Appunti di Fisica '18
&
Dottorato di Ricerca in Fisica

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Ionic liquids – fundamentals and application in next generation batteries

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Ionic liquids have been highlighted as a candidate for new and safe electrolytes for next generation batteries. The attractiveness arises from the intrinsic properties such as high ionic conductivity, low vapour pressure, and high thermal, chemical and electrochemical stability. However, ionic liquids are also of high interest from a more fundamental point of view. Being just made up of ions coulombic interactions naturally dominate, but due to the generally bulky nature of the constituent ions there is in most cases also a large contribution from van der Waals forces. There is now a general agreement that the presence of competing interactions is the cause for the presence of structural heterogeneities on the nm-length scale in ionic liquids.

In this seminar I will present our work on both the fundamental aspects of ionic liquid electrolytes as well as their application to LiS-batteries, one of the most promising technologies for high capacity energy storage. We have investigated electrolytes based on neat ionic liquids, solvated ionic liquids, and mixed electrolytes where organic solvents are added to the ionic liquid electrolyte.

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