

Solar sail mission To Be Launched

After decades of dreaming about ‘solar sailing’ – pushing a space vehicle deliberately with sunlight – the first orbital test is now only a few months away. It’s been a difficult road, and spaceflight experience warns that even greater difficulties lie ahead, but this will be a big step towards making it work.

Funded privately by the ‘Planetary Society’ in California, a small package called “Cosmos-1” will be shot into orbit aboard a Russian ‘war surplus’ sub-launched missile off the northern coast of Russia. As with any bargain basement hardware, this ‘Volna’ launch system has proven problematical on past attempts. Once, an upper stage misfired, and another time, the payload separation system failed, and after that was fixed, the payload fell off during flight. But it was cheaper to build replacement payloads than to pay the going rate for a higher-reliability commercial launch vehicle.

The 100-kg payload is being fabricated by a Russian team in Moscow, that used to build interplanetary space probes for the USSR. It will deploy 15-meter-long inflatable spars holding eight triangular sails that can be rotated to control the angle of sunlight falling on them. The force of the photon impact – NOT, as widely misunderstood, the much weaker ‘solar wind’ of ions ejected from the Sun – creates a pressure which pushes the entire vehicle.

This concept still confuses people, including some top scientists such as Thomas Gold. He recently wrote that the laws of thermodynamics dictate that ‘photon pressure’ must be much less powerful than advocates claim.

But ‘solar sailing’ isn’t theoretical at all, and photon pressure has been successfully calculated for all large spacecraft. Interplanetary missions would arrive thousands of kilometers off course if correct equations had not been used. The effect for a genuine ‘solar sail’ will be even more spectacular.

The plan is for the Volna rocket to put this payload into a polar orbit about 800 kilometers up, high enough so that air drag doesn’t overwhelm the gently pressure of sunlight. The orbit will then be raised gradually but inexorably.

More advanced solar sails – or ‘light sails’, as one space theoretician once suggested, in a beautiful neologism encompassing both their propulsion scheme and their very small mass – could carry ‘slow-boat’ science missions – or even supplies for astronauts – onto interplanetary trajectories. NASA has no plans for such missions so it has fallen to private funding to pioneer this literally limitless new technology.