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Geometric effects on blackbody radiation

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Planck's formula for blackbody radiation was formulated subject to the assumption that the radiating body is much larger than the emitted wavelength. We demonstrate that thermal radiation exceeding Planck's law may occur in a narrow spectral range when the local radius of curvature is comparable with the wavelength of the emitted radiation. Although locally the spectral enhancement may be of several orders of magnitude, the deviation from the Stefan-Boltzmann law is less than one order of magnitude. The fluctuation-dissipation theorem needs to be employed for adequate assessment of the spectrum in this regime. Several simple examples are presented as well as experimental results demonstrating the effect. For each configuration a geometric form factor needs to be incorporated into Planck's formula in order to properly describe the emitted radiation.

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