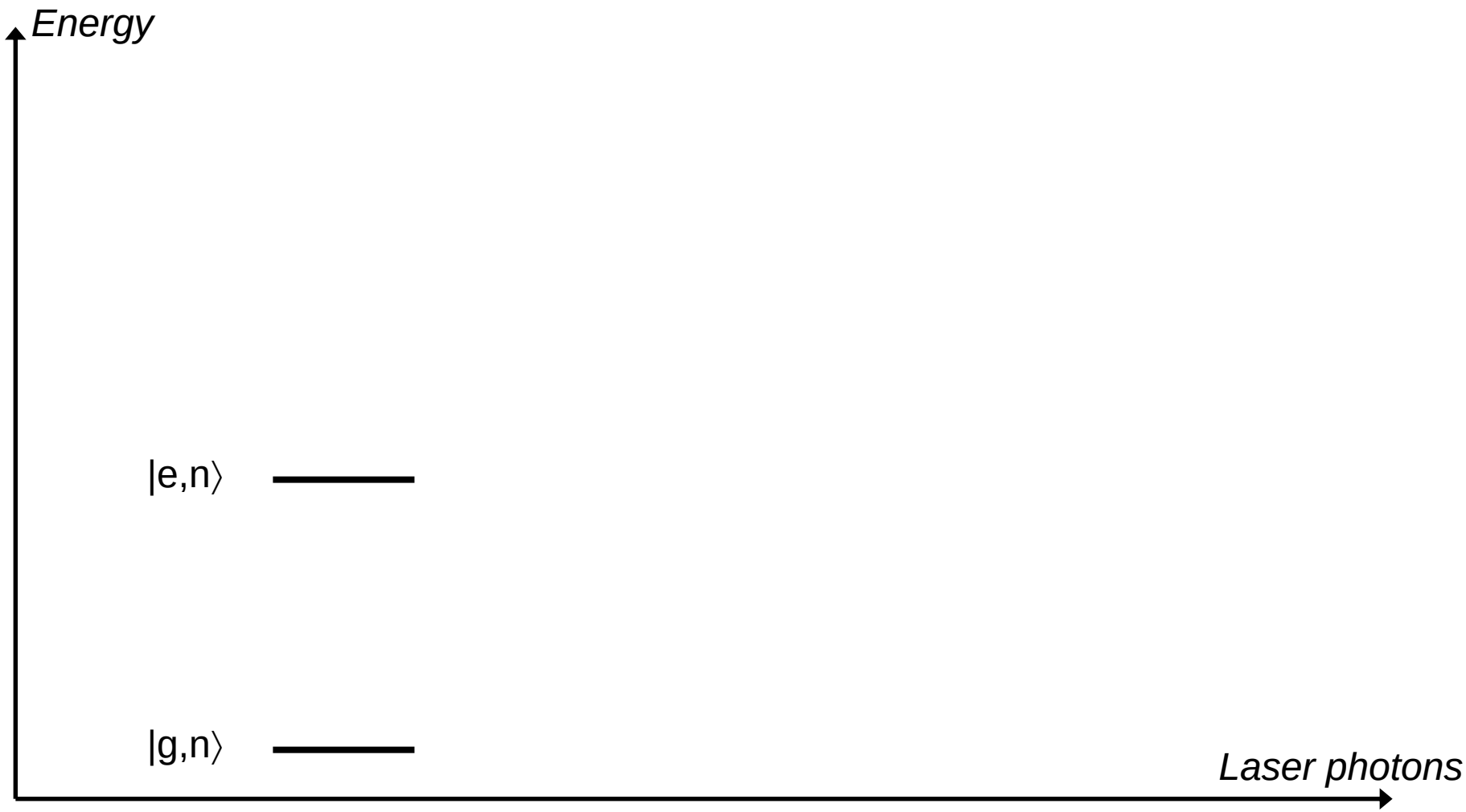
Mollow Triplet (I)

Atom + Laser Field (dressed atom picture), $\delta=0$



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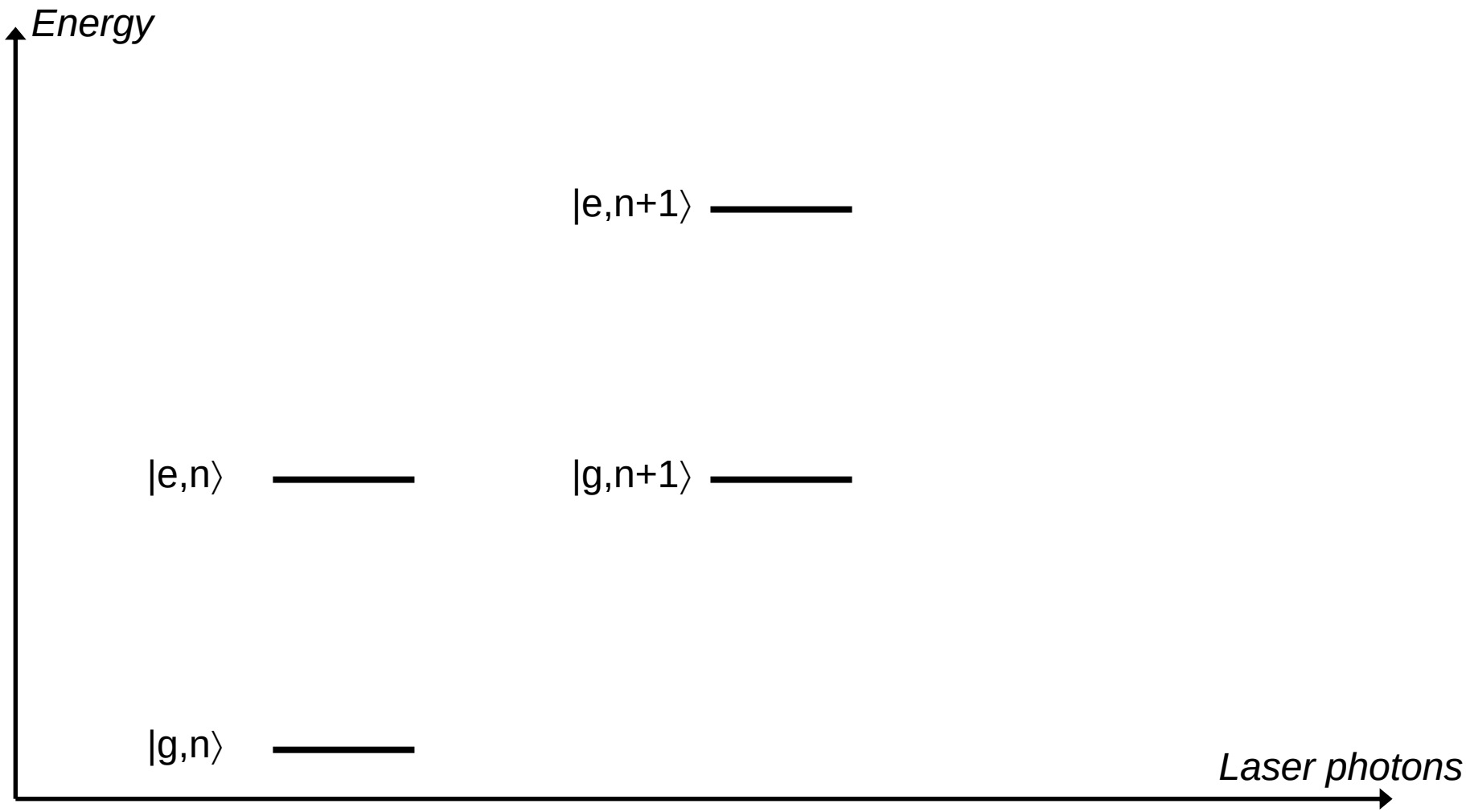

