Hall A HRS Acceptance Study via White Spectrum Scans in Experiment E94-004 (R-function Cuts)

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Here the R-function technique [1, 2] was used to make cuts on the data from the white spectrum scans for experiment E94-004 (for details and previous results see [3]) via the routines of J. LeRose [4]. These cuts describe an "equi-distant" contour relative to the acceptance boundary given by J. LeRose. This boundary is defined in the space of target Transport coordinates but reflects all spectrometer apertures including, in this case, a front-end collimator (nominally 6 msr). At each of a set of (δ, y_t) grid points within the nominal acceptance, a contour in the (θ_t, ϕ_t) plane is defined by a 12-sided polygon where θ_t and ϕ_t are defined as the tangents of the corresponding angles. The R-function value is then the minimum distance in this space from a given particle's coordinates to the polygon ($R > 0$ defines points inside the polygon and $R < 0$ points outside). A cut can then be enforced on the value of R so that all events are within some minimum distance from the boundary. This allows efficient cutting while keeping a safe distance from the acceptance boundary. The results using this technique are shown in Figure 1 and Figure 2 for the electron and proton arms respectively. The agreement is substantially better than for the case without cuts [3].

References

[1] V.L. Rvachev, T.I. Sheiko, V. Shapiro and I. Tsukanov, *On Completeness of RFM Solution Structures*, Computational Mechanics **25**, 305-316 (2000) and http://sal-cnc.me.wisc.edu/publications/completeness.html.

[2] V.L. Rvachev, T.I. Sheiko, V. Shapiro and I. Tsukanov, *Transfinite Interpolation over Implicitly Defined Sets*, to appear in Computer-Aided Geometric Design and http://sal-cnc.me.wisc.edu/publications/transfinite.html.

[3] "Hall A HRS Acceptance Study via White Spectrum Scans in Experiment E94-004", P.E. Ulmer, *JLAB Technical Note # 01-025* (2001).

[4] J. LeRose, private communications.

