

**Coherent States in the Longitudinal Dynamics of Electron Beams in Particle Accelerators,**

S. DE MARTINO, S. DE SIENA, Dipartimento di Fisica dell'Università and INFN, Salerno, Italy, R. FEDELE, Dipartimento di Scienze Fisiche, Università "Federico II" and INFN, Napoli, Italy - The possibility to generate and control coherent states for a charged particle bunch in a circular accelerating machine in the presence of radiation damping and quantum excitation is investigated in the framework of the Thermal Wave Model. It is proven that in correspondence of arbitrary time-variations of a radio-frequency (RF) strength, a Schrödinger-like equation predicts the final equilibrium state, toward which the system spontaneously goes, where a sort of macroscopical coherence is reached. This state corresponds to an example of the Glauber-Sudarshan-Klauder coherent states widely considered in quantum optics and optical fibres. In addition, it is shown that for suitable time-varying RF strength, coherent states are also analytically possible in each time during the evolution toward the above asymptotic equilibrium, and the possibility that allow for carrying out these analytical predictions in particle accelerators is discussed.