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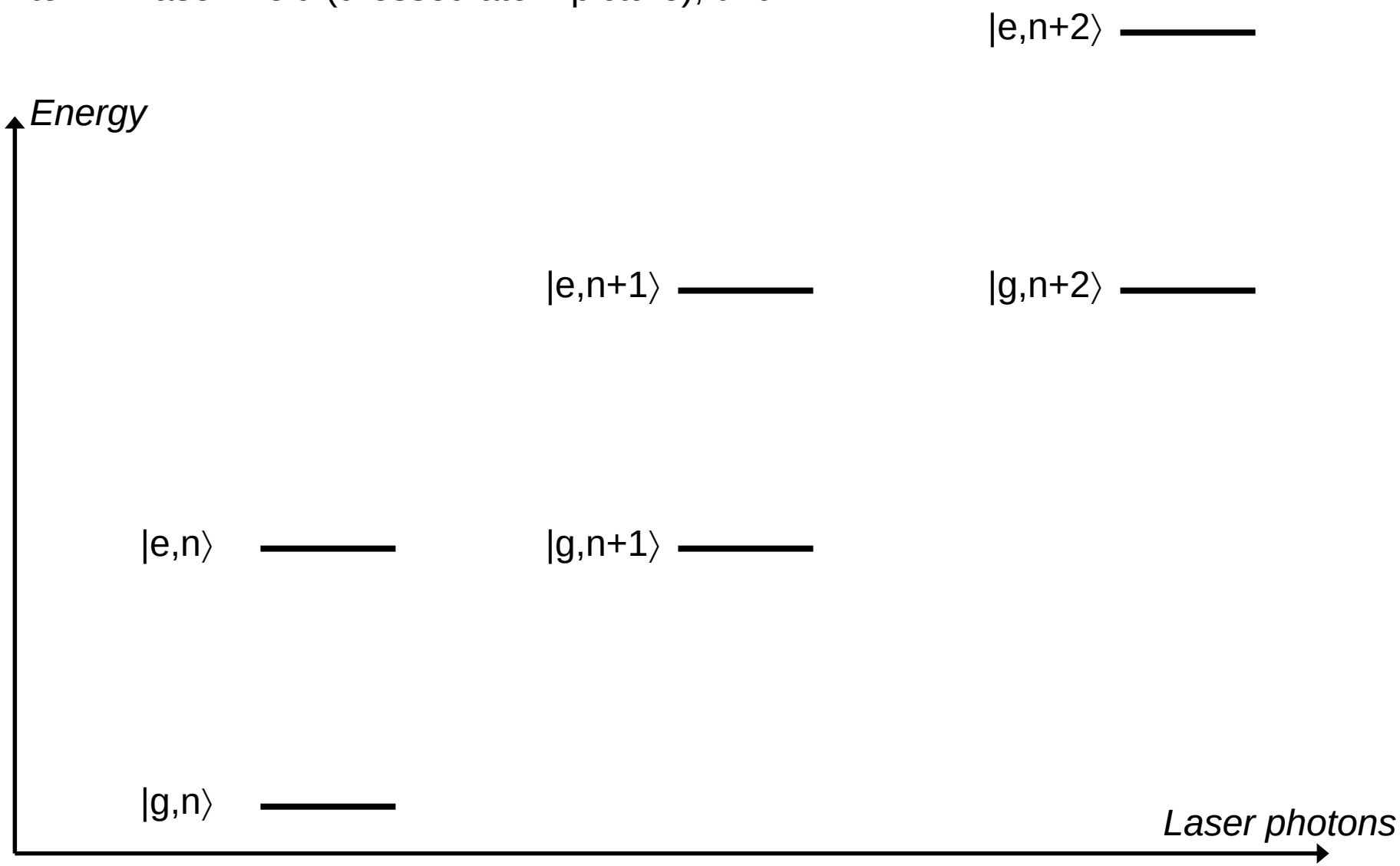

Mollow Triplet (II)

