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Mitigating IDVC thermal deformation with mechanical constraint for reliable ID minimum gap operation

Monday 11 August 2025 16:00 (2 hours)

Premature activation of the insertion device (ID) minimum-gap limit switches was observed during beamline commissioning at the Advanced Photon Source Upgrade (APSU). This issue was traced to vertical deformation of the insertion device vacuum chamber (IDVC) due to temperature differences with its strongback. Direct measurements of temperature and vertical displacement of IDVC in a selected sector of the APS storage ring confirmed this effect, and simulations successfully reproduced the thermal deformation mechanism. To address the issue, we developed a simple mechanical constraint to limit the vertical displacement, rather than actively compensating for the temperature difference through enhanced heat transfer. This paper reports the investigations, proposed mechanical solution, simulation, and measurement validation after its installation. Post-installation tests successfully demonstrated its effectiveness, allowing the IDs to reach the minimum gap without triggering the limit switch.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Funding Agency

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Yes

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