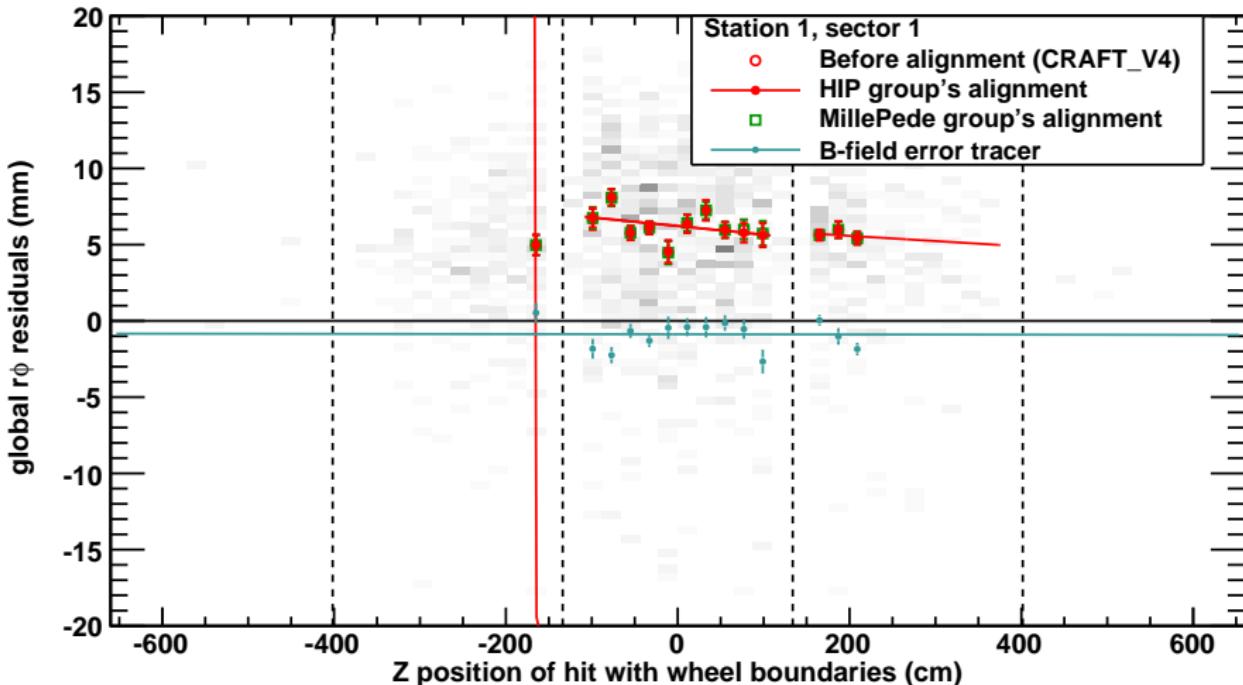
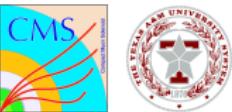