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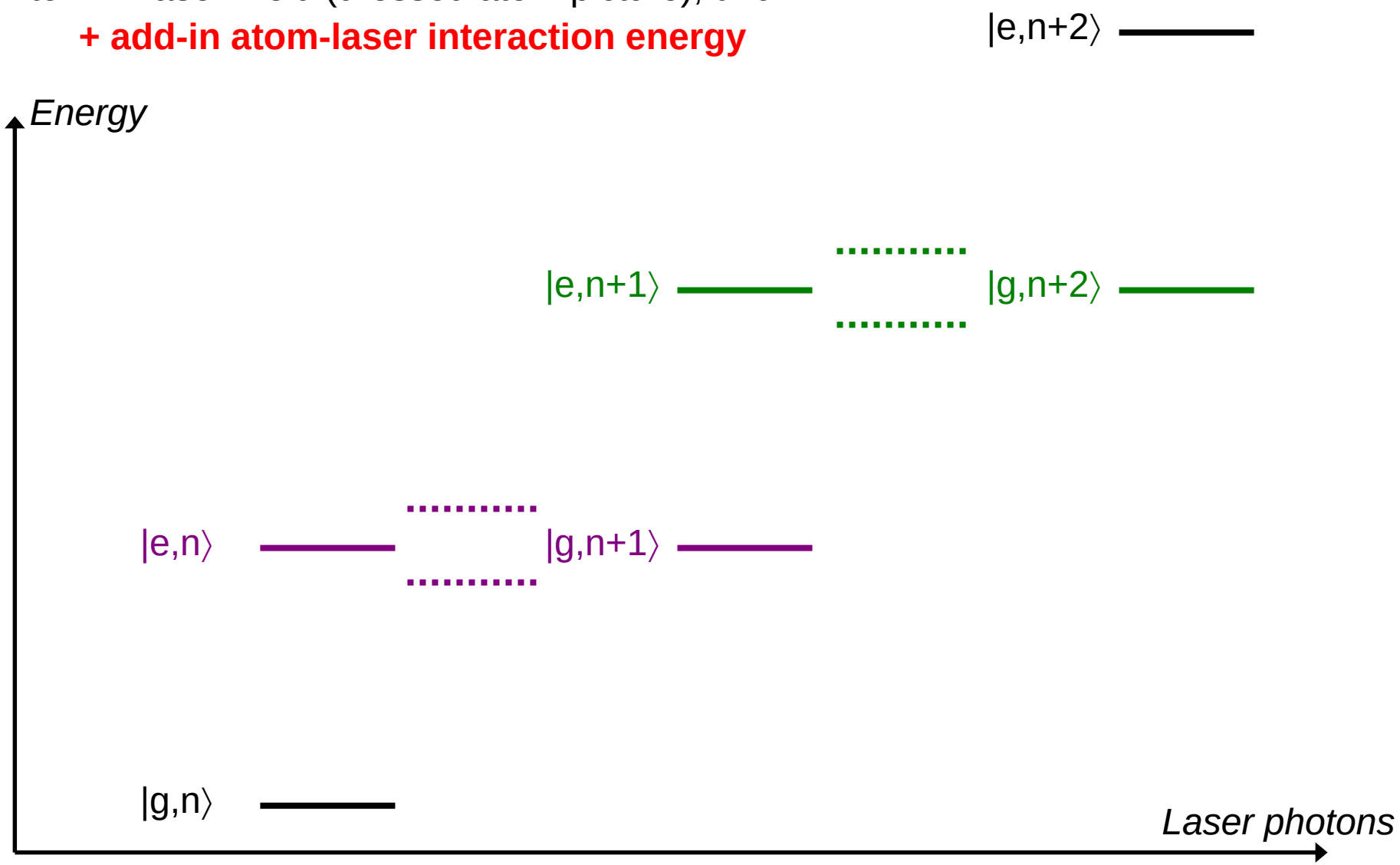
+ add-in atom-laser interaction energy



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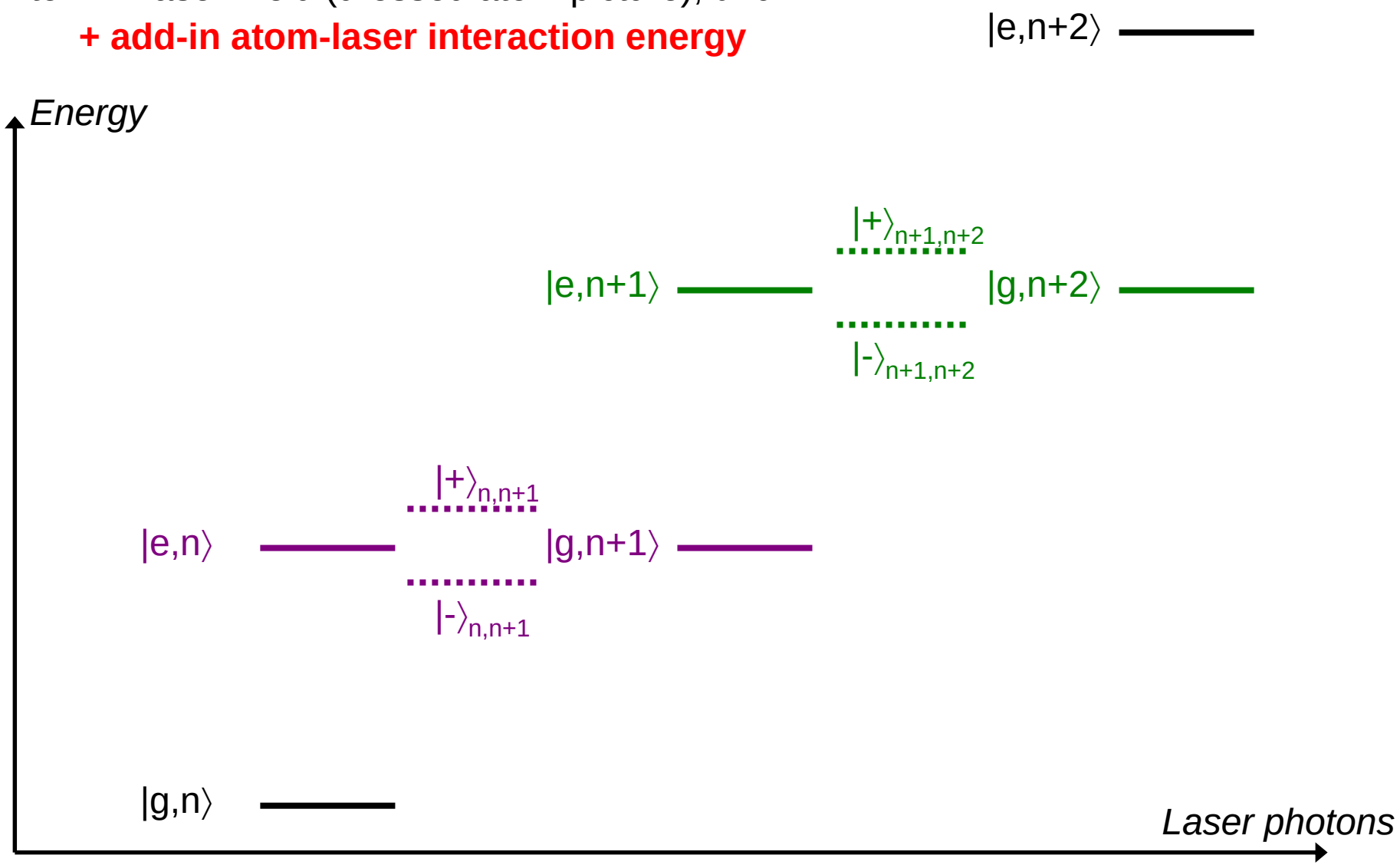

