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Study of high-intensity bunch merging and its experimental application on rapid cycling synchrotrons

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Longitudinal beam manipulation have been widely employed for various scientific and industrial applications in many hadron (heavy ion or proton) synchrotrons. One of the most important manipulations is the longitudinal bunch merging based on the dual rf system. For high-intensity hadron beams, longitudinal space-charge matching and cavity beam loading matching and compensation are of practical concern to minimize the emittance blow-up for merging of high-intensity beams. For rapid cycling synchrotrons, a trade off should be made between the limited bunch merging time and the high-intensity effects. This paper discusses the schemes for high-intensity hadron bunch merging and proposes a fast bunch merging scheme for rapid cycling synchrotrons. Some experimental preparations for the bunch merging in the CSNS/RCS are also introduced.

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Footnotes

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Primary author: YUAN, Yaoshuo (Chinese Academy of Sciences)

Co-authors: FRANCHETTI, Giuliano (GSI Helmholtzzentrum für Schwerionenforschung GmbH); LIU, Hanyang (Institute of High Energy Physics); WANG, Sheng (Institute of High Energy Physics)

Presenters: FRANCHETTI, Giuliano (GSI Helmholtzzentrum für Schwerionenforschung GmbH); YUAN, Yaoshuo (Chinese Academy of Sciences)

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