$r\phi$ residuals versus z

Track-based validation plots

Jim Pivarski 2/152



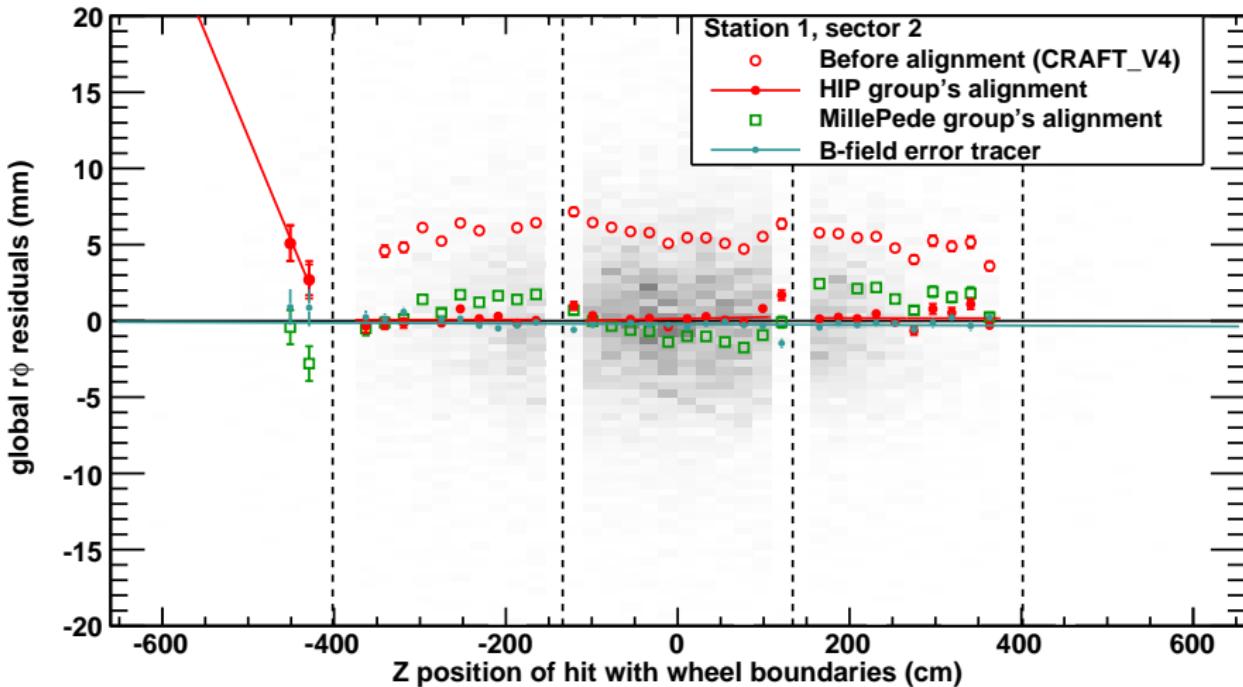
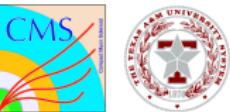
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Track-based validation plots

Jim Pivarski 3/152



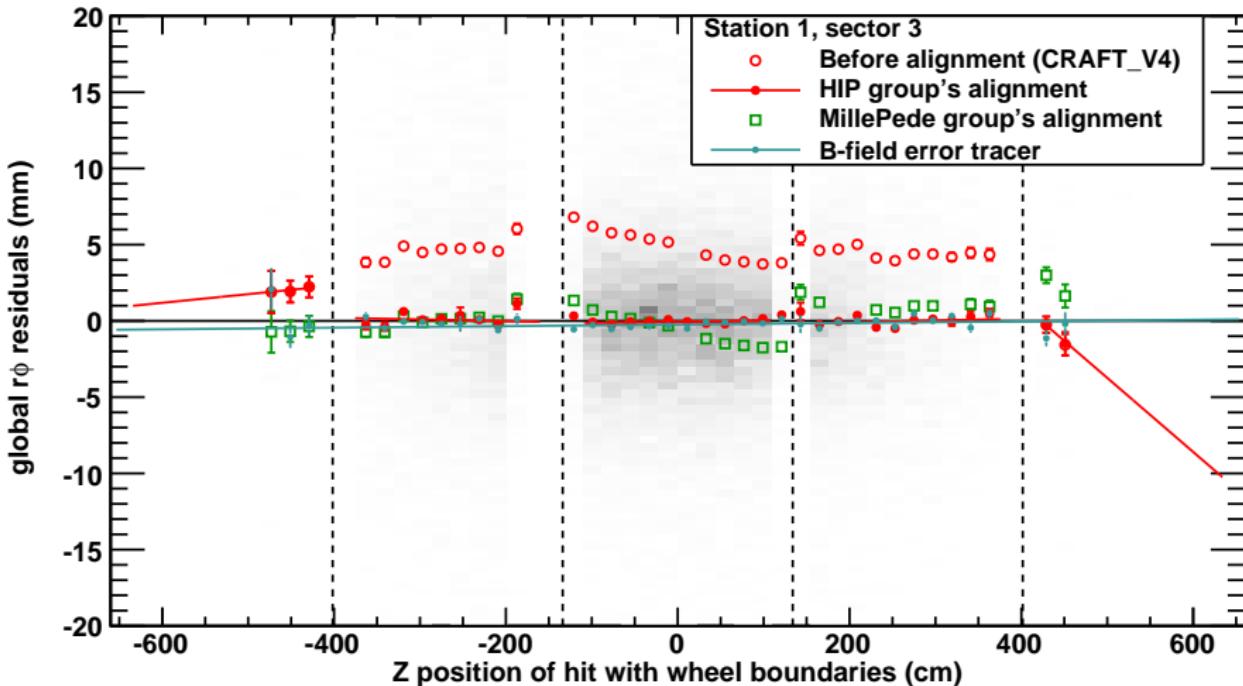
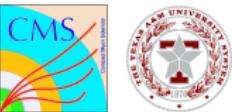
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Track-based validation plots

