



**Appunti di Fisica '10  
&  
Dottorato di Ricerca in Fisica**

**18 maggio ore 15.30  
aula E. Majorana, Dipartimento di Fisica**

**Non-equilibrium quantum many-body physics  
with optical systems**

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Experiments have recently started providing first evidences of a variety of non-equilibrium many-body effects in gases of exciton-polaritons in semiconductor microcavities: Bose-Einstein condensation, spontaneous nucleation of vortices, superfluidity, peculiar Goldstone modes in the presence of BEC.

In this talk we shall review the contribution of the Trento group to the theoretical understanding of such systems. In particular, we shall discuss the analogies and differences that the intrinsic driven-dissipative nature of these systems introduces as compared to standard systems such as liquid Helium and ultracold atoms. Particular attention will be devoted to the conceptual nature of superfluidity in polariton fluids.

New developments in the direction of exploring the peculiar phases that originate from the interplay of strong correlations with the non-equilibrium condition will be finally presented.