An Alternative Formation Theory of Beat Applied to the Pendelloesung Beat[1]

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An alternative theory of beat, in which a variation of the intensity of a composite wave is formed from definite distinct waves of which more than two have different frequencies is constructed. It is applied to Pendelloesung beat (hereafter, abbreviated as PB) as an apt example. PB has been observed only in some light elements (below atomic number 32) by using rather hard X-rays up to 60keV and above the room temperatures. These observations for the formation of PB support the view that the recoil energy loss plays essentially important role in beat production by the superposition of the photons with the reduction of the momentum.

The Bragg law for the reduction of the momentum is derived based upon the corpuscular character of the light and the principle of the equipartition of the recoil energy over all the atoms. The application of the Bragg law, to the superposition of the expected value of the even or odd time multi-reflex photons (taken by the binomial distribution as stochastic events) forms the two types of the transmitted or diffracted PB, respectively. The law predicts two types of the prominently positive projecting peaks at half wave at even times of π and the plus or minus projecting peaks at odd times of π, according to the multiplicity factor of the reflection, exist as pulsations of bare PB from AM by cosec $\Delta\omega t$ in the basic bare envelope curve. It turns out that the AM effect of the binomial distribution on bare PB makes all of the peaks contracted as if it is erased, and makes the intense collimated photon flux follow the Borrmann effect. This review can be confirmed by testing the prediction that the reflection intensity of PB fades into quantum PB near 0K by a reduction of the recoil reflections due to the enhancement of the crystal rigidity with decreasing temperature.

[1] Nakajima T., *J. Low Temp. Phys.*, 2005, **138**, *to be published*.

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