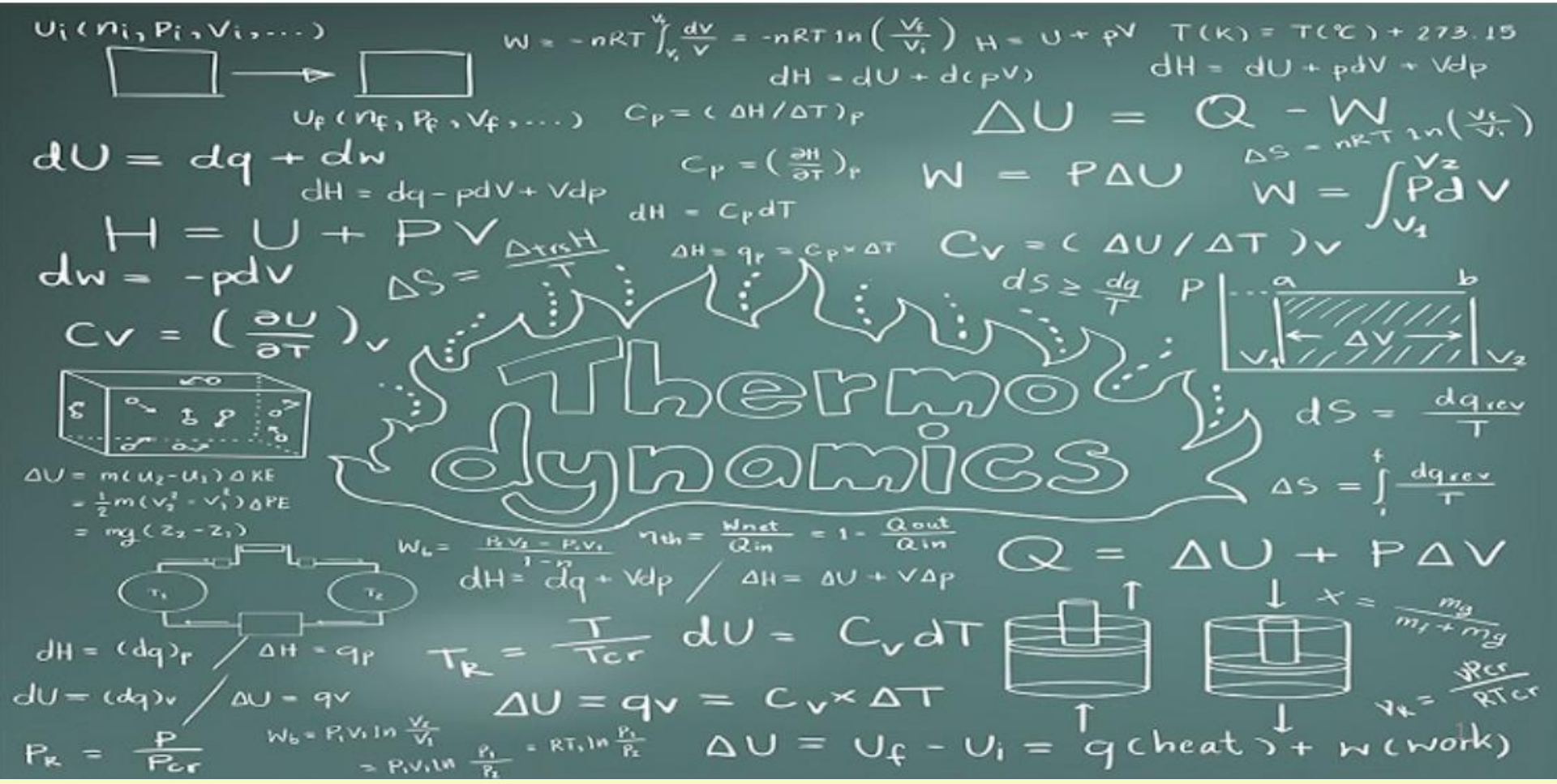
PHYS1013
Energy and Matter

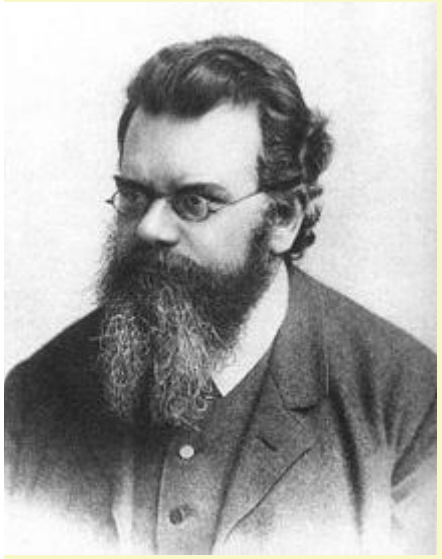


There are two more MPs to go – they are both available online now – one is due this weekend and one the weekend after…

