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**SURFACE BOILING – AN OBVIOUS BUT LIKE NO OTHER DECAY MODE
OF HIGHLY EXCITED ATOMIC NUCLEI**

Essentials of a generalized compound nucleus model are introduced based on a concept of an open microcanonical ensemble which considers explicitly the role of the diffuse surface domain and of the thermal expansion of nuclear systems in the quest for maximum entropy. This obvious generalization offers a unique and universal thermodynamic framework for understanding the changes in the gross behavior of excited nuclear systems with increasing excitation energy and, specifically, the competition between different statistical decay modes, including classical evaporation and binary fission, but also the Coulomb fragmentation of excited systems into multiple fragments – the famed multifragmentation. Importantly, the formalism offers a natural explanation, in terms of boiling or *spinodal vaporization*, for the experimentally observed appearance of limiting excitation energy that can be thermalized by an excited nuclear system and the associated limiting temperature. It is shown that it is the thermal expansion that leads to volume boiling in an infinite matter and surface boiling in finite nuclei. The latter constitutes an important and universal, but hitherto unappreciated decay mode of highly excited nuclei, a mode here named *surface spinodal vaporization*. It is also shown that in iso-asymmetric systems, thermal expansion leads to what constitutes distillation – a decay mode here named *distillative spinodal vaporization*.

Keywords: compound nuclear model, excited nuclear systems, spinodal vaporization, excitation energy finite nuclei, distillative spinodal vaporization.