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Specific Features of Photonuclear Reactions Yield Induced by Channeling Radiation from Relativistic Electrons

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The sub-GeV –several GeV electrons channeling radiation (CR) spectrum is characterized by a brilliant maximum at photon energies up to several MeV [1], depending on electron beam energy. This is enough to excite separate nuclear levels (tens or hundreds KeV) and to excite reaction on light Be and D nuclei and even may reach the region of giant dipole resonance (7-8 MeV) in more heavier nuclei in the downstream target.
In this photon energy region the CR photon number exceeds by decades that of bremsstrahlung (BS) if the radiator thickness is the same. This can be an advantage to use CR instead of tradiational BS in studies of photonuclear reactions, as well as for generation of pulsed neutron beams at electron accelerators.
Detailed calculations based on simulated CR spectra (simulation procedure is described in detail in [3-4]) reveal the non-trivial dependence of the CR- induced photonuclear reactions yield on the energy of incident electron beam as well as on electron beam alignment with respect to the crystal channeling planes.
References
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