GP 7: Practices and Experiments

Time: Wednesday 13:45–15:45 Location: KH 02.019

GP 7.1 Wed 13:45 KH 02.019

Materielle Kultur der Thermodynamik: Werkstattbericht aus dem Ausstellungsprojekt „Energie – Dampf“ — •Eckhard Wallis — Deutsches Museum, München, Deutschland

Im Zuge der Generalsanierung des Deutschen Museums wird die Kraftmaschinenausstellung bis 2028 zur thematisch breiteren Ausstellung „Energie – Dampf“ umgestaltet. So soll auch der ehemalige Raum „Moderne Dampfmaschinen“ zukünftig eine allgemeinere Perspektive auf thermodynamische Prozesse einnehmen. Die physikalischen Prinzipien von Dampfmaschinen, so die Kernbotschaft, haben nichts an Aktualität verloren. Kreisprozesse und Phasenübergänge sind bis heute elementar für das Verständnis von Kältemaschinen und Wärmepumpen, aber auch von Kraftwerken und Dampfturbinen. Historische Artefakte bilden eine tragende Säule des Ausstellungsnarrativs. Der Vortrag gibt einen Einblick in den aktuellen Planungsstand und reflektiert insbesondere die Frage, welchen Mehrwert der Einbezug der materiellen Kultur für die Vermittlung thermodynamischer Prinzipien bietet.

GP 7.2 Wed 14:15 KH 02.019

Experiments on the Propagation of Light: Taqi al-Din al-Rasid and His Source Ibn al-Haytham — •Sena Aydin — Istanbul Medeniyet University Institute for the History of Science, Istanbul, Turkey

Taqi al-Din al-Rasid (d. 1585) is regarded as the leading figure of optical science in the classical Ottoman period. Containing forty-nine experimental setups, his book on optics may be considered an experimental manual. One of its principal sources is Ibn al-Haytham (d. 1040), who, by combining physical and mathematical methods in the history of science, established the method of experimental verification. In doing so, he brought about a major transformation in optical studies and fundamentally changed how natural philosophers produced scientific knowledge. The experiments of Taqi al-Din on the propagation of light include observations such as the perception of objects by the eye along straight lines; the formation of a conical structure by light as it travels between the eye and the object; the observation that light spreads in a straight direction through smoky air; the spherical propagation of light from every point of a luminous source toward all opposite directions; and the creation of secondary lights as rays from primary sources reflect off surfaces. This study aims to present examples of replicas of experiments of Taqi al-Din on the propagation of light, produced within the framework of our project, and to analyze these experiments in comparison with those of his primary source, Ibn al-Haytham.

GP 7.3 Wed 14:45 KH 02.019

Between geometry and physics: revisiting Torricelli's Opera geometrica (1644) as a foundational framework for early modern mechanics — •Raffaele Pisano — HOPAST team, IEMN, Department of Phsysics, University of Lille, France

My talk revisits the physical-mathematical foundations of Evangelista Torricelli's Opera geometrica (1644) within the context of seventeenth-century mechanics and geometry. Marking the 380th anniversary of the work, it draws on the historical-scientific analysis developed in Homage to Evangelista Torricelli's Opera Geometrica (1644-2024) (Springer, 2024), which presents a critical transcription of the original text alongside interpretative essays. Torricelli stands at a crucial transition between classical Archimedean geometry and early modern infinitesimal methods, deeply shaped by Galilean mechanics. Like Cavalieri, he relied on geometrical proportions rather than algebraic equations and worked without an explicit notion of limit. Yet Torricelli advanced beyond the geometry of indivisibles by seeking the logical and physical structure underlying geometrical reasoning. His mathematics is inseparable from physical-mechanical meaning, especially in problems concerning motion, statics, and the determination of areas and volumes of curvilinear solids. For example, Torricelli's proofs on finite volume of the solido acutissimo, illustrating early infinitesimal reasoning at the boundary between geometry and mechanics, and his analysis of the logarithmic spiral, revealing a refined conception of geometrical motion.The Opera geometrica is examined as a synthesis of geometry, infinitesimals, and mechanics.

GP 7.4 Wed 15:15 KH 02.019

Practicising with the Lucernal Microscope — •Peter Heering[1] and Trienke van der Spek[2] — [1]Europa-Universität Flensburg, Institut für Physik und ihre Didaktik und Geschichte — [2]Teylers Museum Haarlem

The lucernal microscope, a projection microscope that uses the newly developed Argand lamp as a light source, was developed at the end of the 18th century, particularly George Adams sen. and jun. are key persons in this respect. The instrument was marketed as an improvement of the solar microscope and has two key advantages. Due to the use of an artificial light source, the device can be used both during the day and, above all, at night. Furthermore, use of the device is not dependent on weather conditions, meaning that, unlike a solar microscope, it can be used for demonstrations at any time.

Martinus van Marum ordered a lucernal microscope together with a substantial set of specimens from George Adams in 1788. This instrument still exists in Teylers Museum Haarlem where we started to use both the instruments and the specimens for projections. In our presentation, we are discussing the experiences made in working with the instrument. Moreover, we will also discuss in particular the findings with respect to the sliders - this seems to be particularly relevant as these objects are frequently neglected in the discussion of 18th century microscopes.