

The Hohenberg-Kohn Theorem

The Suspenders



1. Assume that two potentials V and V' that differ by more than a



constant give rise to the same electron density for a non-degenerate ground



state. Now suppose that Φ is the eigenstate corresponding to V , and that



Φ' , corresponds to V' . Then the expectation value of H in state Φ ,



must be less than in Φ' , must be less than in Φ' .



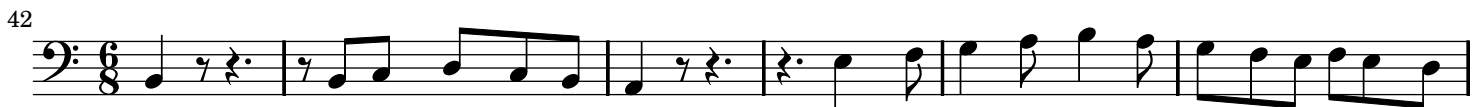
Write H by adding two terms the first one with V the



next with the rest, T is the kinetic energy and V_{ee} the re-



pulsion Now you see that the term with V must cancel out on both sides because



n is the same for the two. Then the expectation value of R in state



Φ , must be less than in Φ' , must be less than in Φ' . Two po-



tentials that differ by more than a constant cannot give rise to the same density.

2. ...Then the expectation value of H' in Φ' , must be less than in Φ , must be less than in Φ .

Write H' by adding two terms the first one with V' the next with the rest, T is the kinetic energy and V_{ee} the repulsion Now you see that the term with V' cancels out on both sides...

Lyrics and Music by The Suspenders:

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