

## Outline

### **A. Introduction to Particle Accelerators (Basics, Pre-acceleration era and the Time line)**

- a) The main players and their inventions (devices)
- b) A second history line (understanding the principle of acceleration)
- c) A third history line (development of “true accelerators”: Wideroe’s Betatron, Lawrence’s cyclotron, Synchrotrons and Colliders)
- d) Understanding the ideas behind acceleration and their implementation
- e) Subsequent developments (Livingstone Plot)
- f) A classification of Accelerators and applications in important areas other than HEP

### **B. Understanding Particle beam dynamics in an accelerator (Basics)**

- a) Longitudinal Beam dynamics : RF acceleration and concept of cavity, Momentum compaction, Phase stability in “linear and cyclic systems”
- b) Hard edge model and Transverse beam dynamics: i) in Magnetic fields and, ii) in Electrostatic fields (Dipoles, Quadrupoles: strong and weak focusing)
- c) The Optics analogy & Lattice structure
- d) LHC : A special case (its injector, layout, Beam parameters, SC cavities)

### **C. Future**