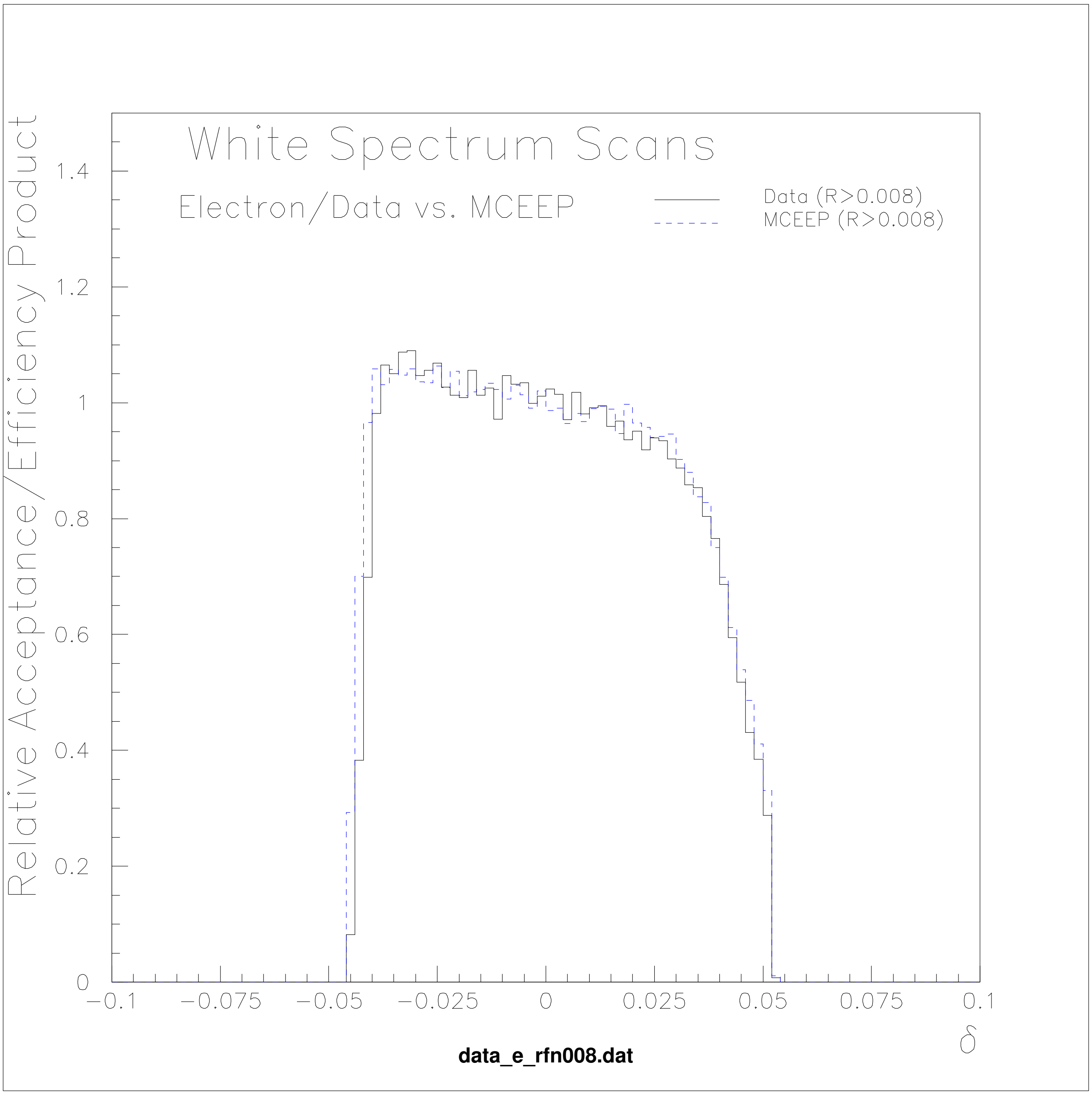

Figure 1: Electron arm relative acceptance/efficiency profile for the cut: $R > 0.008$ for data and MCEEP.

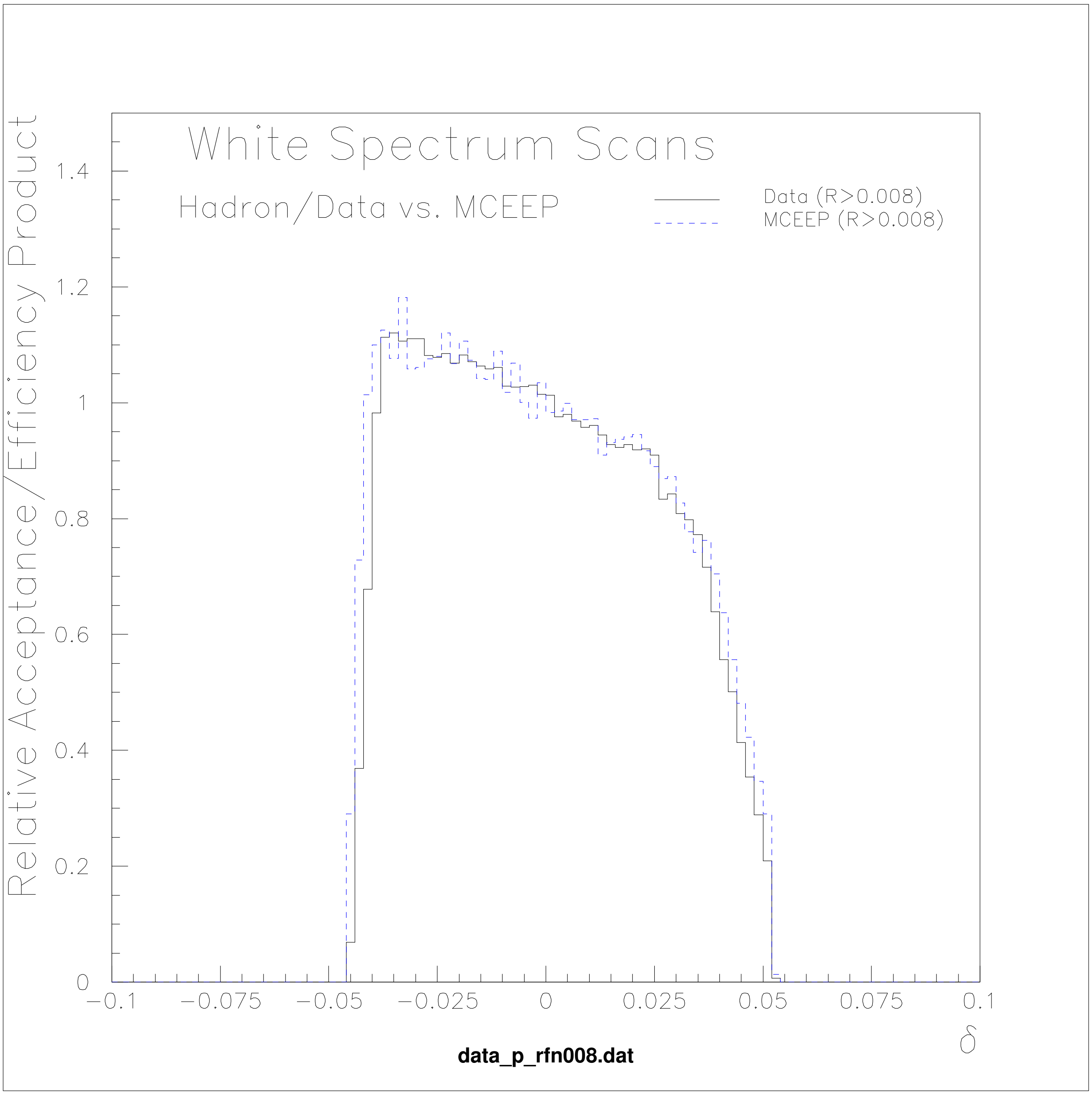

Figure 2: Proton arm relative acceptance/efficiency profile for the cut: $R > 0.008$ for data and MCEEP.