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Effects of Vacuum Pressures on the Fast ion-instability in the PLS Storage Ring

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We show experimental results on the fast-ion instability at the 2.5 GeV Pohang Light Source (PLS). In order to enhance the fast-ion instability in the PLS, we inserted helium gas to the storage ring in order to raise the vacuum pressure from 0.6 nT to 40 nTorr. With the gaps in the bunch train which is large enough to avoid multiturn ion trapping, we observed increase of a factor of 3-4 in the vertical beam sizes for the increased vacuum pressure up to 40 nTorr. The instability growth rate is estimated as a function of the vacuum pressure in the ring and is also compared with the simulation results.