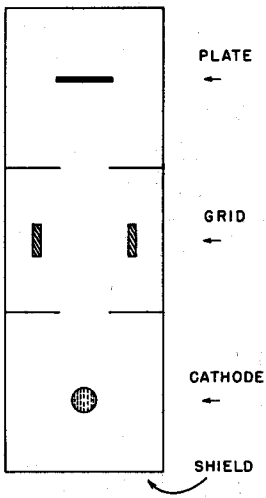

FIG. 1. Cross section of the 2D21 thyratron.

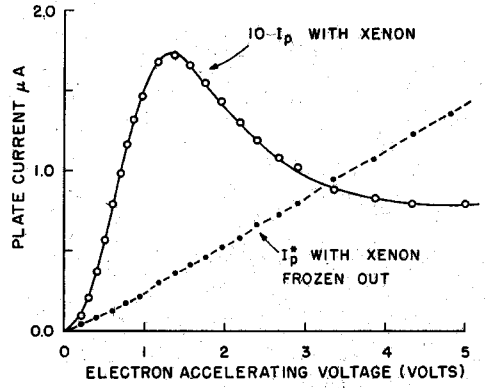

FIG. 3. The plate current I_p as a function of the voltage V, and I_p^* the plate current with the xenon frozen out with liquid nitrogen.

well is small.[1] When the $l=0$ phase shift becomes 2π, or higher l phase shifts become π at higher values of electron energy, the dips in the cross section will not be as prominent since contributions from other values of l will not be small. The well parameters may be adjusted to give a minimum at the observed energy. This model predicts the Ramsauer–Townsend effect in a qualitative way, but does not give quantitative agreement over a wide range of electron energies. The results of more accurate calculations with a screened coulomb potential are given by Mott and Massey.[1]

I. THE EXPERIMENT

The 2D21 thyratron is very well suited for a demonstration of the Ramsauer effect. The shield (grid 2) is a boxlike structure with three sections connected by apertures (see Fig. 1). The electron beam originates at the cathode in the first section, passes through the second section, and part of it is collected on the plate in the third section. The xenon pressure in the tube is approximately 0.05 Torr. A diagram of the circuit is shown in Fig. 2. The shield current is proportional to the intensity of the electron beam at the first aperture. After the first aperture the beam passes through an equipotential region where the scattering takes place. In this region the beam intensity is $J=J_0e^{-x/\lambda}$, where λ is the mean free path. If the plate is a distance l from the first aperture, the intensity at the plate is $J_p=J_0e^{-l/\lambda}$ or $J_p=J_0(1-P_s)$, where P_s is the probability of scattering. The plate current is $I_p=I_s f(V)(1-P_s)$, where I_s is

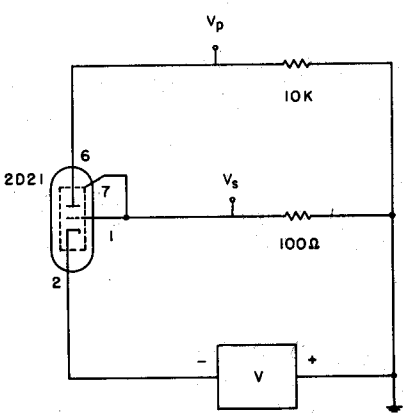

FIG. 2. Diagram of the circuit for the Ramsauer effect experiment. The filament of the 2D21 (pins 3, 4) is heated by 4 V dc.

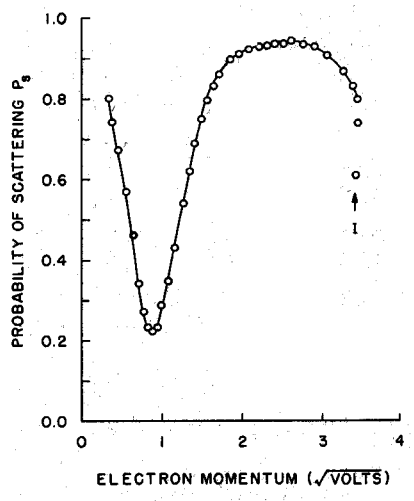

FIG. 4. The probability of scattering P_s as a function of $(V-V_s)^{1/2}$, where $V-V_s$ is the electron energy. Ionization occurs at "I".