Public Symposium: 400th Birthday of Blaise Pascal

Monday, 04.09.2023, Aula 033

Time	ID	400TH BIRTHDAY OF BLAISE PASCAL *Chair: Teresa Montaruli, Université de Genève*
14:30	1	**Order and disorder in Pascal's PENSÉES** *Dominique Descotes, Université Clermont Auvergne* The history of criticism, particularly in the 19th century, has tended to portray Pascal as an author who was the victim of serious intellectual and medical disorders, as evidenced by the appearance of the manuscript of his Pensées (owned by the BNF). An examination of this manuscript leads to different conclusions, both literary and psychological.
15:15	2	**Pascal's law and the Pascal unit in material science and engineering** *Helena van Swygenhoven, EPFL & Paul Scherrer Institut Villigen* Pascal's law had an enormous impact on material science and engineering. The law states that a change in pressure at any point in an enclosed incompressible fluid at rest is transmitted undiminished to all points in the fluid. The pressure, defined as the amount of force that is exerted per unit area, is in the International System of Units (SI) expressed in Pascal (Pa), which is equivalent to 1 Newton of force applied over an area of 1 square meter. The Pascal (Pa) unit is however also used to quantify stress. Stress and pressure are both words that are commonly mistaken for one another. Pressure is a scalar quantity. Stress, defined as the internal resistive force to deformation per unit area, has a magnitude and direction, and the angle with the plane on which the stress is acting is important. Therefore, stress is a tensor. 1 Pa is inconveniently small compared to the stresses most structures experience or the pressure in closed environments, one often encounters 10^3 Pa = 1 kPa, 10^6 Pa = MPa, or 10^9 Pa = GPa. Using examples, this talk will make the link between the physics contained in Pascal's law and some applications in material science and engineering. Well known applications of Pascal law are the hydraulic lift used in car garages or at the dentist, hydraulic cranes, and hydraulic brake systems in cars. But there are also applications in medicine, as for instance the first aid procedure "abdominal thrusts", also known as Heimlich maneuver, or the blood pressure device. This talk will also illustrate the use of the unit Pascal to quantify stress. The role of the directionality of stress is shown in examples where mechanical anisotropy poses a major challenge in manufacturing processes.
16:00		***Coffee Break***
		Chair: Bernhard Braunecker
16:30	3	**Mechanical Thinking: The PASCALINE and its Planetary Predecessors** *Michael Korey, Staatliche Kunstsammlungen Dresden, Mathematisch-Physikalischer Salon* The *Pascaline* is often hailed as the oldest surviving mechanical calculator, and the Mathematisch-Physikalischer Salon in Dresden proudly holds the largest of the extant machines by Blaise Pascal. Starting from an analysis and visualization of this machine, the talk moves to consider earlier analog calculators, in particular planetary automata designed to represent the real-time, 'true' movement of all stars and planets visible to the naked eye in accordance with Ptolemaic theory. Four such automata from the 16th-century survive (in Paris, Vienna, Kassel, and Berlin) and may rightly lay claim to being the most intricate machines of their era. This richly illustrated talk will present recent research underscoring the mechanical thinking manifest in these subtle machines and attempt to explain how and why their makers – mathematicians, astronomers, and mechanicians – used surprisingly varied means to achieve putatively similar ends.

17:15	**4**	**From Pascaline to Piz Daint in the Alps infrastructure: a modern day view of computing in science** *Thomas Schulthess, ETH Zürich & Swiss National Supercomputing Center (CSCS) Lugano* “Piz Daint” is our flagship supercomputer system at CSCS. The current instance was introduced in 2017 and includes five thousand computing nodes accelerated with general purpose graphic processing units (GPGPU) NVIDIA dubbed “Pascal”. It has been the workhorse of our User Laboratory over the past decade, leading the way for Europe’s adoption of GPGPU in scientific computing. While the allure of supercomputing system’s arithmetic performance remains, physics has forced the balance of computing devices to change, and we now must pay much more attention to data flow than arithmetic efficiency. Moreover, as we embrace the evolving digital age, the demands of scientific computing are shifting towards more complex workflows. These were the primary motivations to begin developing the new “Alps” infrastructure. As “Piz Daint” transitions into the “Alps” infrastructure, it will essentially become a software-defined cluster within “Alps.” The current Pascal accelerators will be substituted with the latest GPGPUs, with vastly improved memory performance. Observing the progression of energy efficiency is intriguing; however, performance enhancements come at the cost of higher power consumption. These performance gains now come at higher cost, making a new trend that underscores the dusk of Moore’s Law.
18:00		***END***
18:15	***General Assemblies of SPS and ÖPG ****	
19:15		***END***

* ÖPG: Room 117