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## Longitudinal Beam Dynamics I

*Tuesday 11 March 2025 11:20 (1 hour)*

Contains the course material for the part I and part II.

The lectures present an introduction to longitudinal beam dynamics on a basic level, focused rather on the concepts than the mathematical details.

It covers the basic methods of acceleration in a linac, presents different circular accelerator types, 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, and their stability conditions presented.

The lecture also shows the importance of a proper matching of the longitudinal parameters when the beam is transferred from one accelerator to the next.

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

**Presenter:** Dr TECKER, Frank (CERN)