SONOLUMINESCENCE EXPLAINED BY THE STANDPOINT OF QUANTUM VACUUM DYNAMICS AND ITS PROSPECTS FOR ENERGY PRODUCTION

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Sonoluminescence, or its more frequently studied version known as Single Bubble Sonoluminescence, consisting in the emission of light by a collapsing bubble in water under ultrasounds, represents one of the most challenging and interesting phenomenon in theoretical physics. In fact, despite its relatively easy reproducibility in a simple laboratory, its understanding within the commonly accepted picture of condensed matter, remained so far unsatisfactory. On the other hand the possibility to control the physical process involved in sonoluminescence, representing a sort of nuclear fusion on small scale, could open unthinkable prospects of free energy production from water. Different explanations has been proposed during the past years considering, in various way, the photoemission to be related to electromagnetic Zero Point Field energy dynamics, by considering the bubble surface as a Casimir force boundary. More recently a model invoking Cerenkov radiation emission from superluminal photons generated in quantum vacuum has been successfully proposed. In this paper it will be shown that the same results can be more generally explained and quantitative obtained within a QED coherent dynamics of quantum vacuum, according to which the electromagnetic energy of the emitted photons would be related to the latent heat involved in the phase transition from water's vapor to liquid phase during the bubble collapse. The proposed approach could also suggests an explanation of a possible mechanism of generation of FTL particles by quantum vacuum as well as interesting applications to energy production from quantum vacuum.