

The Second Law of Thermodynamics: Foundations and Status

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Published online: 6 September 2007
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Abstract Over the last 10–15 years the second law of thermodynamics has undergone unprecedented scrutiny, particularly with respect to its universal status. This brief article introduces the proceedings of a recent symposium devoted to this topic, *The second law of thermodynamics: Foundations and Status*, held at University of San Diego as part of the 87th Annual Meeting of the Pacific Division of the AAAS (June 19–22, 2006). The papers are introduced under three themes: ideal gases, quantum perspectives, and interpretation. Roughly half the papers support traditional interpretations of the second law while the rest challenge it.

Keywords Second law of thermodynamics · Entropy · Thermodynamics · Statistical mechanics · Ideal gas

Perhaps more has been written about the second law of thermodynamics than about any other physical law. Direct and indirect references to it are found in all branches of science, engineering, economics, literature, psychology, philosophy, art and popular culture. It touches nearly everything from mundane folk wisdom¹ to the physical eschatology of the universe [1, 2]. In the scientific sphere, more memorable lines have been written about its universality than about the law itself. For instance:

¹For example: heat goes from hot to cold; a mess expands to fill the space available; if anything can go wrong it will; situations tend to progress from bad to worse; the only way to deal with a can of worms is to find a bigger can.

Symposium proceedings from 87th Annual Meeting of the Pacific Division of the AAAS; University of San Diego, June 19–22, 2006; D.P. Sheehan, editor.

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