

Electric Double Layer is Secret Behind Revolutionary Space Thruster

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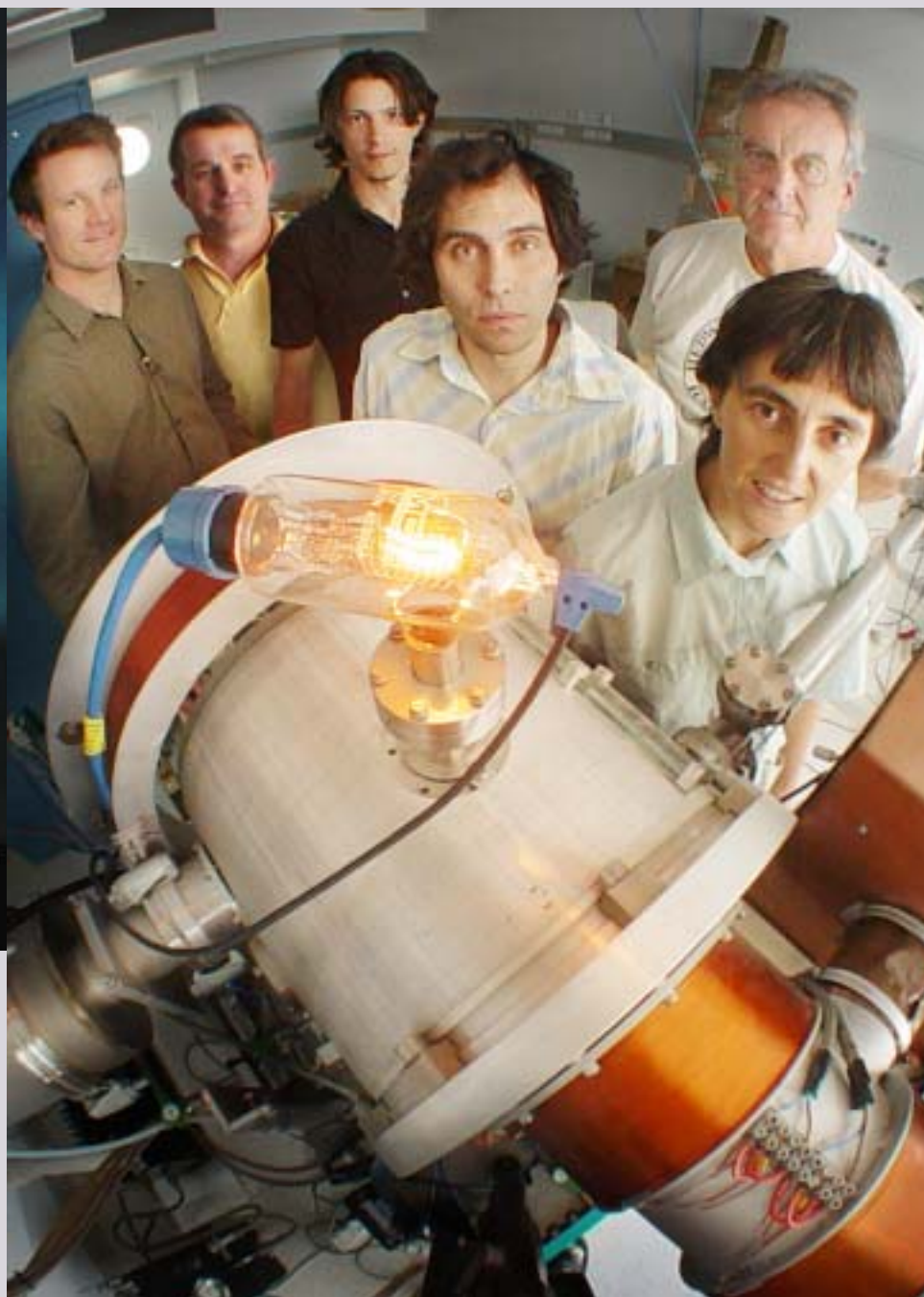
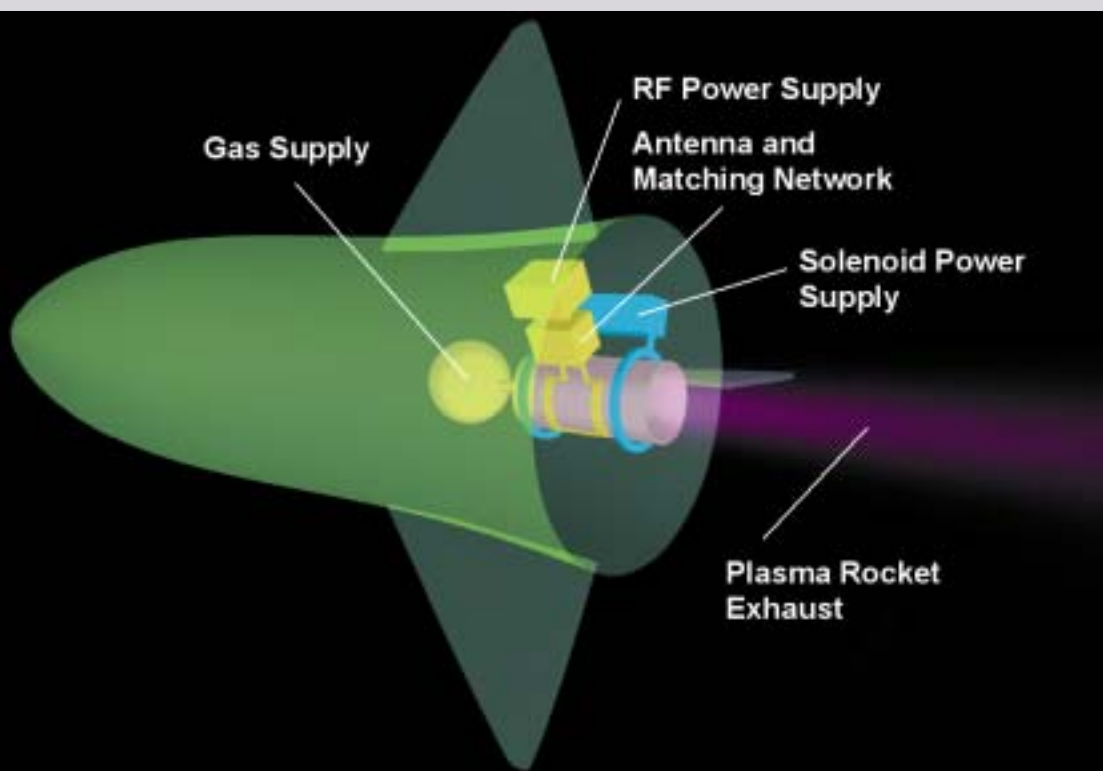
One of the most beautiful mysteries in the heavens is the aurora which is seen during winter months at latitudes about 20 degrees away from the poles. These "lights in the sky" are caused by the impact of electrons on the upper atmosphere which excite various lines of oxygen and nitrogen resulting in the splendid colours and draperies. Many believe that the basic mechanism underlying most of the observable phenomena is the existence of a large electric double layer situated about one earth radius (about 6000 km) above the visible auroral regions.



An electric double layer is a local region in a plasma which can sustain a potential difference, much like a cliff of potential (like a riverwaterfall) that can energise charged particles falling through it. These double layers are rather exotic objects that can only be described by resorting to non-linear physics.

Apart from being an interesting phenomenon for space plasma physics, the ions accelerated by a double layer can be used for thrust in a space craft.

Scientists at the ANU are currently building a prototype of the Helicon Double Layer Thruster (HDLT) which will be tested at the ESA (European Space Agency) in Europe.



The ANU space thruster is simple, has no moving parts, no electrodes and no need for a neutraliser. Both the research (CHI KUNG reactor) and development (HDLT prototype) efforts are being carried out in parallel by a team of scientists and PhD students in collaboration with astrophysicists, rocket physicists, and plasma physicists around the world.

