

# Simulation Study of Ion Effects in Korea-4GSR

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The Korea-4th generation storage ring (Korea-4GSR), with an energy of 4 GeV, a circumference of 800 meters, a multi-bend achromat (MBA) structure, and an emittance of  $60 \text{ pm} \cdot \text{rad}$ , is designed for a high-performance synchrotron light source. To ensure stable and efficient functioning of the 4GSR, mitigating the impact of ion effects—which can lead to fast beam-ion instability (FBII), emittance growth, and reduced beam lifetime—is crucial, especially in low-emittance machines where these effects can severely degrade performance. In this study, we analyze the influence of ion effects on the Korea-4GSR using ELEGANT simulations. Given the well-known ion effects in storage rings, our focus is on evaluating how varying fill patterns and gas pressures affect beam stability in the specific environment of the Korea-4GSR. The results indicate that ion effects can indeed lead to beam instabilities under certain conditions. However, by adjusting operational settings, such as fill patterns and vacuum conditions, these effects can be mitigated, resulting in more stable beam performance.

## Paper submission Plan

No

## Best Presentation

No

## Contribution track

ICABU WG2. Beam Physics, Diagnostics & Novel Techniques

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