

# Crossovers: Polariton BEC to lasing, and equilibrium to nonequilibrium BEC

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Bose-Einstein condensation (BEC) of polaritons is one of many types of coherent light-matter interaction; in general, the transition between this state and other states, such as photon condensation, lasing, and superradiance, can be either continuous or discontinuous, leading to a complicated phase diagram. I will discuss the underlying physics, including unifying principles, and the use of the quantum Boltzmann equation and Gross-Pitaevskii equation for modeling nonequilibrium dynamics.

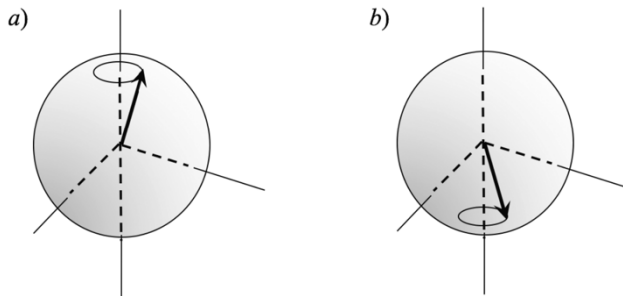


Figure 1. a) Bloch sphere representation of the state of electronic excitations in a laser, with inversion. b) Bloch sphere representation of the state of electronic excitations in an excitonic or polaritonic condensate. From Ref. [1].

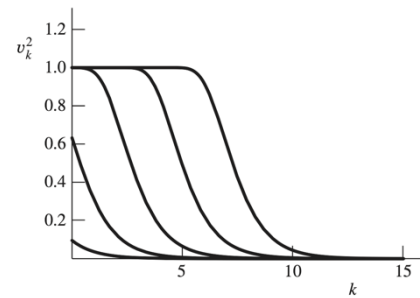


Figure 2. Electron occupation number as exciton density is increased from BEC to BCS limit. From Ref. [1].

**Acknowledgements.** This work has been supported by the US National Science Foundation under grant DMR-2306977.

## References

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