

These originally sharp levels are not only raised in energy. Those that now lie in the continuum of states interact with these states and so broaden into resonances. The s like resonance is so broad as to be almost featureless and this may be considered as the principle origin of the conduction band. The p and d levels of the free ion are broadened, but retain some sharpness. If these levels are near the Fermi level they give rise to enhanced scattering which is reflected in an enhancement of the corresponding phase shift.

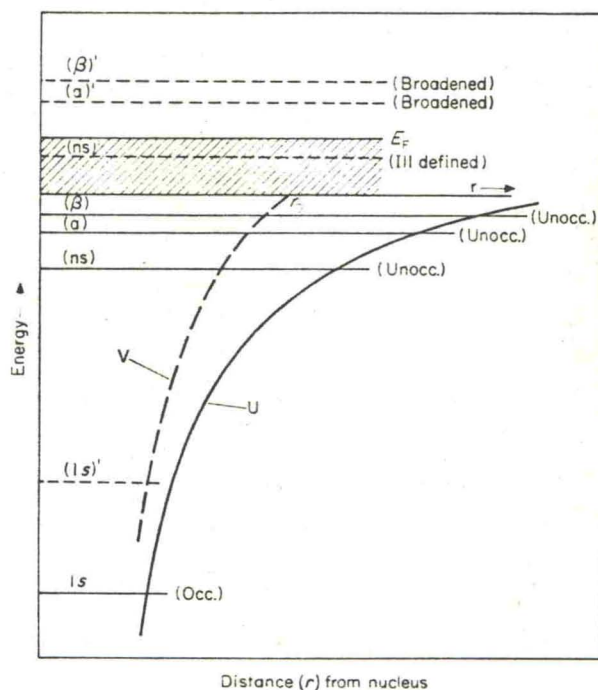


FIG. 26. Electron-ion potential: U , free ion; V , ion in a metal. The free-ion levels are shown as continuous horizontal lines. The corresponding levels in the metal are shown dashed. ns is highest occupied level in the unexcited free atom. (From Dickey *et al.*, 1967.)

The matter may be put differently and rather crudely as follows. In the free ion, an electron of the correct energy would be *bound* in the appropriate bound state. In the metal it may be thought of as bound for a short time and then escaping into the continuum. The potential around the ion in the metal retains a "memory" of the free-ion potential from which it arises.