

# **Introductory Course on Accelerator Physics**

**Budapest, 2-14 October, 2016**

**Introduction to tutorial**

## Basic idea: Put the course material into practice

### Traditional style in previous schools:

- Work on a specific problem with a specific solution, this often leads to some attitude towards the exercise:
  - "I know the formulae, I just have to figure out how to put them in the problem"
  - "I've always done it that way and I was successful (i.e. it works in examinations)"
- You will not always do it that way, in your job you will flunk
- The problems always come in the context of a larger undertaking, not as isolated bits
- Understanding the concept, even at high level, does not ensure that it can be applied in an appropriate manner

**We (CAS Programme Committee) decided to try a new strategy:**

- Should be closer to everyday working practice than traditional tutorials.**
- Work in small groups on an "Accelerator Project", as a "Real World Scenario"**
- This style of working is increasingly used by universities (same reasoning as above)**
- Should encourage to be critical and decision making**
- The exercise and some hints provided by the handout**

**Exercise:**

**Develop a conceptual design for a particle accelerator complex (for particle physics) with the following features:**

- **Centre of mass energy 50 TeV**
- **Desired Luminosity:  $L \approx 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$**
- **Maximum magnetic field for any type of magnet 10 T**
- **Maximum length of the machine must not exceed 100 km**
- **Maximum beam energy 1 GJ**
- **Relative momentum spread smaller than  $\frac{\Delta p}{p} \leq 1.0 \cdot 10^{-4}$**
- **To avoid significant loss of luminosity and time resolution, the bunch length should not exceed 0.1 m**
- **Develop some ideas for the required injector chain**

## Working style:

- **No unique solution: some creativity and initiative needed !**
- **Working in a small group (6 - 7 people, see later)**
- **Each group has a tutor assigned to serve as facilitator and guide, will be available day and night ..**
- **Discussions and interactions with lecturers highly encouraged (and needed !)**
- **Use the scheduled discussion sessions**
- **Tutorial sessions (2) interleaved during the school to discuss in larger groups and with a tutor to get help to sort out upcoming problems.**
- **For final tutorial: groups should prepare a short (10') summary of their proposal**

**What should be the outcome:**

- **Concept for a proposal with a realistic parameter set**
- **Discuss and propose an injector chain**

**What should not be the outcome:**

- **Full design of the machine(s)**