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## Studies of single bunch and multi-bunch beam instabilities in the Diamond-II booster

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To reduce filling times and enable advanced injection schemes, it is desirable for the Diamond-II booster to provide high charge in both single and multi-bunch modes. The single bunch charge will be limited by short range wakefields in the booster, and long-range wakefields limit the charge for the multi-bunch trains. Due to the relatively low 100 MeV injection energy into the booster, the injected beam is susceptible to instabilities due to the very weak synchrotron radiation damping. In this paper, we present the simulation results carried out to estimate the single and multi-bunch charge thresholds in the Diamond-II booster including short and long range wakefields, RF cavity HOMs, and with physical apertures applied. Simulations results will also be presented that demonstrate the extracted multi-bunch charge could be increased by installing a transverse multi-bunch feedback (TMBF).

### Footnotes

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Europe

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