

HST 2004

Programme Overview



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The 2' HST users' guide

- Turn yourself into a sponge: don't miss any opportunity to absorb whatever information will be passed to you during these three weeks
- Closely follow all the activities, in particular the discussions
- Don't be afraid to ask questions, argue with your lecturers, force them to clarify anything obscure
- Keep asking yourself:
 - would this material interest my pupils?
 - how can I explain to them these ideas?
 - am I being offered useful material, in an appropriate form?
- Identify in the lectures/visits/discussions/etc seeds for original work to be done during your stay:
 - lectures for your students, presentations for the public, projects in conjunction with other classes or schools in your region
 - material for the HST web page, to be shared with other teachers worldwide
 - etc

- We do not want to turn you into particle physicists!
- We don't expect you to go back and turn your children into professional physicists, but we expect you to go back and **inspire them** to look with interest and excitement at the marvels of Nature
- The main intent of this stage is to provide you with that extra **comfort layer of knowledge** about modern physics to be able to speak without fears to your students about quantum mechanics, elementary particles, cosmology.

- **Week 1:**
 - foundations building
- **Week 2:**
 - outlines of the working group projects, preparation of the material
- **Week 3:**
 - discussions, finalisation of the projects, documentation, reports

The themes

- Particle accelerators
- Detectors for particle physics
- The theoretical foundations of particle physics
- Technological spinoffs of particle physics
- How do we bring all of this to the classroom?

Accelerators

- Main themes:
 - how do we produce particles?
 - how do we accelerate them?
 - develop connection with electromagnetism classes, classical and relativistic mechanics, superconductivity
- Material:
 - lectures from Oliver Brüning and Lucio Rossi
 - visit to magnet testing facilities
 - visit to the antiproton decelerator facility
 - material from HST web site

Particle detectors

- Main themes:
 - how do we detect (i.e. “see”) particles?
 - how do we tell one from the other?
 - develop connection with electromagnetism classes, conservation laws, classical and relativistic mechanics
- Material:
 - lectures from Gron, Sascha
 - hands-on activity from Silvia (cloud chamber)
 - visits to CMS/Atlas/Alice
 - material from previous HST editions

Theory

- Main themes:
 - what do particles tell us about Nature?
 - what are the building blocks of nature, and how do they interact?
 - how do different phenomena in the Universe relate to each other (the very small vs the very large): develop connection with chemistry classes, conservation laws, Newtonian gravity, quantum mechanics, etc)
- Material:
 - lectures from J.Engelen and L. Di Lella (SSL), MLM, J.P. vanderShaar (Astroparticle physics, Cosmology, strings).
 - material from previous HST editions

Spinoffs and outreach

- Themes:
 - what is the return to Society, aside from knowledge, which arises from research in particle physics?
 - what can you, as teachers, do to help your students, other teachers, and society at large benefit from the knowledge developed at CERN?
- Materials:
 - lectures from Juan Antonio Rubio and Antonella
 - visit to the Technology Transfer labs

Teaching PP in HSs

- Themes:
 - how can you take this knowledge back to the classroom?
 - can/should you teach modern physics in the classroom?
- Materials:
 - 1-day Workshop held by ex-HST Dick Hoekzema on the teaching of modern physics in high schools in the Netherlands
 - Lectures by Gron on the didactic use of bubble chamber pictures
 - loads of material from the HST web site
 - discussions, discussions, discussions

Proposed Working Groups

- Bubble chamber pictures in the class-room (Gron)
- The Standard Model in the class-room (help from MLM)
- Developing material for teachers (Antonella) and for the public (Antonella, Yiota Foka)
- The HST web page (Vlado, Mick, Antonella)
- The analysis of experimental data (Sascha)

Additional activities

- Could chamber construction and operation
- Computing tutorials (Powerpoint, Word, Web editing)
- Lecture on scientific recollections by a Nobel laureate (J. Steinberger)
- Sessions organized by you on teaching experiences, syllabus development, experiences in international collaboration, etc.
- Discussions, discussions, discussions

Documentation of the work done

- HST web page (Webmaster: Vlado)
- Agenda system