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Simulation of deflecting structures for dielectric laser driven accelerators

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In laser illuminated dielectric accelerators (DLA) high acceleration gradients can be achieved, due to high damage thresholds of the materials at optical frequencies. This is a necessity in developing more compact particle accelerator technologies. The Accelerator on a CHip International Program funded by the Gordon and Betty Moore Foundation is researching such devices. DESY Hamburgs ARD group under Ralph Aßmann is part of the collaboration.

Means to manipulate the beam, i.e. focusing and deflection, are needed for the proper operation of such devices. These means should rely on the same technologies for manufacturing and powering like the accelerating structures. In this study different concepts for dielectric laser driven deflecting structures are investigated via particle-in-cell (PIC) simulations and compared afterwards. The comparison is conducted with respect to the suitability for beam manipulation. Another interesting application will be investigated as a diagnostic device for ultra short electron bunches from conventional accelerators functioning alike a radio frequency transverse deflecting cavity (TDS).

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