

Simulation Study of a ERL based EUV FEL for Lithography

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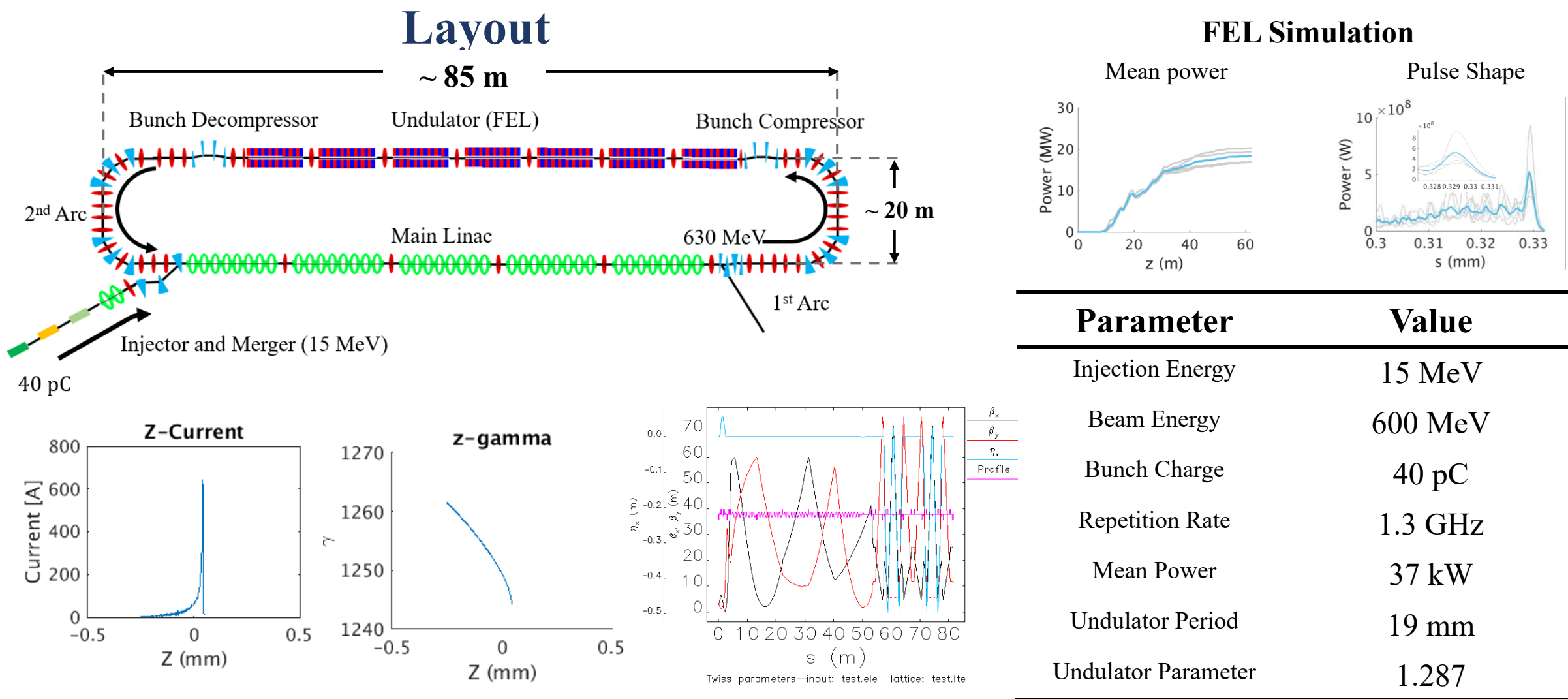
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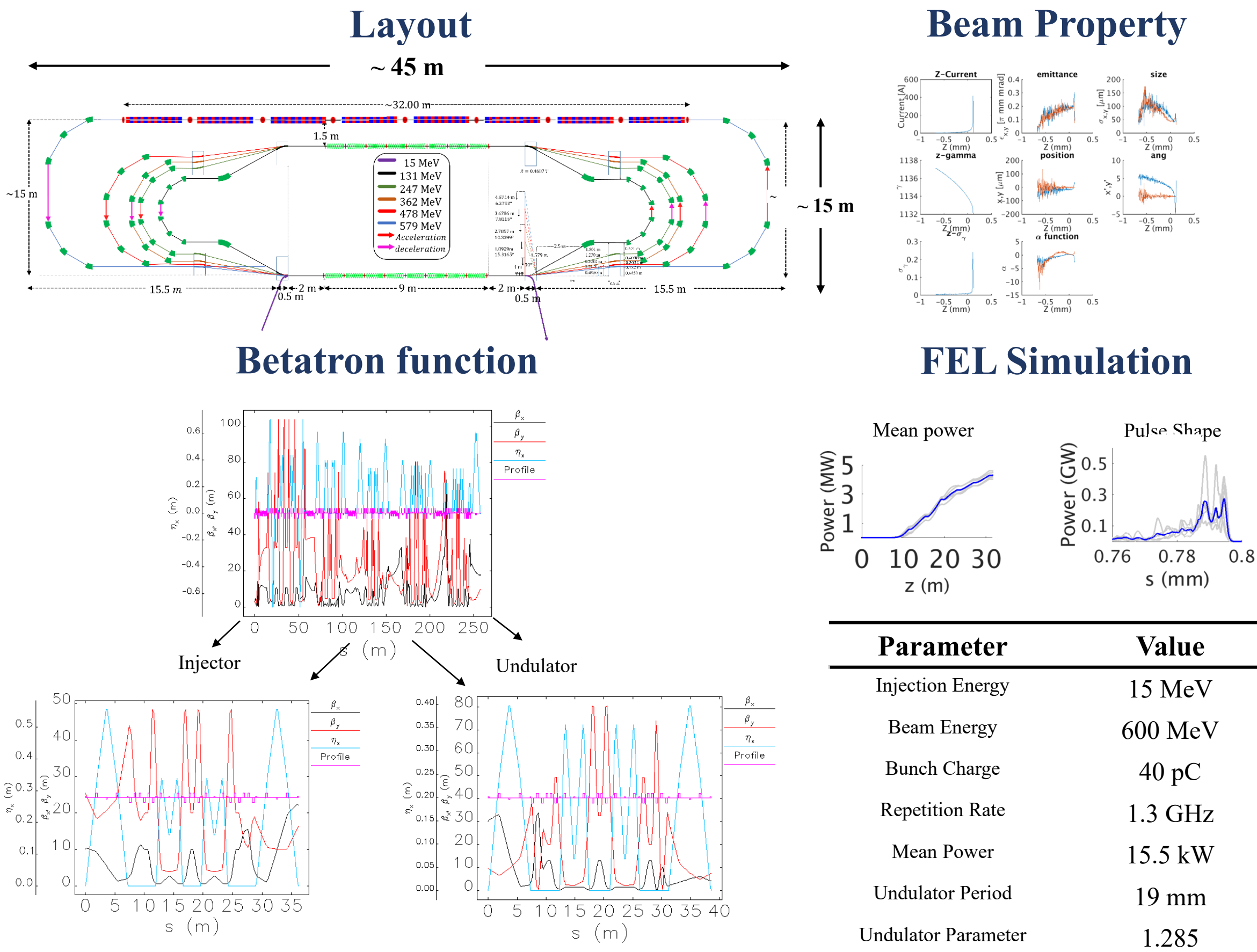
Abstract

Photolithography technology is the core part of the semiconductor manufacturing process. It has required light having stronger power for higher throughput. ERL based EUV FEL is emerging as a next generation EUV source which can produce the light over 10 kW. In this study, first, EUV-FEL design, which is based on single turn, is presented. It accelerates 40 pC electron beam to 600 MeV and produces EUV, whose wavelength is 13.5 nm and power is 37 kW. Second, multi-turn based design is presented. It improved compactness to make it more suitable for industrial use. Simulation study shows that the multi-turn design can generation 15.5 kW average power. This study is expected to increase the practical industrialization potential of ERL-based photolithography.

Single Turn ERL Design



Multi-turn ERL Design



Conclusion

- By using ERL based EUV FEL, 37 kW ERL EUV is generated in single turn ERL
- Compactness is intensified by using multi turn ERL and EUV power is 15.5 kW due to short undulator length.