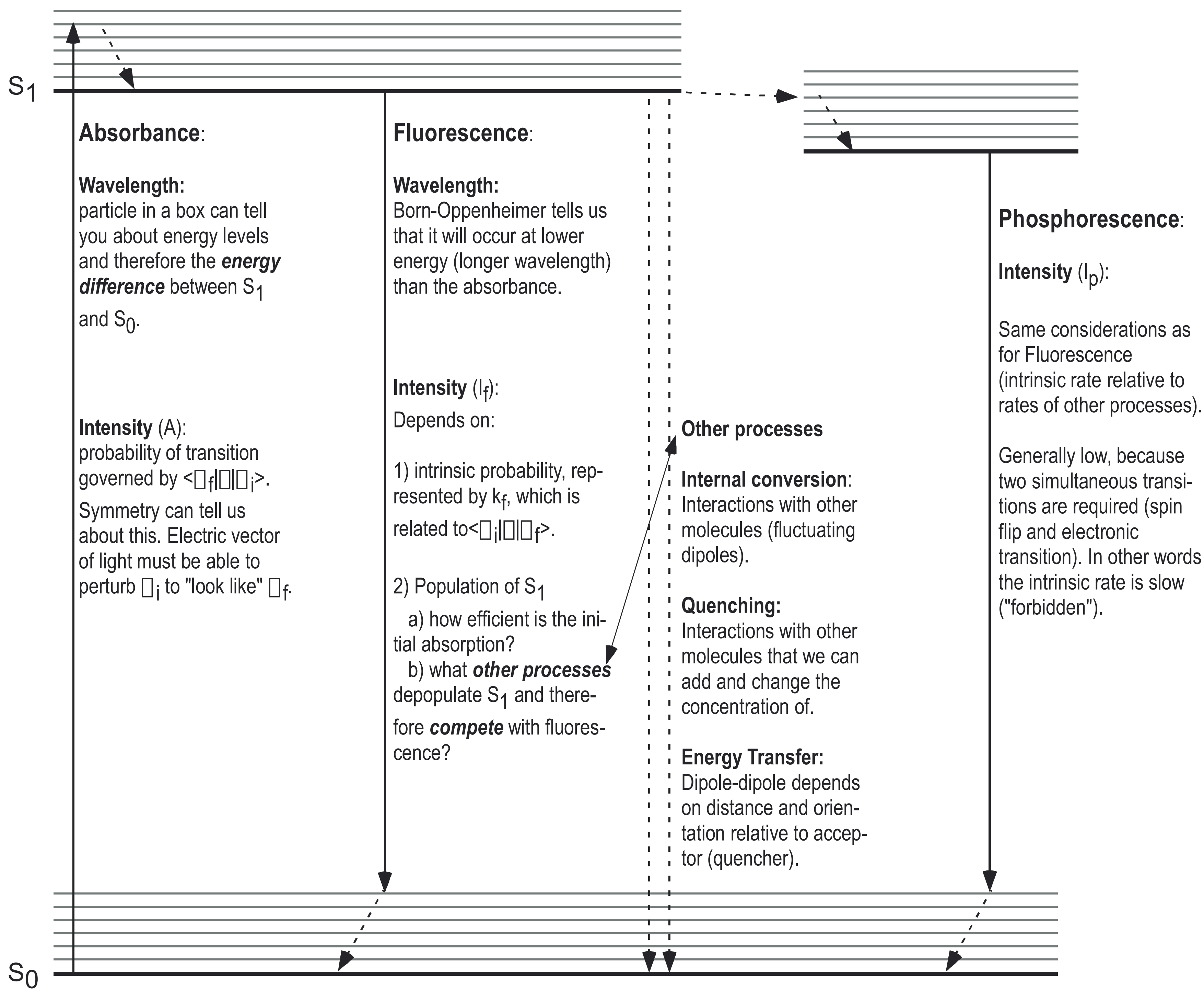

S_1
S_0
Absorbance:
Wavelength:
particle in a box can tell you about energy levels and therefore the ***energy difference*** between S_1 and S_0.
Intensity (A):
probability of transition governed by <$□_f$|□|$□_i$>.
Symmetry can tell us about this. Electric vector of light must be able to perturb $□_i$ to "look like" $□_f$.
Fluorescence:
Wavelength:
Born-Oppenheimer tells us that it will occur at lower energy (longer wavelength) than the absorbance.
Intensity (I_f):
Depends on:
1) intrinsic probability, represented by k_f, which is related to<$□_i$|□|$□_f$>.
2) Population of S_1
a) how efficient is the initial absorption?
b) what ***other processes*** depopulate S_1 and therefore ***compete*** with fluorescence?
Other processes
Internal conversion:
Interactions with other molecules (fluctuating dipoles).
Quenching:
Interactions with other molecules that we can add and change the concentration of.
Energy Transfer:
Dipole-dipole depends on distance and orientation relative to acceptor (quencher).
Phosphorescence:
Intensity (I_p):
Same considerations as for Fluorescence (intrinsic rate relative to rates of other processes).
Generally low, because two simultaneous transitions are required (spin flip and electronic transition). In other words the intrinsic rate is slow ("forbidden").