

## XXVI. QUALITATIVE ILLUSTRATIONS OF SOME ASTRONOMICAL PHENOMENA

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During the present school year, the writer has been experimenting with electro-magnetic pendulums in order to find illustrations of Astronomical phenomena, particularly any that have bearing on the planetesimal hypothesis.

An electro-magnet was supported by a rod 50 cm. in length which terminated at its upper end in a hook, the point of which rested in a metallic pan containing mercury. Both the pan and the rod were made a part of the electric circuit. The other conductor from the electro-magnet was a wire coiled about the rod to near the upper end where it bent around the metallic pan

and terminated in a cup of mercury. A battery which supplied the current for the electromagnet was connected to the two mercury cups.

When the magnetic pendulum bob was placed in a single row of tacks, each supported by a long thread so as to be at the same level as the electromagnet, and the current was turned on, tacks as far away as ten centimeters were attracted to the magnet. When the bob was allowed to swing through an arc of about 120 degrees, the row of tacks being perpendicular to the plane of the swing, tacks more distant than five centimeters were not picked up by the magnet. A number of rows of suspended tacks were then arranged so that different rows were passed through by the pendulum bob when it was in different parts of its arc. As was to be expected the width of path thru the "field" of tacks varied inversely as the speed of the bob.

This was shown by the fact that the path was widest at the beginning and end of the swing and narrowest at the midpoint, the ratio of the widths being about two to one for an arc of about 120 degrees. The number of tacks collected in a single swing of the pendulum also depended, as was expected, on the strength of the magnet.

These experiments illustrate the fact that when a heavenly body sweeps through a field of nebulous matter, it will collect matter which is not too distant. The amount which it will collect will depend on the speed with which it is moving relative to the matter and on the size of the body.

A second electromagnet was supported on a vertical spring steel wire so that it was free to wave about thus forming a sort of inverted pendulum. The axis of the wire was about two centimeters from the axis of the pendulum rod and the ends of the electromagnet could not approach each other closer than one centimeter. When the pendulum was set in motion and currents were sent through both electromagnets, the pendulum bobs soon described ellipses. In fact each electromagnet tended to occupy the position of focus of the other's ellipse. When the lower electromagnet was made considerably stronger than that of the pendulum, the motion of the latter at "perihelion" was much faster than it was at "aphelion." This experiment illustrated Kepler's law: "The radius vector describes equal areas in equal intervals of time."