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The potential energy landscape of glass-forming materials: a computer study

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Glass-forming systems show remarkable properties in the supercooled liquid phase (e.g. non-Arrhenius temperature dependence or strong connections between thermodynamics and dynamics) as well as in the glassy phase (e.g. the emergence of tunneling centres at very low temperatures). Another aspect deals with the surprisingly fast dynamics of ions in some glassy materials. In this talk a concept is presented which allows one to describe all these features in a coherent way. It is based on the study of the potential energy landscape. Using appropriate numerical tools as well as physical insight it is possible to elucidate the underlying nature of the many relevant features in the supercooled as well as in the glassy regime. Among other things the difference between strong glasses and fragile glasses (Arrhenius vs. Non-Arrhenius temperature dependence) can be expressed in terms of specific properties of the potential energy landscape.