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Comprehensive power consumption profiling of KARA for sustainable operations

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The negative impacts of global warming and continuously rising energy costs emphasize a need for sustainable and cost-effective operation also for accelerator facilities. This necessitates optimization of accelerator operation, which then requires a comprehensive profiling of accelerator facilities for power consumption patterns to break down the consumption trends of the whole facility. At KIT, as part of the Horizon Europe project Research Facility 2.0, a comprehensive analysis of the Karlsruhe Research Accelerator (KARA) was carried out using the past 1 year of power consumption profiles for all accelerator components. This contribution provides an analysis to identify the overall power consumption profiles of KARA's main systems, such as the storage ring, cooling plants, and beam-lines. It also explores correlations with factors like weather and temporal variation in consumption patterns on a quarterly, monthly, weekly, and daily basis. The results highlight peak power consumers and consumption periods, as well as the influence of seasonal behavior, accelerator operation modes, and weather patterns.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

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