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Longitudinal BD in Circular Machines I

Thursday 28 September 2023 13:45 (1 hour)

The lectures present an introduction to longitudinal beam dynamics for circular accelerators.

It presents different circular accelerator types (betatron, cyclotron, synchrocyclotron, synchrotron), and focuses more on the longitudinal beam dynamics in synchrotrons.

The operation principle of synchrotrons is described, synchrotron oscillations in energy and phase are discussed together with their representation in phase space.

The lecture discusses the equations of motion, the stability conditions for the longitudinal oscillations, and introduces the Hamiltonian of longitudinal synchrotron motion.

It also explains the bunch transfer from one accelerator to the next and shows the importance of a proper matching of the longitudinal parameters.

Finally, the RF manipulations in the PS for the generation of the bunch structure of the LHC beam are explained.

Presenter: TECKER, Frank (CERN)