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Non Linear Dynamics - Phenomenology I

Thursday 21 November 2024 08:30 (1 hour)

This lecture will review concepts for representing non-linear particle motion starting from analysing dynamics on phase space through fixed point identification. After introducing 1-turn (Poincaré) maps, the motion close to a resonance will be reviewed and its role on the onset of chaotic motion, leading to particle diffusion. Finally, methods for analysing and detecting chaotic motion will be presented, through direct particle tracking and the concept of dynamic aperture estimation. Other methods will be briefly introduced, including Lyapunov exponent and Frequency map analysis. Several examples of the application of these methods in design studies and improvements in the performance of operating hadron and lepton synchrotrons, storage rings, and colliders will finally be given.

Presenter: PAPAPHILIPPOU, Yannis (CERN)