

# A Comparison of Drude and Sommerfeld Theories with Experiment

Property	Experiment	Drude Theory	Sommerfeld Theory
Current	$= \sigma E$	$\propto E$	$\propto E$
Lorentz Number $K/(\sigma T)$	$\sim k^2/e^2$ at 300K Decreasing radidly with decreasing T	$\frac{3}{2} \frac{k^2}{e^2}$	$\frac{\pi^3}{3} \frac{k^2}{e^2}$
Specific Heat	$= \gamma T$	$\frac{3}{2} nk$	$\frac{1}{2} \pi^2 n \frac{k^2 T}{E_F}$
Hall constant R	+ve or -ve	-ve	-ve
Magneto-resistance	YES	NO	NO
Insulator/metals/ semiconductors	YES	NO	NO
Anisotropy	YES	NO	NO
Effective mass	50 to $10^{-4}$	1	1