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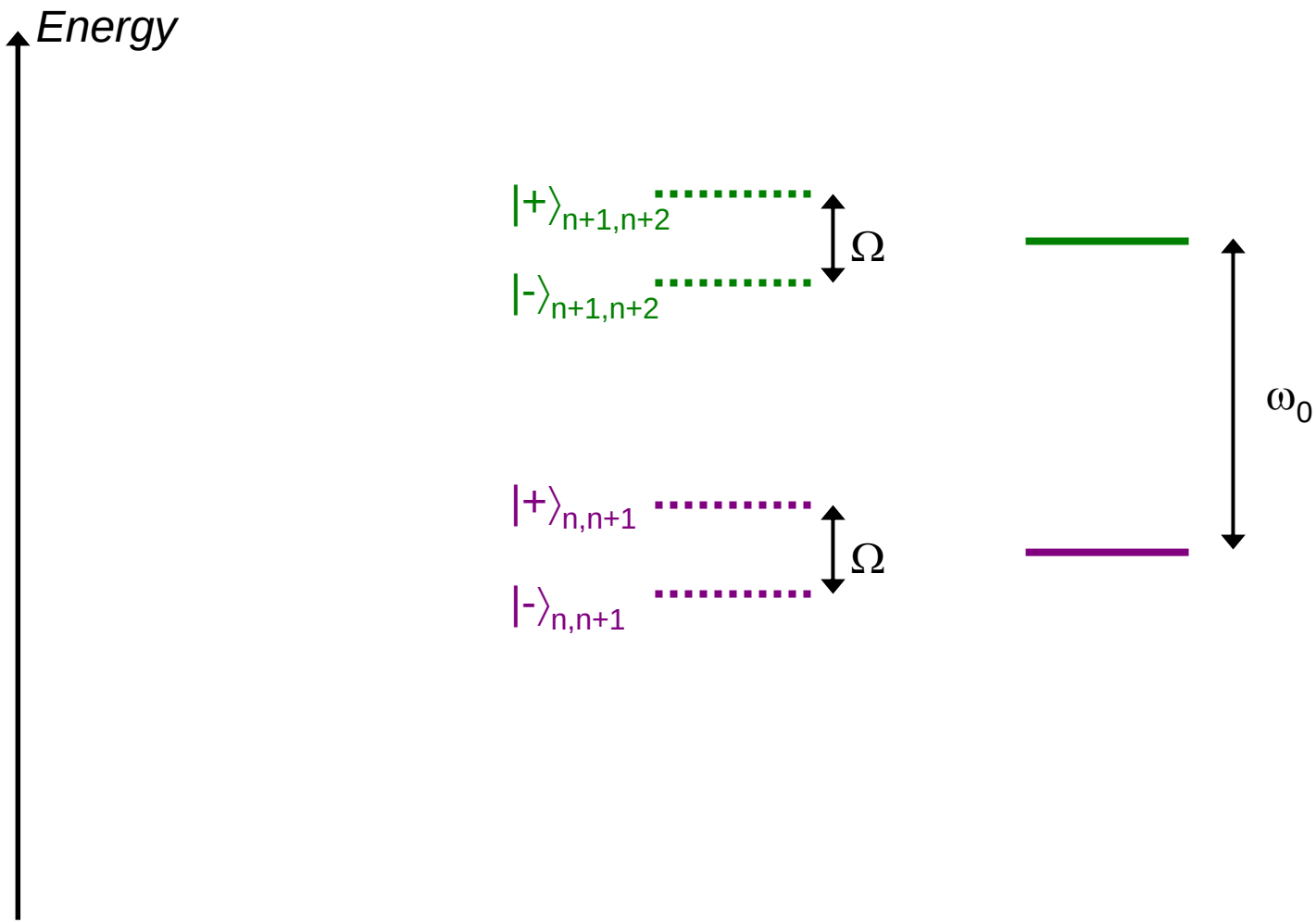

