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Trends in thermodynamics and materials theory

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Trends in Thermodynamics and Materials Theory was the title of a symposium in honor of Prof. Dr. Dr. hc. em. Ingo Müller on the occasion of his 75th birthday, which took place in Berlin in December 2011.

By that time, Ingo Müller had already been an Emeritus of the Technical University of Berlin for a couple of years. As it turned out, the Chair of Thermodynamics in the Engineering Department which he occupied since 1979 should not see a successor, as it was axed in the wake of re-organization at Berlin's university landscape after the reunification of the eastern and western part of the city in 1990. The remaining members of Müller's research team either had to leave science completely or turn to other research institutions. And so, an extraordinary place of scientific endeavor, discussion, and growth seemingly disappeared from the map.

One might assume, a celebration of a 75th birthday of a retired professor on this background has a natural tendency for nostalgia, backward-looking lament, and—perhaps—melancholia.

However, little—if nothing—of this was perceptible during the meeting.

Instead, about sixty well-esteemed scientists from diverse fields of physics, engineering, and mathematics from all over the world turned the symposium into a lively meeting during three extremely prolific days between

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December 15–17, 2011. Thirty-one superb lectures were presented, thematically grouped in recognition of Ingo Müller's most important fields of activity: from kinetic theory of gases to extended thermodynamics; thermo-mechanical solids: from rubber to functional materials; toward new frontiers: from relativistic continuum theory to socio-thermodynamics.

A related collection of more than twenty symposium papers is presented in this special issue of *Continuum Mechanics and Thermodynamics*. It provides a temporal snapshot of the vividness and engagement in these—still!—prevailing areas of scientific interest, which have received tangible impact by Ingo Müller during the past 50 years—and still do. The numerous references and citations to his work in the literature is just one piece of evidence for the influence of Ingo Müller's scientific output, and this special issue provides another a good example.

Another major impact of Ingo Müller's presence in science that must be mentioned in the same context is the development of a scientific culture of rational and unbiased approach to the solution of problems and the shaping of theories, together with the appropriate measures of scientific quality this culture carries forward. Among Ingo Müller's maxims, there is a paramount one: always strive for the highest level of clarity possible during scientific argumentation. This holds equally for himself as well as for his students and co-workers. It is this combination of scientific brilliance and authentic culture that led to Ingo Müller's intellectual authority. Partially, this authority condensed into the idea of an international scientific journal that would focus the thermodynamic field theory, *Continuum Mechanics and Thermodynamics*, founded in 1989.

Ingo Müller lectures thermodynamics in a deductive and hierarchical manner, with mathematical precision and detail. However, Ingo Müller's relation to math is always purposive. The mathematical toolset Ingo Müller uses to state the physical argument is complex indeed, but it is always regarded by him only as the appropriate language and should never be autotelic. In fact, math should be reduced to a minimum wherever required by the communicative context. *Nota bene*, this pragmatic approach has not only induced some reputation of Ingo Müller's physics in the mathematical community but also invites and enables non-mathematicians to join the discussion.

In combining genetic concepts, R. Dawkins introduced the idea of the “meme” as a form of cultural replicator. Ingo Müller is certainly fond of this concept. “Cultural transmission is analogous to genetic transmission in that, although basically conservative, it can give rise to a form of evolution,” says Dawkins and continues: “Memes are ideas... Just as genes propagate themselves in the gene pool by leaping from body to body, so memes propagate themselves in the meme pool by leaping from brain to brain...” And there is also election: A new scientific idea is anticipated not before a new generation of scientists has proven to accept it—and the criticism has died out, as Ingo Müller cites Max Planck repeatedly in his monographs.

In view of the lively lectures and discussions during the symposium, and also in view of the productive scientific work Ingo Müller has induced all around the world, we are glad to attest Ingo Müller passed on a remarkable portion of active scientific memes to the community—and obviously, many were taken up into the living bloodstream of science. The memes Ingo Müller seeded—insights, ideas, culture—are the true ingredients of good science. These persist—and will find appropriate accommodations as the journey of science continues.

So no reason for melancholia -
Happy Birthday, Ingo Müller!

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