

Response to EPL referee report on manuscript EPL G41974

The referee starts by saying *"This manuscript appears to make the argument that there is a qualitative difference between electrons and holes, such that normal state conductivity occurs only with electrons and superconductivity occurs only with holes."* This indicates that the referee has completely misunderstood everything about my paper, and in addition knows nothing about my work on superconductivity over the last 30 years, where I say consistently exactly the opposite: that in superconductors the dominant carriers in the normal state have to be holes.

S/he says *"In Eq. (6), the author writes the Drude expression for the conductivity due to electrons, but there was no corresponding equation for holes, as is usually written with $n_n(t)$ replaced by p or $p(t)$ and m^* replaced by m_p^* ".* That is wrong, it is a trivial matter of notation. I am simply assuming a situation with one-band conduction, and Eq. (6) is the simple widely used Drude formula, e.g. Eq. (1.6) in Ashcroft-Mermin, whether the carriers are electrons or holes. I am not specifying at that point whether $n_n(t)$ refers to electrons or holes. It is true that in many metals there is conduction by both electrons and holes, but it is also true that for a simple analysis of fundamental issues it is legitimate to assume the simplest possible situation, i.e. conduction dominated by carriers in a single band, which is what I assume, and for which Eq. (6) holds.

The second paragraph of the referee, on thermodynamics, further reveals that the referee has understood absolutely nothing about this paper.

The only point in this paper where the issue of holes versus electrons comes in is at the end, where I say: *"The only way to transfer momentum between electrons and ions without dissipation other than infinitely slowly is if electrons have negative effective mass. If so, an external force acting on the electron gives rise to acceleration in opposite direction to the force because the difference in momentum is transferred to the body, without scattering processes and associated dissipation. This then implies that to resolve the inconsistency pointed out in this paper charge carriers in superconductors have to be holes"*. Unfortunately the referee has not understood this nor anything else about this paper, and has not bothered to look up the references to my earlier work [7], [11], [12], [13] that could have helped him/her understand.

The referee says that the paper should not be published. However the report does not analyze the content of my paper in a cogent way. Therefore the report is not a valid foundation for the referee's recommendation.