Jim Pivarski 4/152



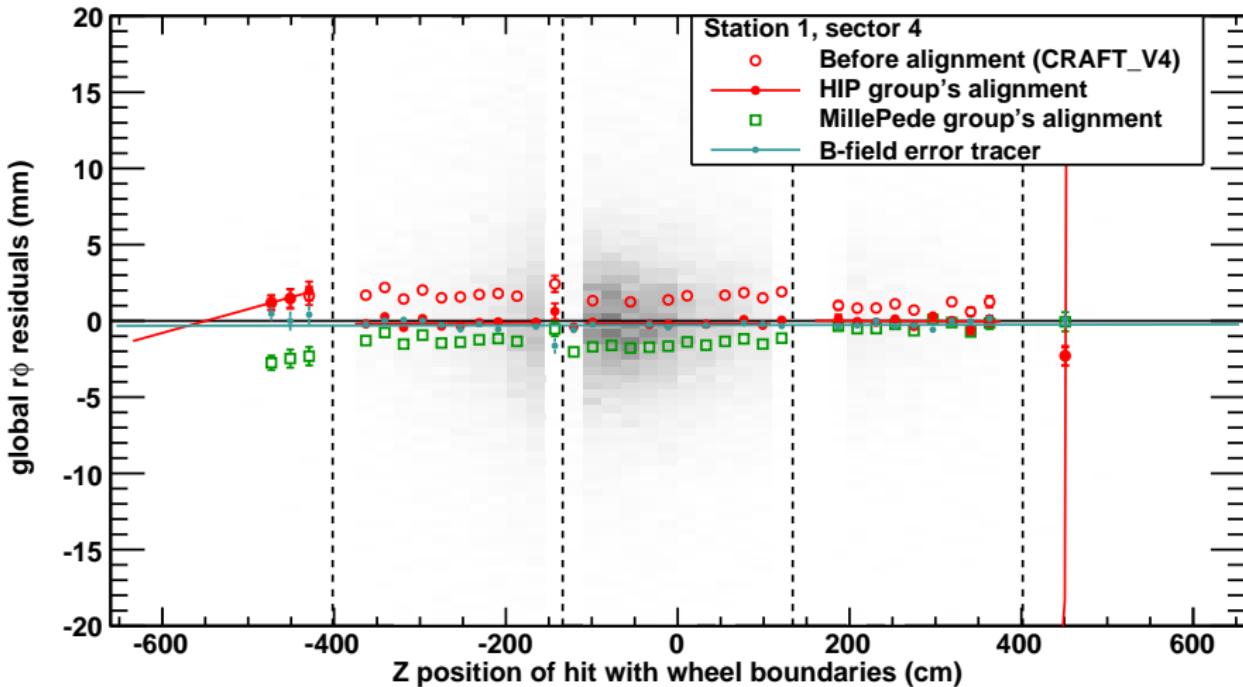
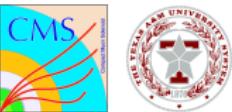
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Track-based validation plots

