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Line shape of soft photon radiation generated at zero angle in an undulator with a dispersive medium

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Unlike in a vacuum undulator, an undulator containing a dispersive medium forms a line shape of soft photons. The energy of these photons is determined by the oscillation frequency of an ultra-relativistic charged particle and the plasma frequency of the medium, when the energy of the particle greatly exceeds the threshold energy for radiation formation. The line shape of the spontaneous radiation of soft photons at zero angle, as well as their number, has been obtained. The directed beams of coherently radiated soft photons by microbunches of charged particles may find significant practical applications.

Autori principali: Dr. SHAMAMYAN, Anahit (Military Academy after Vazgen Sargsyan MoD RA); Dr. GEVORGYAN, Hayk (Alikhanyan National Laboratory (Yerevan Physics Institute)); Sig. GEVORGYAN, Koryun (Alikhanyan National Laboratory (Yerevan Physics Institute)); Prof. GEVORGYAN, Lekdar (Alikhanyan National Laboratory (Yerevan Physics Institute))

Relatore: Dr. GEVORGYAN, Hayk (Alikhanyan National Laboratory (Yerevan Physics Institute))

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