

GP 2: The tools of physics between, research, teaching and public outreach

Zeit: Montag 14:00–16:30

Raum: HS 9

GP 2.1 Mo 14:00 HS 9

On the relation between instruments in research experiments and their representation in teaching demonstrations

— ●PETER HEERING — Europa-Universität Flensburg, Germany

A number of research experiments were (and still are) presented in lectures through related teaching demonstrations. This is not a recent development: at least in the early 19th century, devices for teaching demonstrations existed that were identified as representations of historical experiments (or instruments related to these experiments). It may seem clear that these teaching demonstrations are not identical to the historical experiments; and that there are similarities as well as differences between the respective instruments. However, this raises the question what actually has been represented by the teaching devices, and what was considered being worth communicating in the lecture or demonstration.

In the presentation, some examples of research experiments and teaching devices will be discussed in order to demonstrate the potential of such a discussion.

GP 2.2 Mo 14:30 HS 9

Galileo's tools for the study of motion into history physics and nature of science teaching — ●VINCENZO CIOCI — PhD candidate, Lille University, France

Pendulum, water clock, inclined plane, launching ramp but also the dialectical tool of dialogue and the mathematical ones of Euclidean geometry and proportions are the means used by Galileo to found the new science of motion. This work describes a comprehensive educational and experimental program on Galilean physics and mathematics to be presented in a scientific high school, based on the analysis of Galilean sources and on the most recent historical studies about Galileo's research. The overall objective of this work is to address the Nature of Science (NoS) proposing to students the fundamental kinematics experiments made by Galileo right in the context and with the tools available to him.

Selected References

Abattouy M (2017) The Mathematics of Isochronism in Galileo: From his Manuscript Notes on Motion to the Discorsi. Society and Politics (SAGE Publishing) 11, 2(22): 23-54.

Pisano R, Bussotti P (eds.) (2017) Homage to Galileo Galilei 1564-2014. Philosophia scientiae 21-1, Editions Kimé, Paris.

Damerow P, Freudenthal G, McLaughlin P, Renn J (2004) Exploring the Limits of Preclassical Mechanics. Springer-Verlag, New York.

Riess F, Heering P, Nawrath D (2005) Reconstructing Galileo's Inclined Plane Experiments for Teaching Purposes. International History, Philosophy, Sociology and Science Teaching Conference, Leeds.

GP 2.3 Mo 15:00 HS 9

On Props, Plores and Prototyping. Instrument(al)izing the Early Science Center — ●ARNE SCHIRRMACHER — Humboldt-Universität zu Berlin

How can the physicist's tools for knowledge production be transformed into popular demonstration exhibits that provide insights into physical phenomena? I will discuss this question in the context of the establishment of a new kind of science museum—the Science Center—which was established in North America in the 1960s with the strong participation of (research) physicists and which came to Europe in the 1980s, now in a very different (political) context. Instead of talking about instruments, experimental apparatuses or demonstrations, new terms such as *props* (Frank Oppenheimer) or *plores* (Richard Gregory) were promoted and the development process was turned into *prototyping*. In Germany, the exhibits of the first science centers became a *Versuchsfeld* (Hugo Kükelhaus) or *Erfahrungsfeld* (Lutz Fiesser). It turns out that in their second public life the instruments were not only greatly changed, but also their message was adapted and interpreted anew in the respective cultural sphere.

GP 2.4 Mo 15:30 HS 9

"a token of such things": the galvanism after Galvani and the myth of Frankenstein — ●BERTOZZI EUGENIO — University Museum Network, VIa Zamboni 33, University of Bologna

Electrostatic machines, Leiden jars, conducting arcs and Volta Piles have been central tools in the development of electric physics in the second half of the XVIII and the beginning of the XIX Century. Beside their role in the development of the discipline, scholars have pointed out their uses as demonstrational tools in the public performance of experiments and education. This presentation will explore how, toward the end of the XVIII Century, the use of these instruments alimeted visions and dreams of the highest capacity in the context of the life sciences. The analogy set by the scientists Luigi Galvani between the Leiden jars and the muscles of the frogs as anatomical places for storing electricity in 1791 transformed these devices into laboratory tools for understanding and explaining the physiological apparatus of the living creatures. After Galvani's death in 1798, the extension of his experiments on frogs to dead human bodies with the use of the new Volta pile as done by Giovanni Aldini in Bologna, Paris and London gave a token that life could be restored; this sensation is still explicitly recalled as an inspirational motive by the English writer Mary Shelley in the preface of the romance **Frankenstein**, published in 1818. The threshold between electrical physics and literary fiction and the enhancement of the cognitive potential of scientific instruments has been the focus of the project **Frankenstein Senior** carried out in 2018 at the **Museo di Palazzo Poggi** of the University of Bologna.

30 min. coffee break