Jim Pivarski 5/152



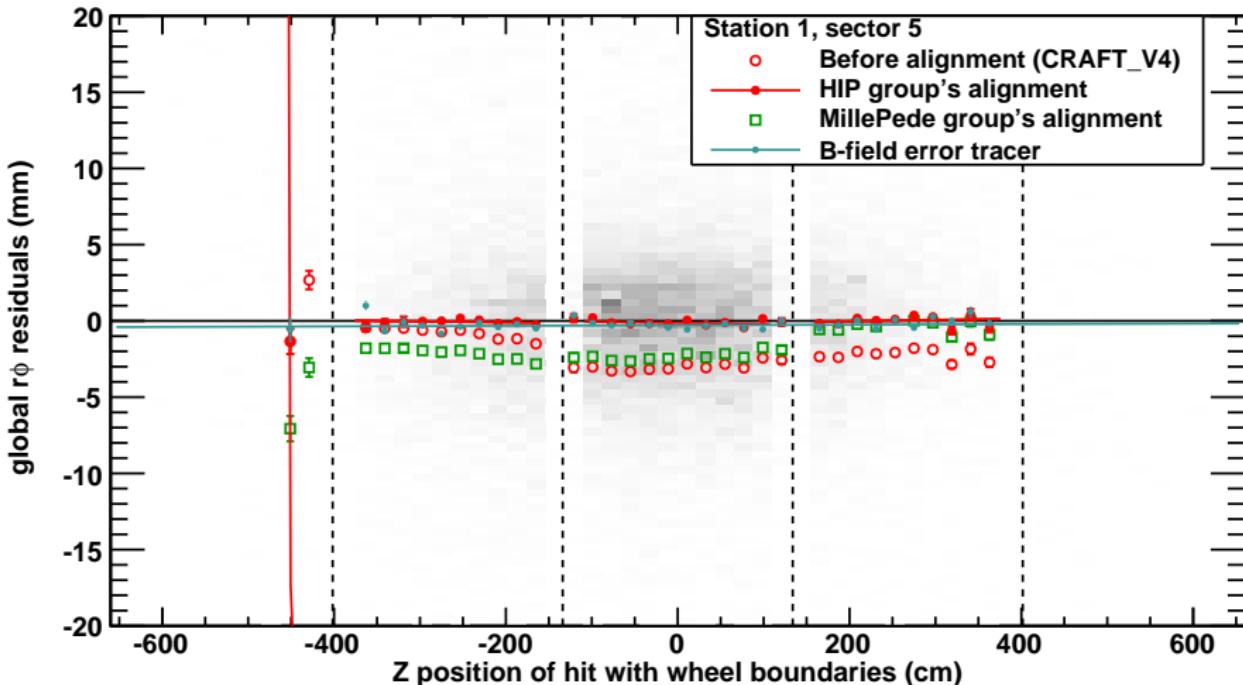
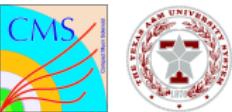
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Track-based validation plots

