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Performance improvement studies for the CERN SPS MKDH system

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The CERN-SPS beam dump system (SBDS) is equipped with a dilution kicker system, the so-called MKDH. During the 2022 and 2023 beam commissioning, the vacuum rise in the MKDH became a concern for reaching the anticipated higher beam intensities. Dedicated conditioning of the SPS kickers enabled successful attainment of High-Luminosity (HL) beam intensities during 2024 operation. However, the conditioning time required after replacing an MKDH magnet remains a significant concern, leading to a study aimed at optimizing its high intensity performance. This paper presents a feasibility assessment, a detailed characterization of operational kickers and spare unit and proposed modifications designed to optimize the MKDH kicker magnet performance. The modifications focus on minimizing interaction and coupling between the kicker and the beam, with the ultimate goal of improving operational efficiency with high intensity beams.

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