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Nonlinear Combination (Raman) Scattering of Photons by the Channeled Positrons

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The channeled particles is characterized by the bound quantum states of its transversal motion. Photon interactions with the channeled particles in a single crystal may be accompanied by the energy transitions between the transverse motion levels of channeling particles. The photon combination (Raman) scattering by the quasi-bound channeled particles leads to the appearance of a frequency combination of the incident photon frequency ω_0 and the frequency Δ ω_if , i.e.
ω_s = ω_0±Δ ω_if ,
where Δω_if = 2 Δε_if γˆ2; Δε_if is the transition energy between "i"and "f"transversal motion quantum states; γ = E/(mcˆ2) is the channeled positrons Lorentz-factor [1]. A "violet"satellite ("anti-Stokes"lines ω) analysis in the Raman combination scattering spectrum is suggested. Tree photons Raman type transition is examined, i.e. the process of the simultaneous absorption of two photons with the frequency ω_0 and the photon emission with the frequency ω_s=2ω_0±2 Δε_if γˆ2. Resonance conditions for the third harmonics observation (ω_s = 3ω_0) is discussed.

LITERATURE
Kalashnikov N.P., Krokhin O.N. Quantum Electronics. 2014. v. 44 (№12). p.1109 –1111. Raman scattering of a photon with frequency doubling by a channeled positron.

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