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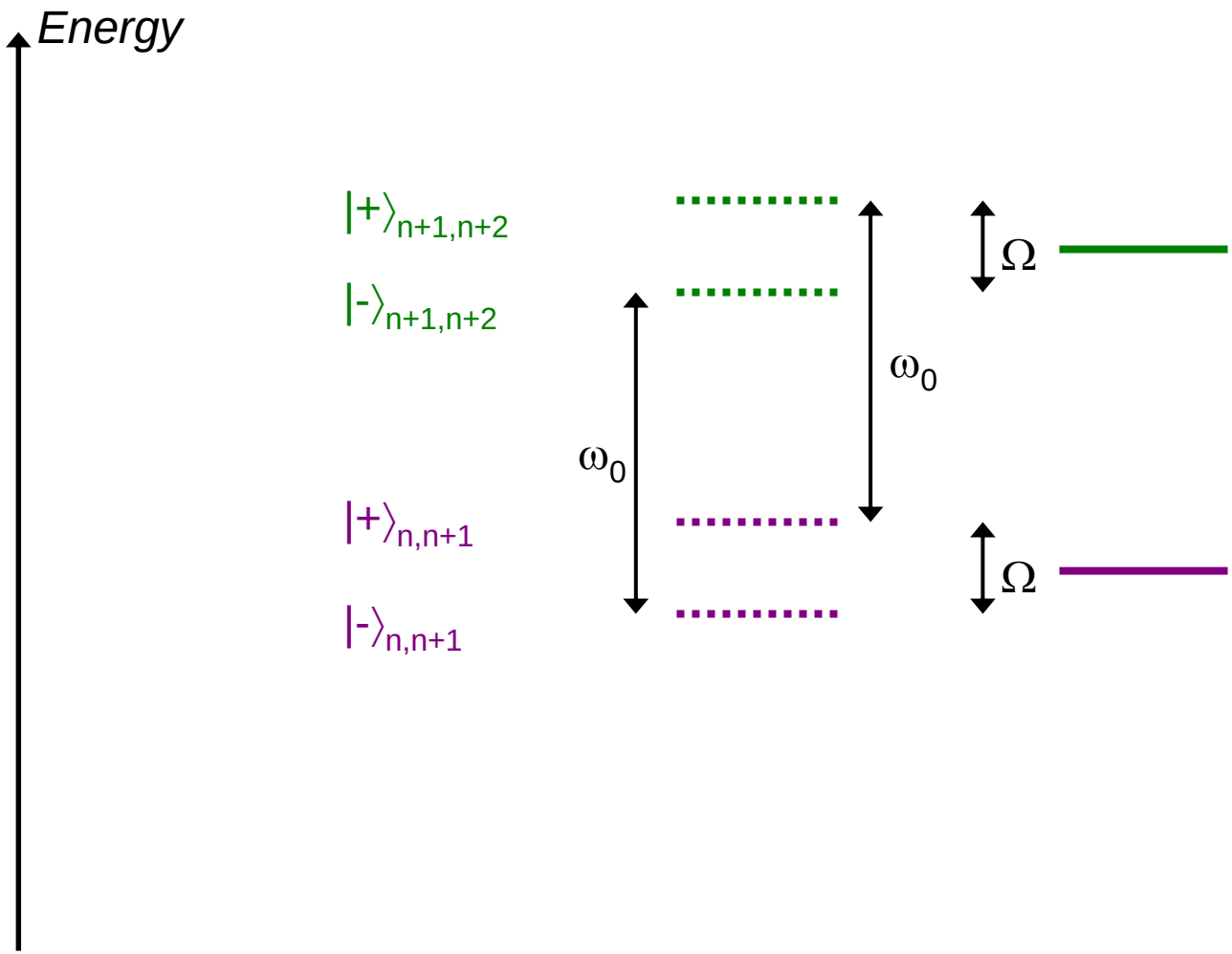

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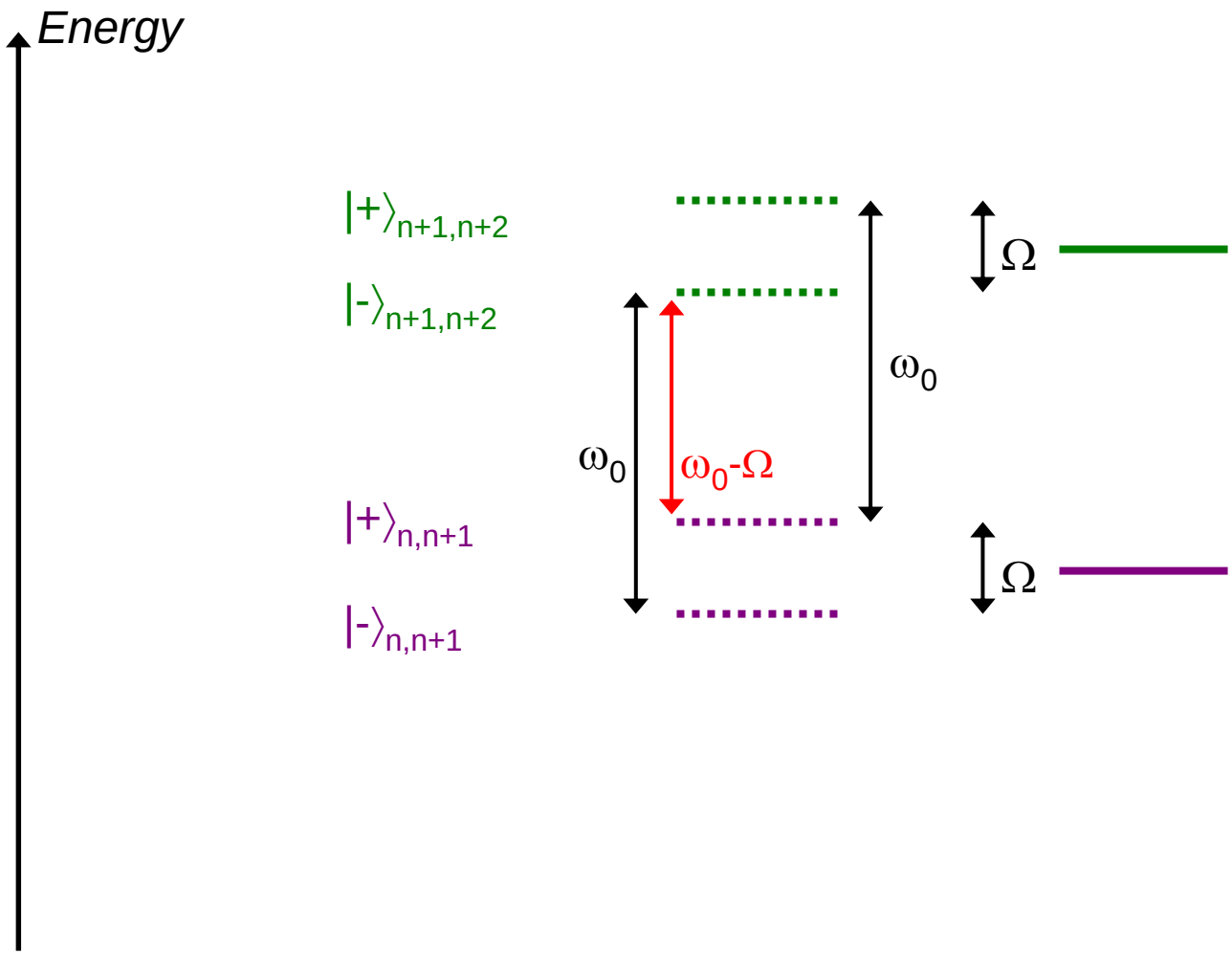