Jim Pivarski 6/152



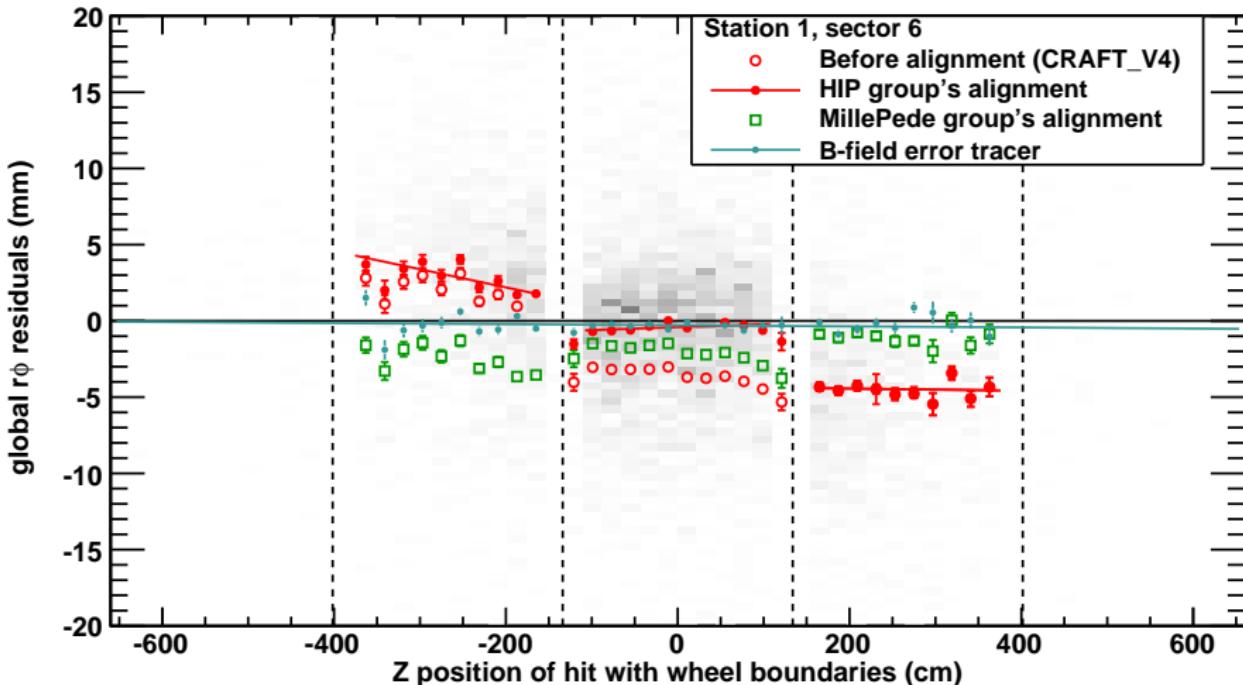
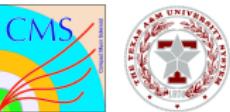
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Track-based validation plots

Jim Pivarski 7/152



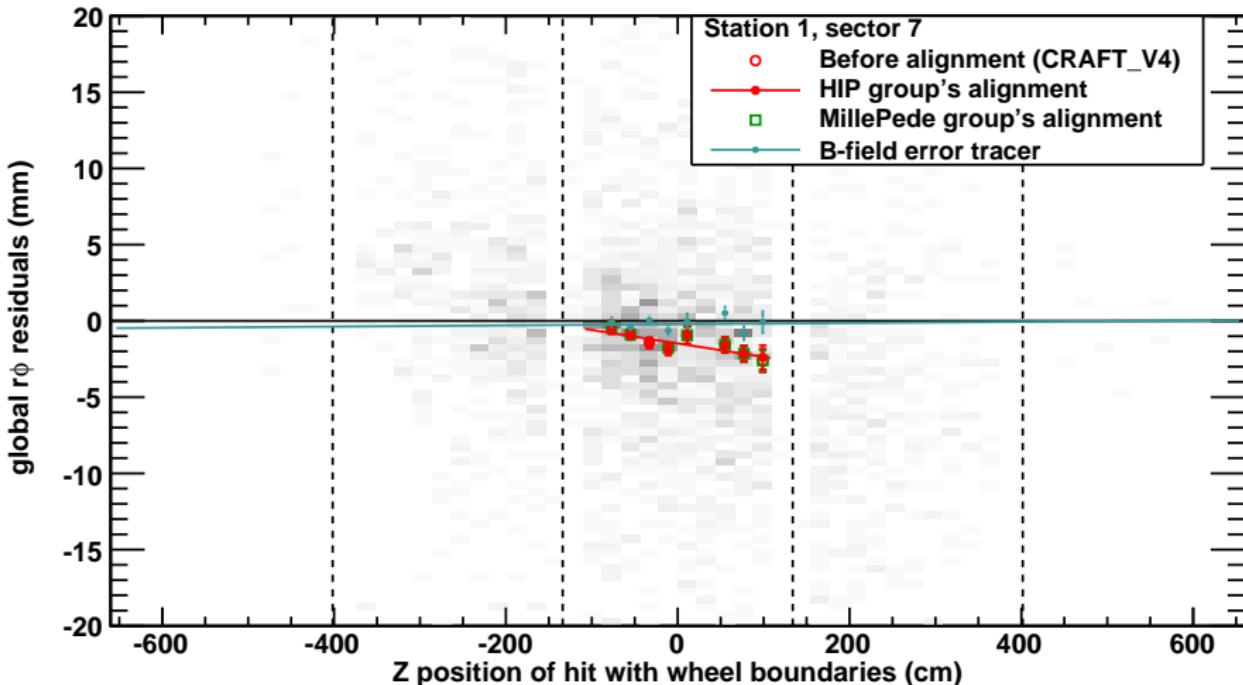
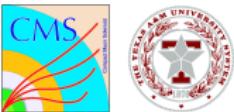
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Track-based validation plots

