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An Isothermal and Isochromatic Comparison of Gall's and Planck's Black Body Radiation Laws CLARENCE A. GALL, Postgrado de Ingenieria, Universidad del Zulia, Apartado #98, Maracaibo, Zulia, Venezuela — Gall's black body radiation law $\left(I_\lambda = \sigma \frac{T^6}{b^2} \lambda e^{-\frac{\lambda T}{b}}\right)$ derived by treating emission as a decay process (BAPS, March 2007, X21.4, Denver, CO), exactly satisfies the three empirical laws of black body radiation and employs the same empirical constants. Planck's law $\left(I_\lambda = \frac{c_1}{\lambda^5} \frac{1}{e^{\frac{c_2}{\lambda T}} - 1}\right)$ is seen as a modification of Wien's law $\left(I_\lambda = \frac{c_1}{\lambda^5} \frac{1}{e^{\frac{c_2}{\lambda T}}}\right)$ with new parameters derived from the idea that EMR travels in packets (quanta). Planck's law allows for further adjustments of the constants than does Wien's law, so as to better fit the empirical laws, but these constants are not identical to the empirical constants. The exponent in λ^{-5} also has to be adjusted for a better intensity fit. While the isothermal curves for the laws of Gall and Planck both show a maximum intensity defined by Wien's displacement law ($\lambda_m T = b$), the isochromatic curves are markedly different. Gall's law gives a maximum at $\lambda T_m = 6b$ whereas Planck's law shows a continuous increase of intensity with temperature. The latter thus appears to lead to a high temperature catastrophe. Measurement of the isochromatic curves should provide a definitive test of the validity of these laws.

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