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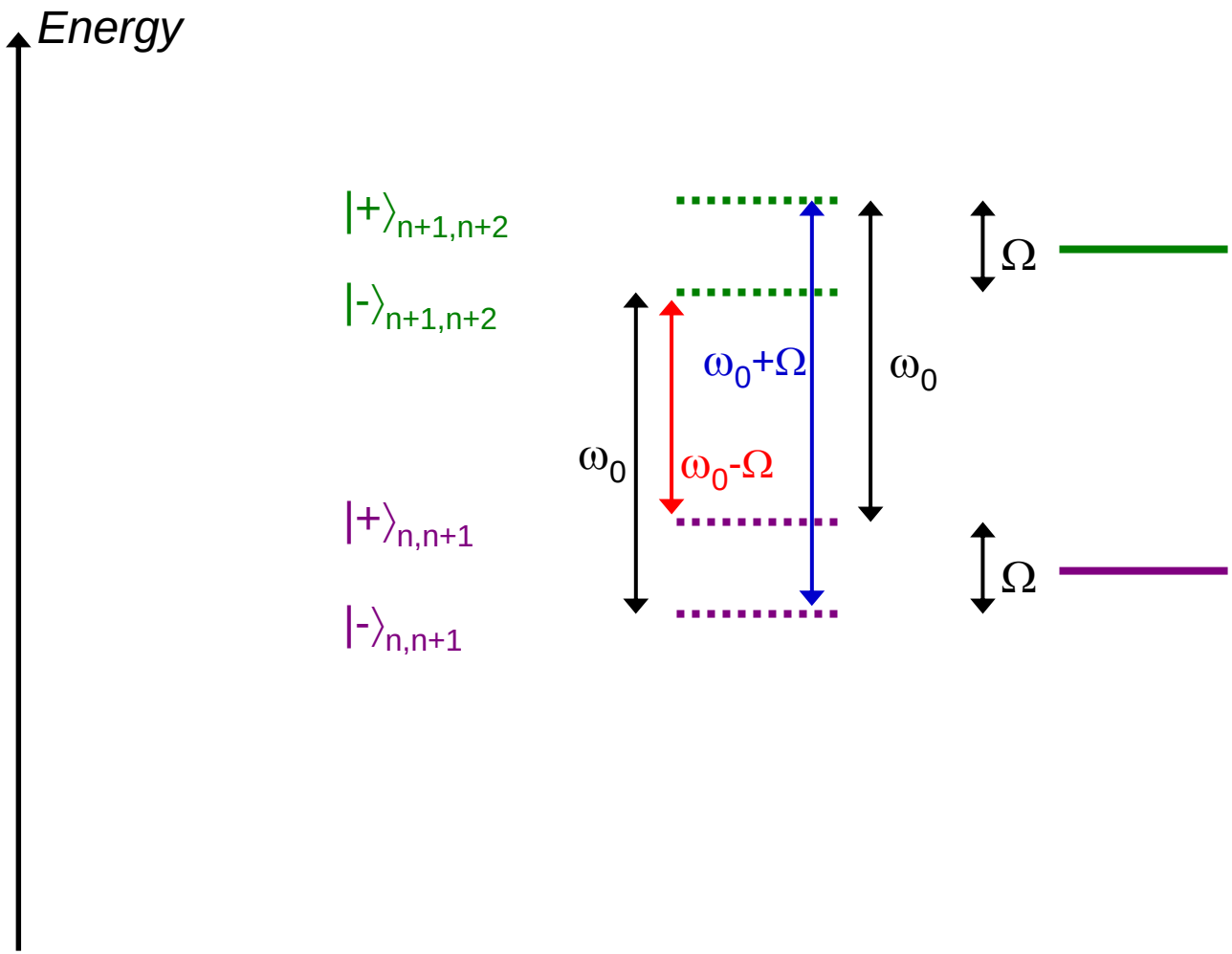

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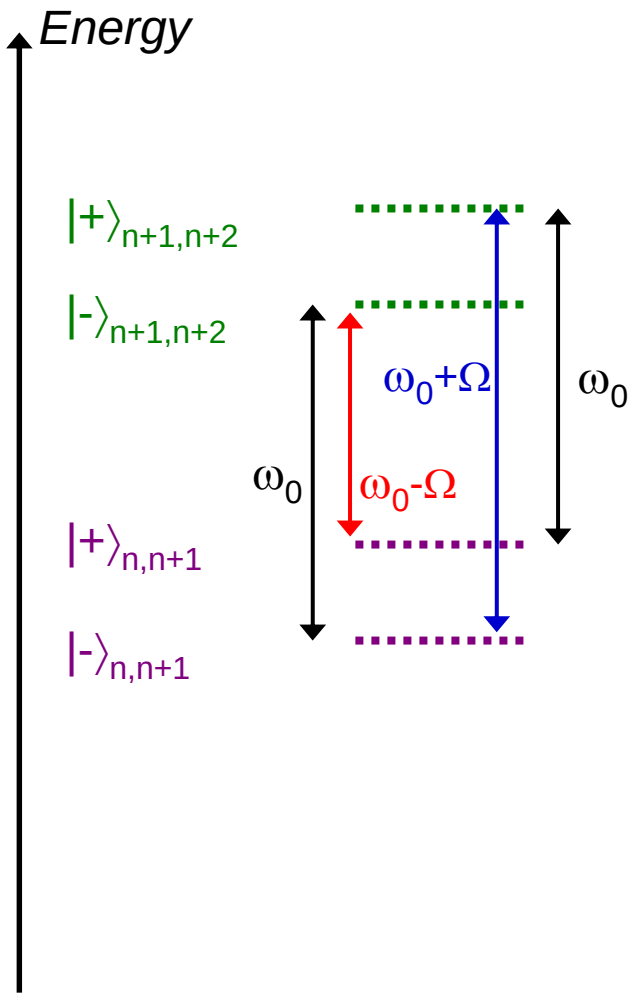

