

A WEHNELT CATHODE FOR THE EMISSION OF A SMALL, COMPACT AND PERMANENT BEAM OF ELECTRONS

PROF. C. J. LAPP, UNIVERSITY OF ILLINOIS

A hot line Wehnelt cathode has been constructed by means of which a very small and compact permanent beam of electrons may be secured through the application of barium resinate and strontium hydroxide to a platinum strip. Heretofore when an experiment was performed requiring a small beam, two methods were available, one in which a tiny speck of either calcium chloride or Bank of England sealing wax was used and the other in which a small beam is obtained from a larger one by means of a platinum diaphragm. The disadvantage of the former is that the beam is not permanent, lasting at times but a few minutes; while the latter can not be used to advantage in strong magnetic fields since the beam is deflected to one side and fails to pass through the opening in the diaphragm.

A strip of platinum 0.5 mm. wide was cleaned with nitric acid and ammonium hydroxide. A tiny drop of strontium hydroxide was placed on the strip, after which it was dried by gently heating the strip by means of an electric current. After two applications the platinum strip was heated red in order to harden the deposit. A small and almost microscopic piece of barium resinate was then placed centrally on the spot and the whole carefully heated so as to evaporate the resin and have barium oxide. After two or three coats of barium oxide the strip was glowed to cherry red for several minutes in order to drive off all organic material. A coating of approximately 0.1 mm. in diameter was thus obtained which gave an intense and compact permanent beam of electrons without the use of a diaphragm. A beam of this nature has been long sought after in this laboratory and is now available for a number of uses.

Laboratory of Physics
University of Illinois
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