GP 4: Instruments and Measurement

Time: Tuesday 16:15–18:15 Location: KH 02.019

Invited Talk GP 4.1 Tue 16:15 KH 02.019

Scientific Instruments and the Evolution of Experimental Volcanology: Insights from Mount Etna — •Valentina Roberti — Department of Humanities, University of Catania, Italy

This contribution examines the emergence of volcanology as an experimental science through an analysis of the scientific instruments employed in research on Mount Etna. Beginning with Giovanni Alfonso Borelli's investigations of the 1669 eruption, scholars progressively incorporated new methods and instruments into the study of volcanic activity. The development of volcanology as an autonomous field, however, was neither linear nor uniform; rather, it was initially shaped by the interaction of different disciplines, such as physics, chemistry, and later geology and mineralogy, as well as by the intrinsic complexity of volcanic phenomena. The analysis is situated within the cultural and academic context of Catania, starting with the university reform of 1779, which introduced the first scientific chairs and promoted the acquisition and commissioning of instruments from both local craftsmen and leading European ateliers. Particular attention is devoted to selected case studies drawn from the cabinets of natural history, physics, and chemistry, whose instruments embodied disciplinary advances and were simultaneously employed in the investigation of Mount Etna. Surviving artefacts provide tangible evidence of the convergence of research and teaching practices that contributed to the institutionalization of volcanology at the University of Catania. These findings have directly informed a broader initiative aimed at enhancing the university's historical scientific heritage, including the temporary exhibition *Lo studio dell'Etna tra strumenti e rappresentazioni* (*The Study of Mount Etna Between Instruments and Representations*), held at the Museo della Fabbrica, Department of Humanities, from 10 March to 30 April 2025.

GP 4.2 Tue 17:15 KH 02.019

Stereoscopic Rangefinders: in the Borderlands Between Physics and Physiology — •Andreas Junk — Europa-Universität Flensburg

The development of the stereoscopic rangefinder is the strange story of an improvement of precision in range determination by introducing a notoriously unprecise element: an observer. After the identification and introduction of the personal equation in astronomy in the first half of the 19th century it was clear, that the human factor cannot possibly be removed from any measurement made by a human operator. The resolution in that particular case was to find methods to remove the human error by mathematical means. The subsequent idea of precision measurement, which were intiated based on the findings of Bessel in astronomy, was to an extent to not let an operator have an influence in any precise measurement, i.e. to remove the operator from the measurement.

In the last decade of the 19th century the newly developed rangefinders were pushing the limits of precision engineering but they were facing very basal problems regarding the uncertainty of the measurement. The geometrical principles of physics and engineering indicated, that the error to be expected in distance measurement couldn't be ruled out by precise manufacturing or an improved design of the instrument. The development of the stereoscopic telemeter was not only an attempt to overcome this particular problem, it added insult to injury by re-introducing the human operator, whose daily experiences gave the grounds to improve the measurements at large distances.

GP 4.3 Tue 17:45 KH 02.019

Development, optimization, distribution, installation and repair of early Bruker Fourier transform infrared spectrometers — •Prof. Dr. Klaus Hentschel — Head of the Section for History of Science & Technology, University of Stuttgart

Roughly 50 years ago, the Karlsruhe & Ettlingen-based company of Bruker Optics introduced its first Fourier-transform infrared spectrometer IFS 113v. An interdisciplinary working group at the University of Stuttgart, consisting of physicists still working with similar kinds of Fourier-transform instruments and a historian of science & instrumentation, collaborated with the Bruker Optics company which gave free access to its archives. A website is produced informing interested users about the history of Fourier-transform technology, the history of Bruker Optics and technical details of FT interferometers including beam-splitters and mirrors, detectors, typical sources etc. Furthermore, 4 members of the Bruker team were interviewed who were active in the early years and had participated in Bruker instrument development and improvement, management, sales, installation and repair. All of this will be presented in an openly accessible webpage, to be released in the spring of 2026. Samples of this webpage will be presented and discussed.