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Characterization of high dynamic range beam emittance

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Measurement of hadron beam emittances with very high dynamic range, one part-per-million and above, become available recently. This level of dynamic range is required for studying the origin and evolution of the halo in high intensity hadron linacs. There are no established or commonly known metrics to describe such distributions. Using data from the emittance measurements of 2.5Mev H- beam at the SNS Beam Test Facility we demonstrate that most common emittance metrics the RMS emittance and the Halo parameter H are totally insensitive to low level features of the distribution. We also suggest a new metric, which is unambiguously computable, invariant of linear simplectic transformations, and capturing features important for low loss beam transport.

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Footnotes

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Yes

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