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The electrical charge and motion of objects inserted into a plasma

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Plasma is gas that has been ionized, with freely moving electrons and ions. Examples of plasma include the solar wind, and a glow discharge made by applying high voltage to a pair of electrodes in a vacuum container filled with low-pressure gas. Plasma has high temperature, usually many thousands of degrees, so it surprises many people to learn that it is possible to insert a solid object into plasma without melting it. This is possible when the plasma has a very low density, so that it has little heat capacity. For example, the Moon is immersed in the solar wind, and it doesn't melt. Objects immersed in plasma develop an electric charge by collecting electrons and ions. I will describe experiments in the laboratory and on board the International Space Station where micron-size plastic spheres are immersed in plasma. These microspheres gain a charge of thousands of electrons, so that they move very easily when they experience electric fields. Videos will be shown of the microspheres in experiments, showing the rich variety of their collective motion.