



**CLARK UNIVERSITY
DEPARTMENT OF PHYSICS
COLLOQUIUM**

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**“Blackbody Radiation in Classical Physics:
A Historical Perspective”**

ABSTRACT: We point out that current textbooks of modern physics are a century are out-of-date in their treatment of blackbody radiation within classical physics. Relativistic classical electrodynamics including classical electromagnetic zero-point radiation gives the Planck spectrum with zero-point radiation as the blackbody radiation spectrum. In contrast, nonrelativistic mechanics cannot support the idea of zero-point energy; therefore if nonrelativistic classical statistical mechanics or nonrelativistic mechanical scatterers are invoked for radiation equilibrium, one arrives at only the low-frequency Rayleigh-Jeans part of the spectrum which involves no zero-point energy, and does not include the high-frequency part of the spectrum involving relativistically-invariant classical zero-point radiation. Here we review the historical treatment of blackbody radiation, and we discuss the correct understanding of blackbody radiation within relativistic classical physics. Finally, we point out how the presence of Lorentz-invariant classical zero-point radiation and the use of relativistic particle interactions transform the previous historical arguments so as now to give the Planck spectrum including classical zero-point radiation. Within relativistic classical electromagnetic theory, Planck's constant h appears as the scale factor for source-free classical zero-point radiation.

Wednesday, September 19, 2018
12:30 pm - Room S-122
Sackler Sciences Center