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Advanced Crystal Assisted Techniques for EuPRAXIA

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Channeling of charged particles is well known technique to handle beams shaped in specified ways. Having proposed more than 40 years ago this technique has been utilized for beam both collimation and focusing at many famous research centers. Channeling of light charged particles is of a special interest as novel powerful and compact radiation source.
Effective approach for a positron source is to use a sub-GeV or GeV electron beam for production of channeling radiation in a crystal with its subsequent conversion into electron-positron pairs in amorphous. On the contrary, coherent bremsstrahlung (for aligned crystals) is characterized by higher radiation frequencies and intensities at lower energies of charged particles. This feature can be also utilized for getting an effective positron source at much lower electron energies.
In this report the possibility for a new technique of particles acceleration based on channeling of charged beams in solids will be also discussed. The research in this field is of strong interests due to the fact that the field gradients that could be obtained in solids are of the order of 0.1-1 TeV/m or even higher.

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