We have 4-5 more lectures of material to go…

Then I'll do 3-4 revisions session…

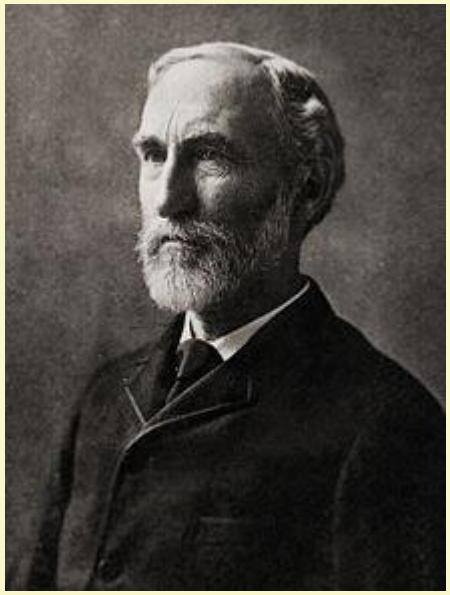
Ludwig Eduard Boltzmann (1844 1906) was an Austrian physicist and philosopher. His greatest achievements were the development of statistical mechanics, and the statistical explanation of the second law of thermodynamics. In 1877 he provided the current definition of entropy, interpreted as a measure of statistical disorder of a system.[2] Max Planck named the constant k_B the Boltzmann constant.[3]



Boltzmann was born in Erdberg, a suburb of Vienna. His father, Ludwig Georg Boltzmann, was a revenue official. His grandfather, who had moved to Vienna from Berlin, was a clock manufacturer, and Boltzmann's mother, Katharina Pauernfeind, was originally from Salzburg. He received his primary education at the home of his parents.[5] Boltzmann attended high school in Linz, Upper Austria. When Boltzmann was 15, his father died.[6]

Starting in 1863, Boltzmann studied mathematics and physics at the University of
Vienna. He received his doctorate in 1866 and his venia legendi in 1869. Boltzmann
worked closely with Josef Stefan, director of the institute of physics. It was Stefan
who introduced Boltzmann to Maxwell's work

Josiah Willard Gibbs (1839 –1903) was an American scientist who made significant theoretical contributions to physics, chemistry, and mathematics. His work on the applications of thermodynamics was instrumental in transforming physical chemistry into a rigorous inductive science. Together with James Clerk Maxwell and Ludwig Boltzmann, he created statistical mechanics (a term that he coined), explaining the laws of thermodynamics as consequences of the statistical properties of ensembles of the possible states of a physical system composed of many particles. Gibbs also worked on the application of Maxwell's equations to problems in physical optics. As a mathematician, he invented modern vector calculus (independently of the British scientist Oliver Heaviside, who carried out similar work during the same period).



In 1863, Yale awarded Gibbs the first American doctorate in engineering. After a three-year sojourn in Europe, Gibbs spent the rest of his career at Yale, where he was a professor of mathematical physics from 1871 until his death in 1903. Working in relative isolation, he became the earliest theoretical scientist in the United States to earn an international reputation and was praised by Albert Einstein as "the greatest mind in American history."[3] In 1901, Gibbs received what was then considered the highest honor awarded by the international scientific community, the Copley Medal of the Royal Society of London,[3] "for his contributions to mathematical physics.“

Commentators and biographers have remarked on the contrast between Gibbs's quiet, solitary life in turn of the century New England and the great international impact of his ideas.

Hermann Ludwig Ferdinand von Helmholtz[a] (1821 –1894) was a German physicist and physician who made significant contributions in several scientific fields. The largest German association of research institutions, the Helmholtz Association, is named after him.[5] In physiology and psychology, he is known for his mathematics of the eye, theories of vision, ideas on the visual perception of space, color vision research, and on the sensation of tone, perception of sound, and empiricism in the physiology of perception. In physics, he is known for his theories on the conservation of energy, work in electrodynamics, chemical thermodynamics, and on a mechanical foundation of thermodynamics. As a philosopher, he is known for his philosophy of science, ideas on the relation between the laws of perception and the laws of nature, the science of aesthetics, and ideas on the civilizing power of science.

Benoît Paul Émile Clapeyron (1799 –1864) was a French engineer and physicist, one of the founders of thermodynamics.

Born in Paris, Clapeyron studied at the École polytechnique, graduating in 1818.[1] He also studied at École des mines. In 1820 he and Gabriel Lamé went to Saint Petersburg to teach and work at the school of public works there. He returned to Paris only after the Revolution of July 1830, supervising the construction of the first railway line connecting Paris to Versailles and Saint-Germain.[1] The half brothers Stéphane Mony and Eugène Flachat collaborated in this project, which was financed by Adolphe d'Eichthal(fr), Rothschild, Auguste Thurneyssen, Sanson Davillier and the Péreire brothers (Émile(fr) and Isaac(fr)).[2] Clapeyron took his steam engine designs to England in 1836 to find a manufacturer and engaged Sharp, Roberts and Co.[1]