Contribution ID: **119** Type: **Oral presentation**

Types of Interference in Highly Non-Dipole Radiation Spectra

Tuesday, 27 September 2016 09:45 (15 minutes)

Generic structure of spectra of non-dipole radiation from ultra-relativistic electrons is discussed on two examples:
1. Radiation accompanying double hard scattering of an electron with a time interval T.
2. Passage of an electron through a domain of uniform magnetic field of finite length T.

In both cases, we will assume that electron deflection angles are small compared to unity, but much greater than electron's Lorentz factor. It is demonstrated that under such conditions, there emerges an hierarchy of photon frequency scales, and the spectrum can be presented as a sum of terms (some of which split in two factors), depending on a single scale of omega, i.e., related with a particular type of a coherence length. As a whole, there can be distinguished three types of coherence length: free", deflection angle dependent, and transverse. The spectrum at double hard electron scattering involves two types of oscillations: collinear-collinear interference (from two ends of asemi-bare electron" state), and soft-collinear interference (between collinear radiation from one of the external electron lines and soft radiation from the adverse trajectory break). For the spectrum at electron passage through a finite magnet, there are only oscillations due to soft-collinear interference, since there is no straight "semi-bare electron" segment. In the latter case, the spectrum can be divided into a synchrotron-like component proportional to the magnet length T, and boundary contributions independent of T. The separation into volume and boundary contributions, as well as the soft-collinear interference, should be present also for electron passage through other targets, such as thin crystals or an amorphous target of thickness T.

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Session Classification: S2.3: Channeling & Radiations in Various Fields