Hands on Workshop on Innovations in Science Teaching: Demonstration of Lattice Potentials and Fermi Surfaces and Bohr's Quantization

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A bar pendulum with point suspension having a permanent magnet at its bottom can be used to probe the potential distributions on a plane lattice of permanent magnets. The gravitational potential is parabolic with respect to the mean position. However, the magnetic potential energy due to arrangement of permanent magnets arranged on the plane are analogues to the lattice potentials and the dynamics of the pendulum shows the behavior of motion of electrons in a periodic lattice as simulated (1). One can play with the height of the suspended pendulum and get a feeling of the electron dynamics in a simulated model with different geometry of magnets. Regarding the demonstration of quantized states of electrons in atoms as circular orbits with integer multiple of wavelength associated with the electrons. The flexible strips are mounted on a speaker operating at 50 Hz.

Figure: Shows photographs of the static and dynamical Models of Lattice.