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# Bragg accelerator optimization

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## **Abstract**

We present the first steps of a design of the optimal parameters for a full Bragg X-Ray free electron laser (BX-FEL). Aiming towards a future source of coherent X-ray radiation, operating in the strong Compton regime, we envisage the system to be the seed for an advanced light source or compact medical X-ray source. Here we focus on the design of the accelerator parameters: maximum gradient, optimal accelerated charge, maximum efficiency, and ‘wake coefficient’, which relates to the decelerating electric field generated due to the motion of a charged-line or train of charged-lines. Specifically, we demonstrate that the maximum efficiency has optimal value and given the fluence of the materials, the maximum accelerated charge in the train is constant. These two results might be important in any future design.

**Keywords:** Bragg; wake-field; Compton scattering; energy conversion; efficiency; fluence; light source; medical accelerator