ESTCube-1: Stepping Stone for Fast Interplanetary Travel

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www.estcube.eu; facebook.com/estcube
Outline

✓ Electric Solar Wind Sail (E-sail) concept
✓ Technological challenges
✓ ESTCube-1 CubeSat mission at LEO
✓ Next steps
The Electric Solar Wind Sail (E-sail)

✓ Invented by Pekka Janhunen, Finnish Meteorological Institute


✓ Uses solar wind momentum for producing thrust
✓ Consists of a number of long thin conducting tethers
✓ An electron gun is used to keep the wires at high positive potential
✓ The electric field of the wires extends tens of meters into the surrounding solar wind plasma

Read more at www.electric-sailing.com, where also all references can be found
Electric Solar Wind Sail (E-sail)
Electric Solar Wind Sail (E-sail)
Technological challenges

- Tether production
- Tether deployment

Images: Dep. Physics, Helsinki University
ESTCube-1 mission objectives

✓ To deploy and confirm the deployment of a 10 m conductive Heytether from a 1U CubeSat
✓ To measure the electric sail force, interacting with the tether. The success criteria for this objective is the measured effect on the satellite attitude resulting from electric sail force

Launch planned for 2013
ESTCube-1 experiment

- Polar LEO, 600-800 km
- A 10 meter 4-fold 25-50 µm Heytehter at 450 V charge
- Deployment by centrifugal force
- Magnetic coils for spin up
ESTCube-1 animation: Austin Hess, MIT
Next steps

- European Commission 7th framework program project ESAIL (2010-2013): development of full E-sail mission components to TRL 4-5
- Test of a 100 m tether deployment on Aalto-1 3U CubeSat (2014)
- CubeSat mission to solar wind (next presentation)