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High-Brightness High-Duty Cycle Electron Injectors.

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High brightness electron sources have been one of the driving forces (probably the main) behind the spectacular results achieved in the last decade by some accelerator-based applications. Indeed, x-Ray FELs, with their 10-fold order of magnitude increase in peak brightness, probably represent the best example of it. New ambitious proposals for x-ray FELs and ERLs, as well as inverse Compton sources for x-ray or gamma ray production, are now requiring operation at MHz-GHz repetition rates. In response to that, a number of groups around the world have been actively working in developing high-brightness high-duty cycle electron injectors capable of driving such machines. The high repetition rate requirement cannot be met by the existing low-repetition rate high-brightness injector schemes, and new technologies and configurations are under investigation. This presentation includes a description of the requirements for such injectors, an overview of the pursued technologies and schemes, a description of the main beam dynamics issues associated with this regime of operation, and examples of the results obtained so far by the groups active in the field.

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