



Second thoughts on the second law



Elliott Lieb re-visits the second law of thermodynamics

17 June 2014, 3.00 pm
SISSA, Main Lecture Hall
Via Bonomea 265, Trieste

A public lecture at SISSA provides Elliott Lieb, professor of Mathematics and Physics at Princeton University, the opportunity to review the foundations of the second law of thermodynamics. This is the physical law which introduces the concept of entropy of the Universe and establishes the direction of the flow of time. Lieb will offer the public his innovative point of view on this fundamental principle.

For physicists, the second law of thermodynamics (the one also studied by us common mortals at secondary school) is "crystal clear and immutable", and never brought into question. This is the law that establishes the univocal direction of some irreversible processes, and that governs the inevitable flow of time. It is also the physical law that introduces the concept of entropy and that



ultimately establishes that our Universe is destined to become a completely homogenized cold "soup" (heat death).

The principle is too important to tolerate even the tiniest deviation, and should any deviation ever be observed in the real world, physicists believe, this would result in major theoretical upheavals. Elliott Lieb, a "physicist-mathematician" from Princeton University, will be proposing a logical "re-visitation" of this law at the next SISSA *Colloquium*, to be held on June 17 in the Main Lecture Hall "P. Budinich".

In his lecture, Lieb will review the foundations of the subject and offer a construct of entropy based on simple mathematical concepts. "The existence of a law so precise and so model-independent must have a logical foundation that is independent of the details of the constitution of matter" explains Lieb, who also adds that to attend his lecture "no previous familiarity with the subject is required", underlining its educational purpose.

The lecture is open to the public and will be held in English.

More in detail...

Elliott Lieb is one of the (few) great mathematical physicists of the last 50 years. He conducted basic research on the Thomas-Fermi model of the atom, connecting the stability of matter to the mathematics of functional analysis. His observations were fundamental for both fermion and boson systems. Within the mathematical physics community, Lieb is known for his ability to reach important results starting from simple inequalities, by analysing in depth the general nature of the problem, building and solving models that, while quite simple, are capable of capturing the essence of the structure.

He is also appreciated for his capacity to demonstrate general theorems that "bring order" to the subject matter. He is a prolific author (with more than 300 publications in international journals), and his production is rich in significant results. He has received many awards, among the most important a mathematical physicist can aspire to, such as the Dannie Heineman prize for mathematical physics, the Boltzmann Medal, the Max Planck Medal, the Henri Poincaré prize and many more.

IMAGE:

- Credits: Chris Khamken - <http://bit.ly/1c7T5yo>

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