# Enhancing Photoelectric Current by Nonclassical Light

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We study the photoelectric current generated by a driving light with nonclassical photon statistics. Due to the nonclassical input photon statistics, it is no longer enough to treat the driving light as a planar wave as in classical physics. We make a quantum approach to study such problems and find that: when the driving light starts from a coherent state as the initial state, our quantum treatment well returns the quasi-classical driving description; when the driving light is a generic state with a certain P function, the full system dynamics can be reduced as the P function average of many "branches" – in each dynamics branch, the driving light starts from a coherent state, thus again the system dynamics can be obtained in the above quasi-classical way. Based on this quantum approach, it turns out the different photon statistics does make differences to the photoelectric current. Among all the classical light states with the same light intensity, we prove that the input light with Poisson statistics generates the largest photoelectric current, while a nonclassical sub-Poisson light could exceed this classical upper bound.

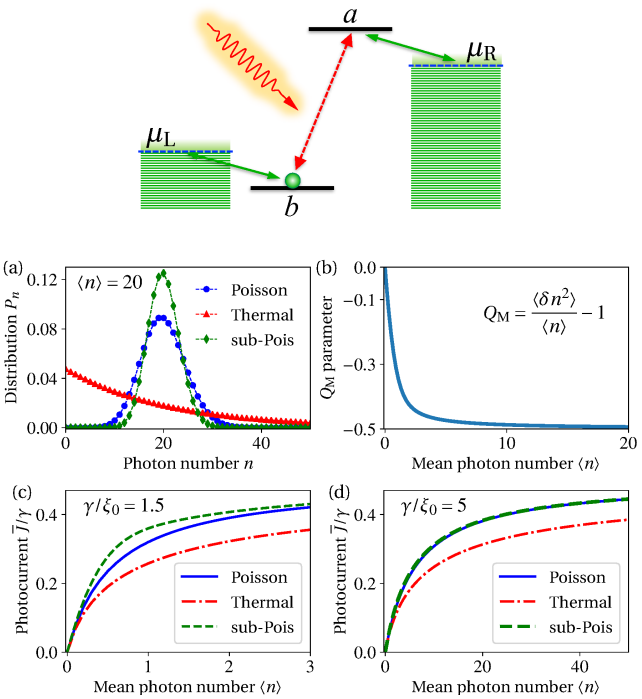


Figure 1: Demonstration for the photoelectric converter model. Under the same input light intensity, the sub-Poissonian light generates a larger photoelectric current than classical light states

## References

[1] H-Y Yao and S-W Li, New J. Phys. **22**, 123011 (2020)