

## **From Quantum Mechanics to Standards for Thermophysical Properties of Gases**

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Quantum mechanical calculations combined with a chain of artfully chosen ratio measurements is leading to improved standards for gas properties including temperature, pressure, and humidity, as well as standards for the dielectric constant, thermal conductivity, viscosity, speed of sound, and the flow of gases. The measurement chain leads from helium to argon and ultimately to industrially important gases such as those used to process semiconductors. We identify several instances where measurement technology can challenge fundamental theory.