$$\frac{\langle \tilde{\Psi}_0 | \hat{H} | \tilde{\Psi}_0 \rangle}{\langle \Psi_0 | \tilde{\Psi}_0 \rangle} \qquad \tilde{\Psi}_0 \; ; \; 2\tilde{\Psi}_0$$

$$= \frac{\int \tilde{\Psi}_0^*(\vec{r}) \hat{H} \tilde{\Psi}_0(\vec{r}) \, d\vec{r}}{\int \tilde{\Psi}_0^*(\vec{r}) \tilde{\Psi}_0(\vec{r}) \, d\vec{r}}$$

$$\frac{\langle 2\tilde{\Psi}_0 | \hat{H} | 2\tilde{\Psi}_0 \rangle}{\langle 2\tilde{\Psi}_0 | 2\tilde{\Psi}_0 \rangle} = \frac{\int 2\tilde{\Psi}_0^*(\vec{r}) \hat{H} 2\tilde{\Psi}_0(\vec{r}) \, d\vec{r}}{\int 2\tilde{\Psi}_0^*(\vec{r}) 2\tilde{\Psi}_0(\vec{r}) \, dr} = \frac{4\langle \tilde{\Psi}_0 | \hat{H} | \tilde{\Psi}_0 \rangle}{4\langle \tilde{\Psi}_0 | \tilde{\Psi}_0 \rangle}$$