

ELECTRONIC "NEARSIGHTEDNESS" OF MATTER: THE CONCEPT AND SOME QUANTITATIVE ESTIMATES

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The concept of electronic nearsightedness, first articulated by the author a few years ago, may be loosely stated as follows: Static electronic properties, like the electron density $n(\mathbf{r})$ or the pair correlation function $g(\mathbf{r}, \mathbf{r}')$, referring to a finite region R of a large system of interacting atoms, are only weakly affected by a perturbing potential $v(\mathbf{r}'')$, no matter how large, provided that all points \mathbf{r}'' are sufficiently distant from all points in R , like \mathbf{r} and \mathbf{r}' , and that the electronic chemical potential μ , relative to the potential $v(\mathbf{r})$ in R , is kept constant. Following a qualitative discussion of this concept, the paper will offer some quantitative estimates for simple models of metals and insulators.