The original theory proposed by [Einstein](http://en.wikipedia.org/wiki/Albert_Einstein) in 1907 has great historical relevance. The [heat capacity](http://en.wikipedia.org/wiki/Heat_capacity) of [solids](http://en.wikipedia.org/wiki/Solid) as predicted by the empirical [Dulong-Petit law](http://en.wikipedia.org/wiki/Dulong-Petit_law" \o "Dulong-Petit law) was required by[classical mechanics](http://en.wikipedia.org/wiki/Classical_mechanics), the specific heat of solids should be independent of temperature. But experiments at low temperatures showed that the heat capacity changes, going to zero at absolute zero. As the temperature goes up, the specific heat goes up until it approaches the Dulong and Petit prediction at high temperature.

By employing Planck's [quantization](http://en.wikipedia.org/wiki/Quantization) assumption, Einstein's theory accounted for the observed experimental trend for the first time. Together with the [photoelectric effect](http://en.wikipedia.org/wiki/Photoelectric_effect), this became one of the most important pieces of evidence for the need of quantization. Einstein used the levels of the quantum mechanical oscillator many years before the advent of modern [quantum mechanics](http://en.wikipedia.org/wiki/Quantum_mechanics).

In Einstein's model, the specific heat approaches zero exponentially fast at low temperatures. This is because all the oscillations have one common frequency. The correct behavior is found by quantizing the [normal modes](http://en.wikipedia.org/wiki/Normal_modes) of the solid in the same way that Einstein suggested. Then the frequencies of the waves are not all the same, and the specific heat goes to zero as a *T*3 power law, which matches experiment. This modification is called the [Debye Model](http://en.wikipedia.org/wiki/Debye_Model), which appeared in 1912.

C_V = 3Nk\left({\varepsilon\over k T}\right)^2{e^{\varepsilon/kT}\over \left(e^{\varepsilon/kT}-1\right)^2}.

Although the Einstein model of the solid predicts the heat capacity accurately at high temperatures, it noticeably deviates from experimental values at low temperatures. See[Debye model](http://en.wikipedia.org/wiki/Debye_model) for how to calculate accurate low-temperature heat capacities.

In [thermodynamics](http://en.wikipedia.org/wiki/Thermodynamics) and [solid state physics](http://en.wikipedia.org/wiki/Solid_state_physics), the **Debye model** is a method developed by [Peter Debye](http://en.wikipedia.org/wiki/Peter_Debye) in 1912[[1]](http://en.wikipedia.org/wiki/Debye_model#cite_note-0) for estimating the [phonon](http://en.wikipedia.org/wiki/Phonon) contribution to the [specific heat](http://en.wikipedia.org/wiki/Specific_heat) (heat capacity) in a [solid](http://en.wikipedia.org/wiki/Solid). It treats the [vibrations](http://en.wikipedia.org/wiki/Oscillation) of the [atomic lattice](http://en.wikipedia.org/wiki/Atomic_lattice) (heat) as[phonons](http://en.wikipedia.org/wiki/Phonon) in a box, in contrast to the [Einstein model](http://en.wikipedia.org/wiki/Einstein_solid), which treats the solid as many individual, non-interacting [quantum harmonic oscillators](http://en.wikipedia.org/wiki/Quantum_harmonic_oscillator). The Debye model correctly predicts the low temperature dependence of the heat capacity, which is proportional to *T*3– the **Debye T3 law**. Just like the [Einstein model](http://en.wikipedia.org/wiki/Einstein_solid), it also recovers the [Dulong-Petit law](http://en.wikipedia.org/wiki/Dulong-Petit_law" \o "Dulong-Petit law) at high temperatures. But due to simplifying assumptions, its accuracy suffers at intermediate temperatures.

**What is the best definition of Singularity?**

The term Singularity has many definitions.

The everyday English definition of Singularity is a noun that designates the quality of being one of a kind, strange, unique, remarkable or unusual.

For a more specific definition of Singularity we can search **The Wiktionary** where we get the following five Singularity definitions:

1. the state of being singular, distinct, peculiar, uncommon or unusual  
2. a point where all parallel lines meet  
3. a point where a measured variable reaches unmeasurable or infinite value  
4. (mathematics) the value or range of values of a function for which a derivative does not exist  
5. (physics) a point or region in spacetime in which gravitational forces cause matter to have an infinite density; associated with [Black Holes](http://news.bbc.co.uk/2/hi/science/nature/8334369.stm)

<http://en.wikipedia.org/wiki/Einstein_solid>

<http://en.wikipedia.org/wiki/Dulong%E2%80%93Petit_law>

<http://en.wikipedia.org/wiki/Debye_model>

<http://en.wikipedia.org/wiki/Kinetic_theory_of_solids>