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ION EFFECTS IN THE ELECTRON DAMPING RING OF THE INTERNATIONAL LINEAR COLLIDER

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Ion induced beam instability and tune shift are critical issues for the electron damping ring of the International Linear Collider (ILC). To avoid conventional ion trapping, gaps are introduced in the electron beam by missing bunches in a train of bunches. However, the beam can still suffer from the fast ion instability (FII) driven by ions that last only for a single passage of the electron beam and are not trapped for multiple turns. Our study shows that the ion effects can be significantly mitigated by using multiple gaps, so that the stored beam consists of a number of relatively short bunch trains. Another way to avoid trapped ions is to introduce clearing electrodes. The ion effects in the ILC damping rings are investigated using both analytical and numerical methods.

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