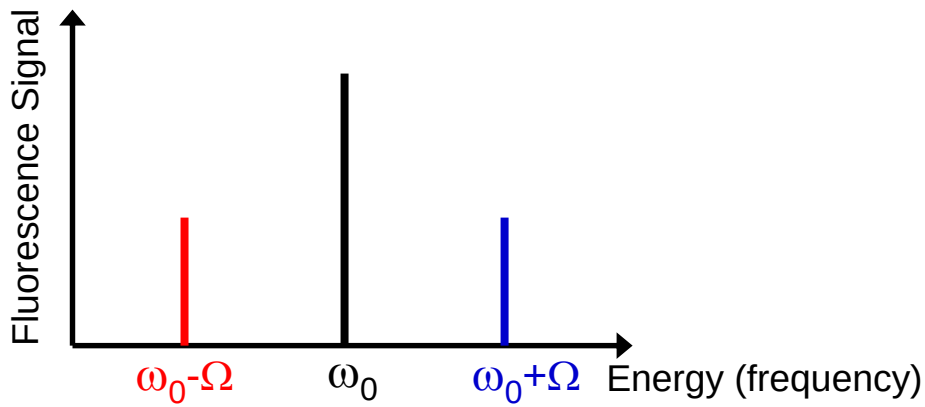

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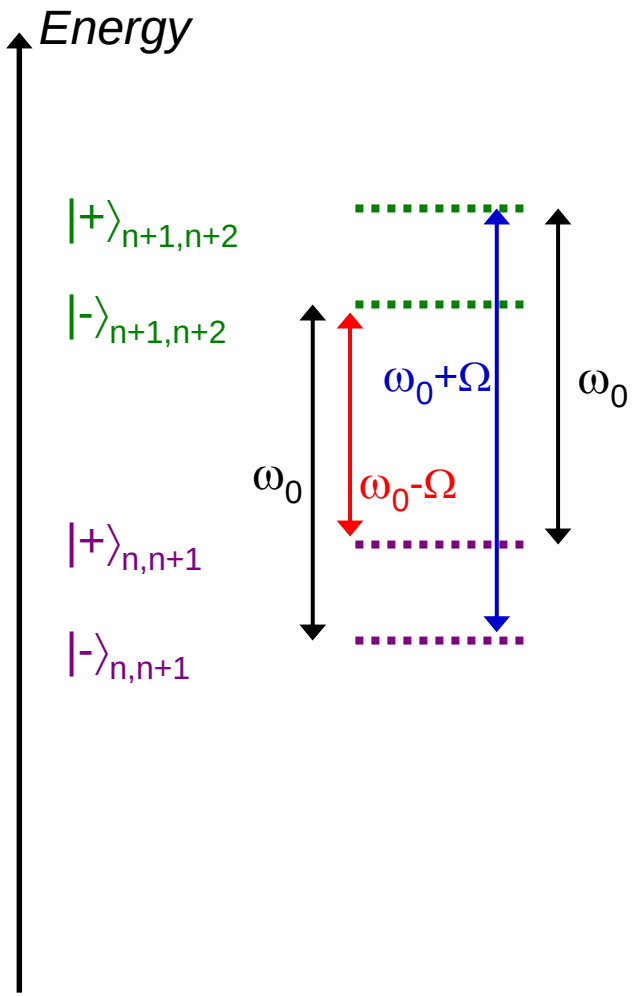
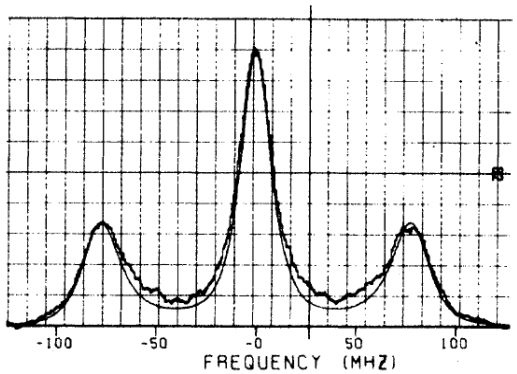
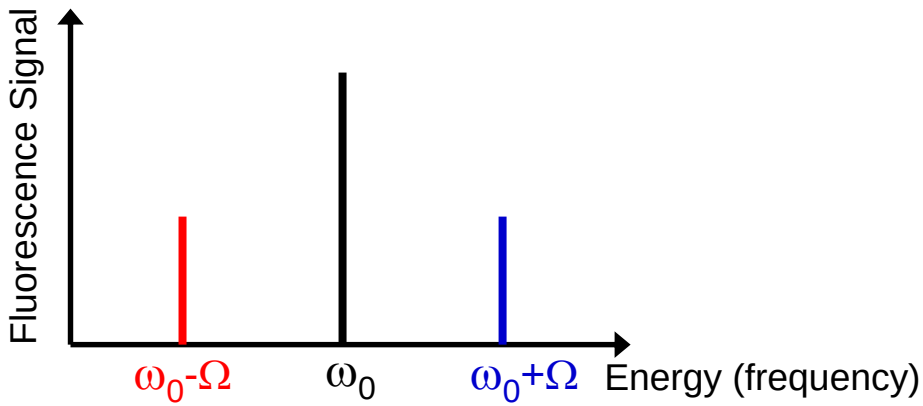


Mollow triplet in Sodium at 589 nm



[Grove et al., Phys. Rev. A 15, 227 (1977)]



Laser Dipole traps

Example of AC Stark Shift:

- 10 mW of laser power.
- focused down to 10 μm.
- Detuning: $\delta = -2\pi \times 100$ GHz.

Recall

$$\Delta E = \frac{\hbar}{4}\frac{\Omega^2}{\delta} \quad \text{with} \quad \Omega = \frac{q_e \langle g | r | e \rangle \cdot E}{\hbar}$$

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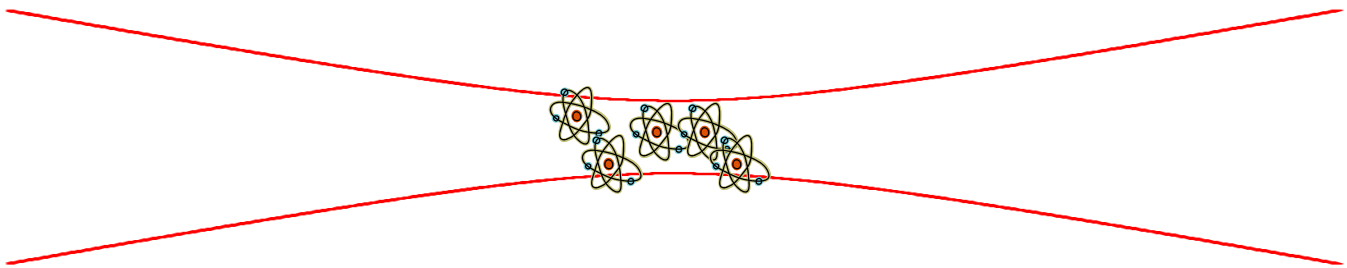

