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An outreach activity at the frontier of science: the Planeterrella

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In 1899, the Norwegian physicist Kristian Birkeland developed an experiment called Terrella, which enabled him to show the mechanism of formation of the auroral oval. An electron gun was shooting electrons (then called "cathode rays") to a magnetized sphere in a vacuum chamber. This enabled him to see also (without identifying them) the ring currents, discovered later by James Van Allen.

One of us (J.L.) built several Terrellas, initially for the Olympiads of physics in 1999, then with undergraduate students and finally assembled a Terrella experiment in a school of geophysics in Trieste in May 2006 (ICTP – UNESCO – COST 724 – NSF).

We recently assembled a new experiment inspired from the Terrella. We completely reconsidered the experiment of Birkeland, in order to give the greatest flexibility. A great number of planetary situations of the interactions sun – planets is now possible: Uranus and Neptune, the interaction between Ganymede and Jupiter, and even the interaction between a magnetized exoplanet and a close star. This is why this experiment has been renamed Planeterrella.

The experiment is now under a calibration process in order to check whether it can still be used for scientific purposes. However, we already presented it in public activities several times. It is very beautiful, and allows to show plasma physics in action, and especially the Sun-Planets relationships in a very spectacular way.

In this talk, we will explain this simple experiment and show slides of the outreach activities we carried out. In the future, we intend to set up an international program to lower the price of the unit (actually about 20 kE) in order to allow all universi-

ties, including in developing countries, to get a Planeterrella. This will be hopefully a UNESCO program.