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Improvement of the longitudinal phase space tomography at the J-PARC synchrotrons

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The longitudinal phase space tomography, which reconstructs the phase space distribution from the one-dimensional bunch profiles, is used in various accelerators to measure longitudinal beam parameters. At the J-PARC, an implementation of the phase space tomography based on the convolution back projection method has been used to measure the momentum spread of the injected beam. The method assumes that the beam distribution rotates without significant deformation during the synchrotron oscillation. Because of the nonlinearity of synchrotron motion with sinusoidal RF voltage, the method can be used only in limited situations such as small amplitude synchrotron oscillation. Algebraic Reconstruction Techniques (ART) in conjunction with particle tracking, which is implemented in CERN's tomography code, allows accurate reconstructions even for nonlinear large amplitude synchrotron oscillations. We present the overview of the application of CERN's tomography code to the J-PARC synchrotrons. The results of benchmarking are also reported.

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Footnotes

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