Jim Pivarski 8/152



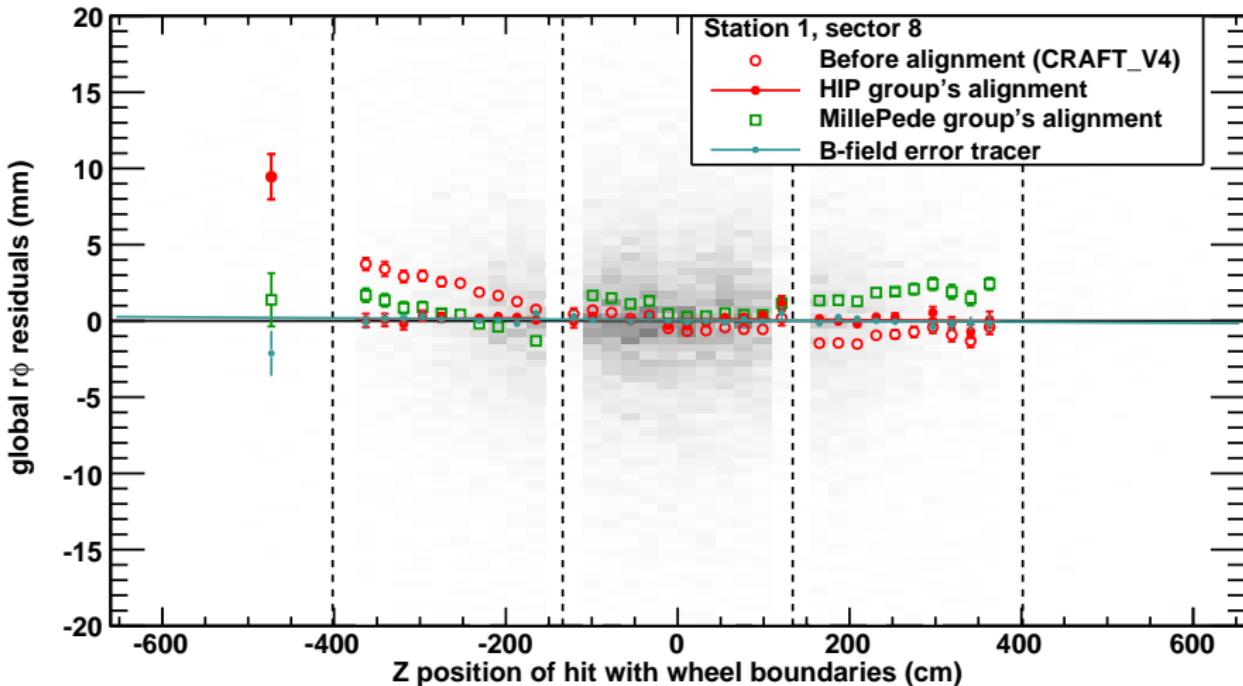
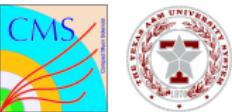
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Track-based validation plots

