Contribution ID: **198** Contribution code: **WEP11** Type: **Poster Presentation**

Design and analysis of the ALS-U Photon Transport Line

Wednesday 17 September 2025 17:00 (1 hour)

The Advanced Light Source Upgrade (ALS-U) will increase the brightness and coherent flux of soft X-rays by a factor of 100 through the use of a multibend achromat lattice. While maintaining a similar number of beamlines, this enhancement introduces significant challenges in packaging photon transport line (PTL) components and managing elevated thermal loads within increasingly constrained spaces. To address these issues, we performed a comprehensive design and analysis of all PTL absorbers and vacuum chambers, using CAD-based ray tracing, geometric evaluations, and numerical simulations to assess beam power deposition under both nominal and missteered conditions. Different thermal analysis strategies were employed for insertion device and bend magnet beamlines to ensure safe operation across varied beam characteristics. This work summarizes the design methodology, analysis results, and the current development status of the ALS-U Photon Transport Line as it advances toward production and testing.

Footnotes

Funding Agency

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Session Classification: Wednesday Poster Session

Track Classification: ACCELERATORS: Storage Rings