Errata Script

Notation

- Red: Corrections.
- Blue: Addition.

List

- Page 12:

T	F	$\frac{\mathrm{d}}{\mathrm{d}t}\int_{-\infty}^{+\infty}\lvert\Psi(x,t)\rvert^2\,\mathrm{d}x = 0$ arises only for unphysical solutions to the 1D SE.
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T	F	The expectation of $\langle H^2\rangle = \left(\sum_i \lvert c_i\rvert^2 E_i\right)^2$.
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- Page 16: Determine $\Psi(x,t)$.
- Page 22: In general,

$$\langle f|g\rangle = \int_{-\infty}^{+\infty} f^* g\,\mathrm{d}x \in \mathbb{R}.$$

- Page 10: $E > V_0$: Reflection (QM behavior) and transmission wave.
- Page 36: The energy levels are

$$E_n = -\frac{1}{n^2}\left(\frac{m}{2\hbar^2}\left(\frac{e^2}{4\pi\varepsilon_0}\right)^2\right) \approx -\frac{13.6\,\mathrm{eV}}{n^2}.$$

- Page 37: Then, the general spin state can be written as a linear combination:

$$|\chi\rangle = a|\tfrac{1}{2},+\tfrac{1}{2}\rangle + b|\tfrac{1}{2},-\tfrac{1}{2}\rangle,$$
$$|\chi\rangle = a\begin{bmatrix}1\\0\end{bmatrix} + b\begin{bmatrix}0\\1\end{bmatrix},$$
$$|\chi\rangle = \begin{bmatrix}a\\b\end{bmatrix}.$$

- Page 38: Thus, $c = \frac{3}{4}\hbar^2$ and $e = 0$. Similarly

$$\begin{bmatrix}c & d\\ e & f\end{bmatrix}\begin{bmatrix}0\\1\end{bmatrix} = \frac{3}{4}\hbar^2\begin{bmatrix}0\\1\end{bmatrix} \qquad \Rightarrow \qquad \begin{bmatrix}d\\f\end{bmatrix} = \frac{3}{4}\hbar^2\begin{bmatrix}0\\1\end{bmatrix}$$