Jim Pivarski 9/152



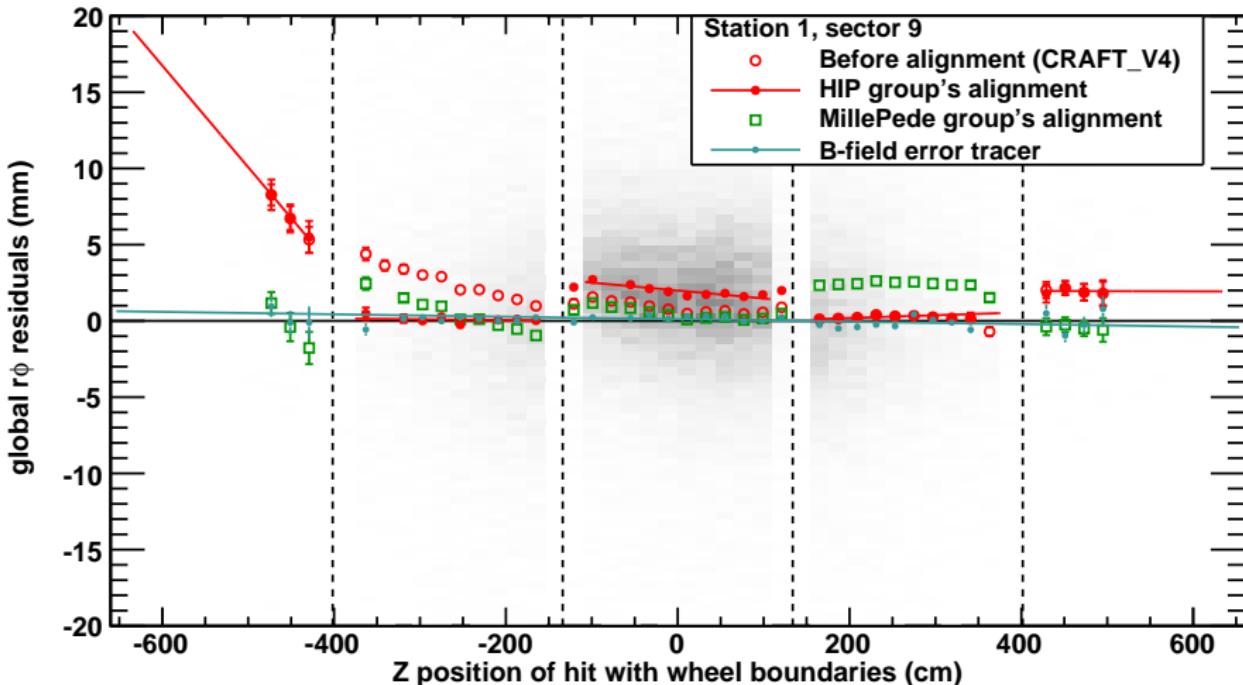
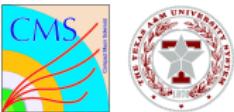
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Track-based validation plots

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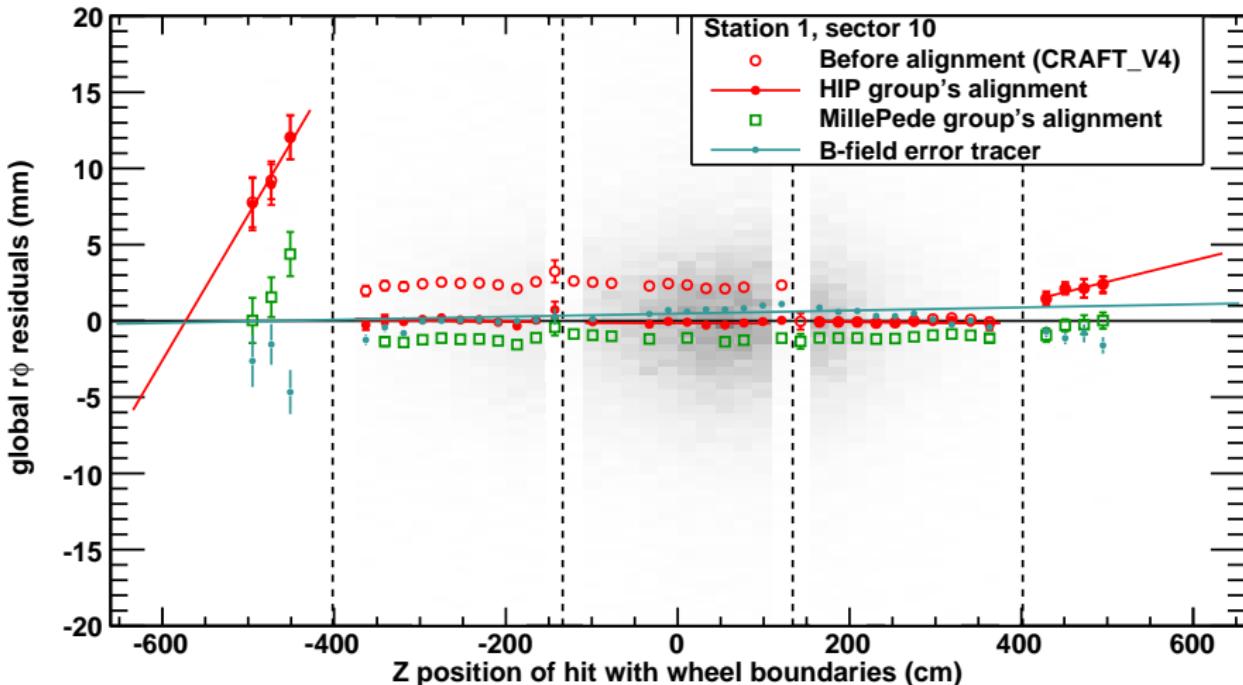
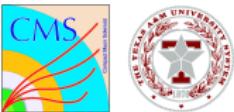
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Track-based validation plots

