The Hall Effect

Is there a flux of charge carriers in an electric current?

Do moving charge carriers define electrical conduction?

Theory of moving charge carriers cannot explain electrical conduction of the Hall effect

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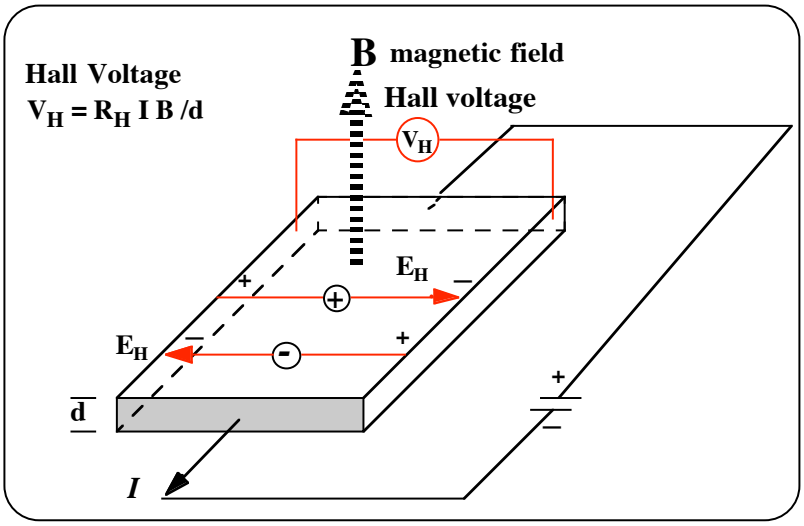
When a current carrying thin sheet (Hall element) is placed in a magnetic field that is perpendicular to the direction of the current ***I*** then a transverse electrical field E_H occurs in the Hall element.



The most important feature of the Hall effect is that the direction of the transverse electrical field E_H depends on the conducting or semiconducting material of the used Hall element. Therefore the so-called Hall coefficient R_H has either a positive sign or a negative sign. The Hall coefficient for the metals Li, Na, K, Cu, Ag, Al, Au and Bi has a negative sign, whereas the sign is positive for W, Zn, Cd and Fe. But there is a temperature dependence of the Hall coefficient: at low temperatures the Hall coefficient for Al has a positive sign for example. See below: electrical conduction and crystal structure.
Quantum physics claims that the different directions of the transverse electrical Hall field are due to different charge carriers, positive and negative ones. The negative charge carriers are allegedly the electrons of an electron cloud in the conductor.
According to this theory every atom of the metal can deliver almost one electron for this purpose. But where do the positive charge carriers come from? Are they the nuclei? Or the ionised atoms, which have a positive net charge? Impossible.