Photo Electric Effect in a Metal

When light of various wavelengths hits the surface of a metal electrons can be ejected with kinetic energy \( KE = hf - \phi \), where \( \phi \) is the ionization energy (energy necessary to overcome the Coulomb attraction of the metal.) The most energetic electrons will correspond to \( \phi_{\text{min}} = W \), defined as the work function of the metal. (also the Fermi energy).

If one applies a stopping voltage to these electrons on can measure the work function and Plank's constant by plotting \( V_S \) vs \( f \).

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e V_S = KE_{\text{MAX}} = hf - W
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Photoelectric Effect

1) Record the stopping voltage at three frequencies RGB by zeroing the picoAmmeter.
2) Graph \( V_S \) vs \( f \) and perform a linear fit.
3) Determine Planck's constant \( h \) and the work function \( W \) of the metal photocathode \( w \pm \)-errors.
4) Identify the metal.
5) Explain why the photocurrent is zero and independent of light intensity when \( hf < W \).