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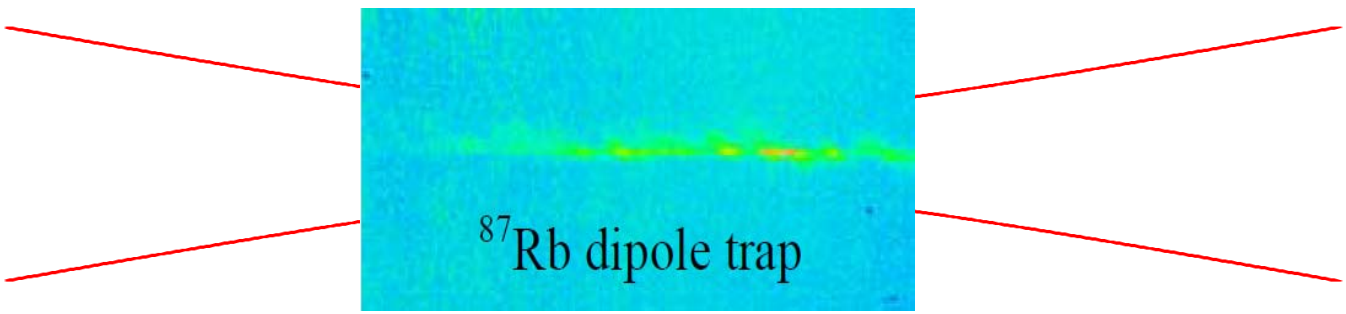
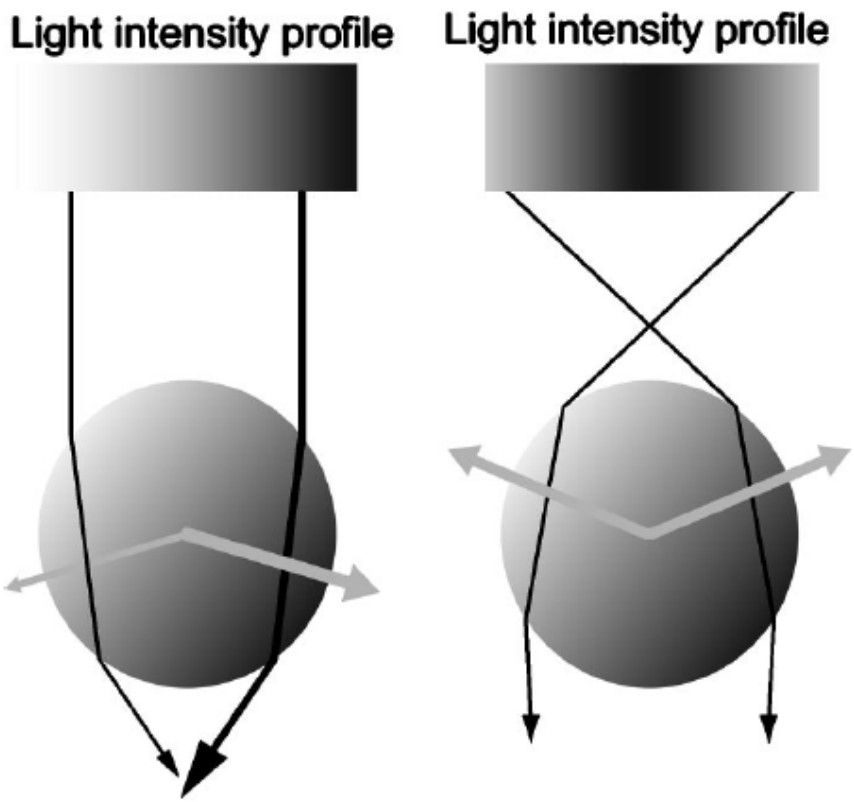
Atoms are trapped by focused laser light !!!



Optical Tweezers

The classical picture of dipole trapping is given by ray optics:



Sphere attracted to region of high intensity.

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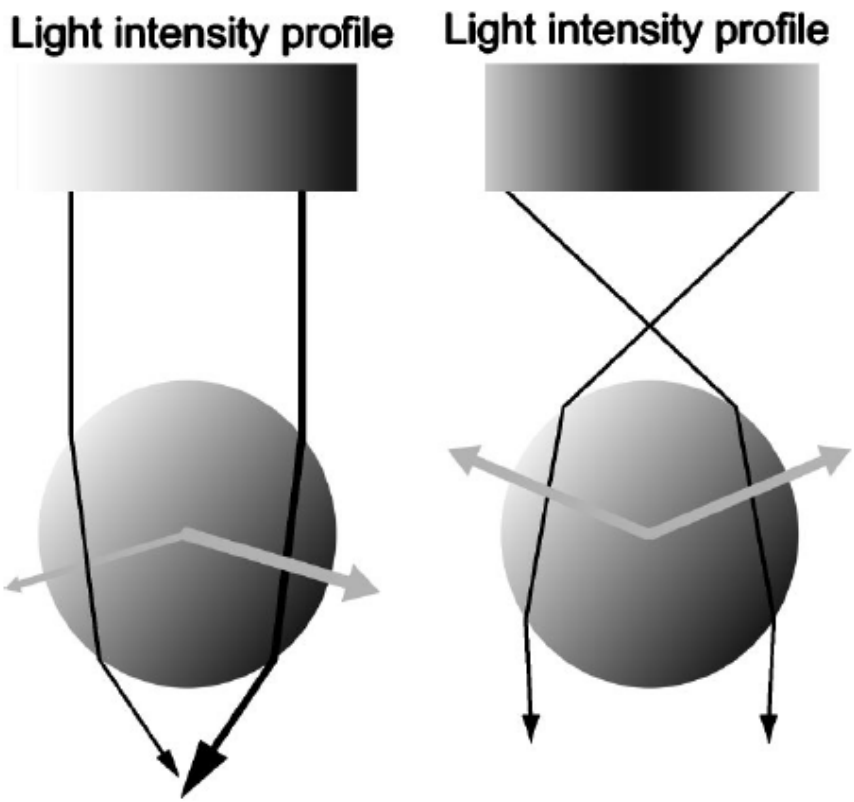

Frequently used in biophysics to manipulate cells !!!

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