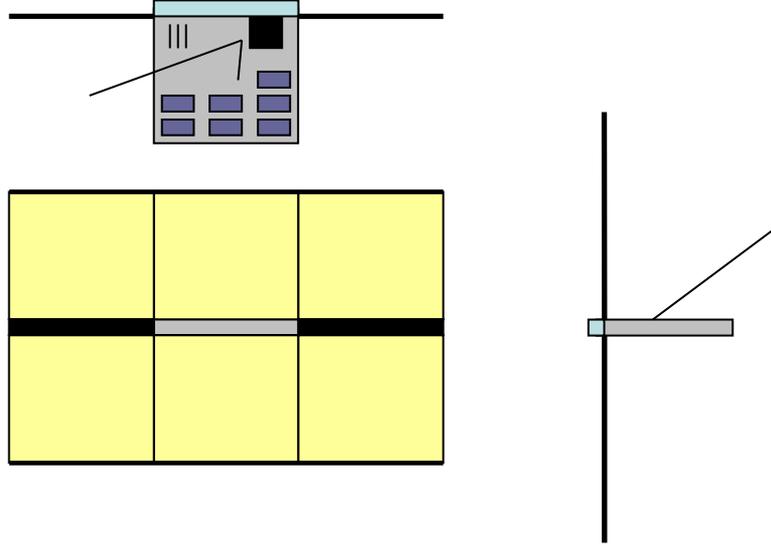


ChipSat proof of concept prototype

*We are currently exploring various design concepts that could be part of this mission. In 2010 J.A.Achison and M.A.Peck wrote a paper in *Astronautica* describing a passive, sun-pointing, millimetre-scale solar sail. They discussed a 25 mm thick, 1 cm square spacecraft with a mass of 7.5 mg, giving rise to a characteristic acceleration of 0.1 mm/s^2 . This high acceleration is enabled by the very low mass of the spacecraft which has a sail loading of 0.075 kg/m^2 .*

Members of the BIS Technical Committee have taking a very preliminary look at this idea and extended it to the concept of a fully deployable solar sail Sprite. The intensity of the solar radiation flux at Earth orbit is around 0.14 W/cm^2 . We have done some very basic analysis of the physics potential over a wide range of sail parameters (20-40 gram mass, 1-9 cm^2 total area, 200 – 400 kg/m^2 sail loading, 0.6 – 1.0 reflectivity)

and we think it may be possible to deploy a small solar sail material from a Sprite giving rise to a solar energy input of between 0.5 – 1.2 W. We have named this concept the Watt Intensity Solar Propelled (WISP) Sprite. In theory, once deployed from a CubeSat and provided the sail opens correctly, Sprite velocities of order 100 – 300 m/s may be possible. There are many engineering issues to address and this is early days, but we would like the opportunity to investigate this potential, as well as launching some basic Sprite probes, perhaps displaying the BIS logo and/or transmitting a small message “From Imagination to Reality”, for example.



Currently, we have invested \$1,000 into this project through our own funds and through a voluntary donation. To raise additional finance we do not want to take any further donations from the BIS central funds. We hope to garner some publicity and marketing value from this mission as part of our contribution to Zac Manchester’s project, whilst also providing for a scientifically interesting experiment. Our capabilities in this mission depend upon the financing available. Whilst we do not wish to draw large sums of money away from the Societies other urgent needs, we see this as an investment which through proper marketing will (1) recruit new members (2) generate publicity (3) generate income through spin-off activities we have planned associated with this mission.

We would like to invite you to offer a small donation towards this project as part of the BIS contribution. If you can we ask you to visit the web site www.KickSat.org and make your donation. When you give your name please put BIS at the end of your surname (e.g. John SmithBIS) so the team know its part of the BIS contribution. In addition, please email fleet@kicksat.org and make a note that you donated on behalf of the BIS (e.g. Dear Sir, I just donated \$300 as part of the BIS contribution, John Smith).

If the mission goes ahead, and so far it’s looking very promising, a certificate acknowledging your part in the BIS contribution will be organized at a later date.

Finally, if this mission is successful, we have plans for a later mission and an even more ambitious mission still under discussion. This is an exciting time for the BIS as we head towards the 80th anniversary of our founding.

Thank you for your support; let’s get the BIS into space together.

Issued by:
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