Jim Pivarski 11/152



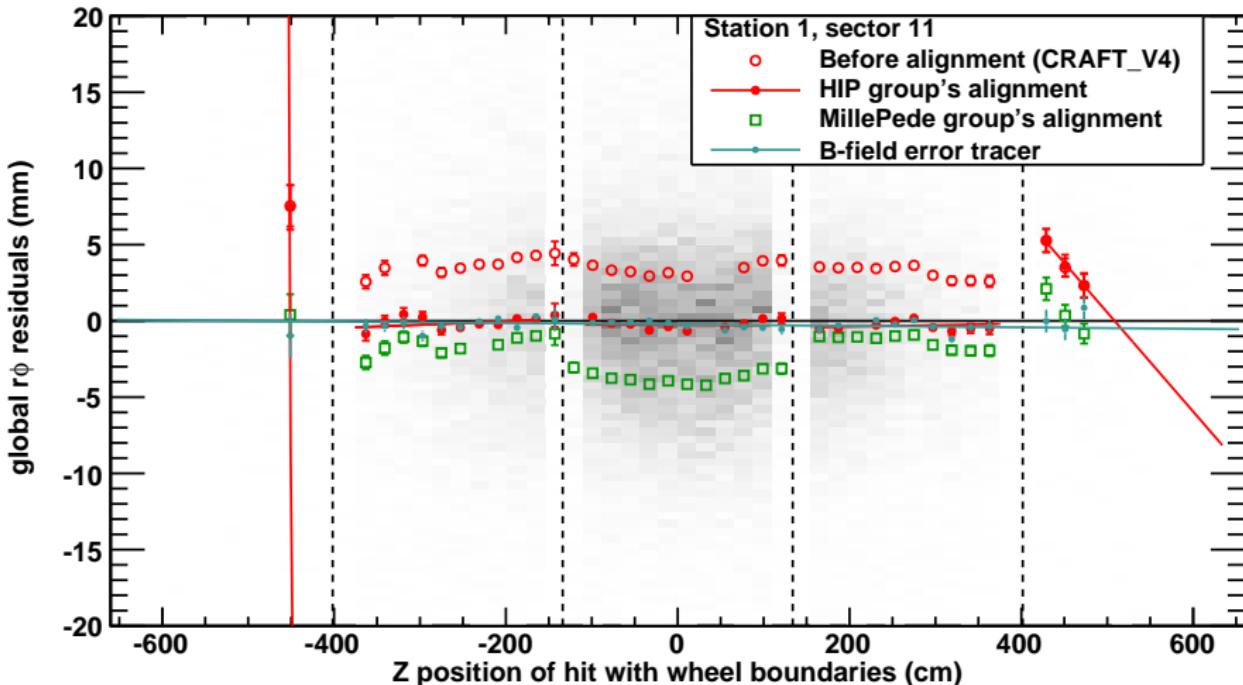
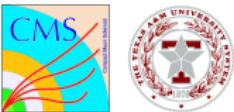
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Track-based validation plots

Jim Pivarski 12/152



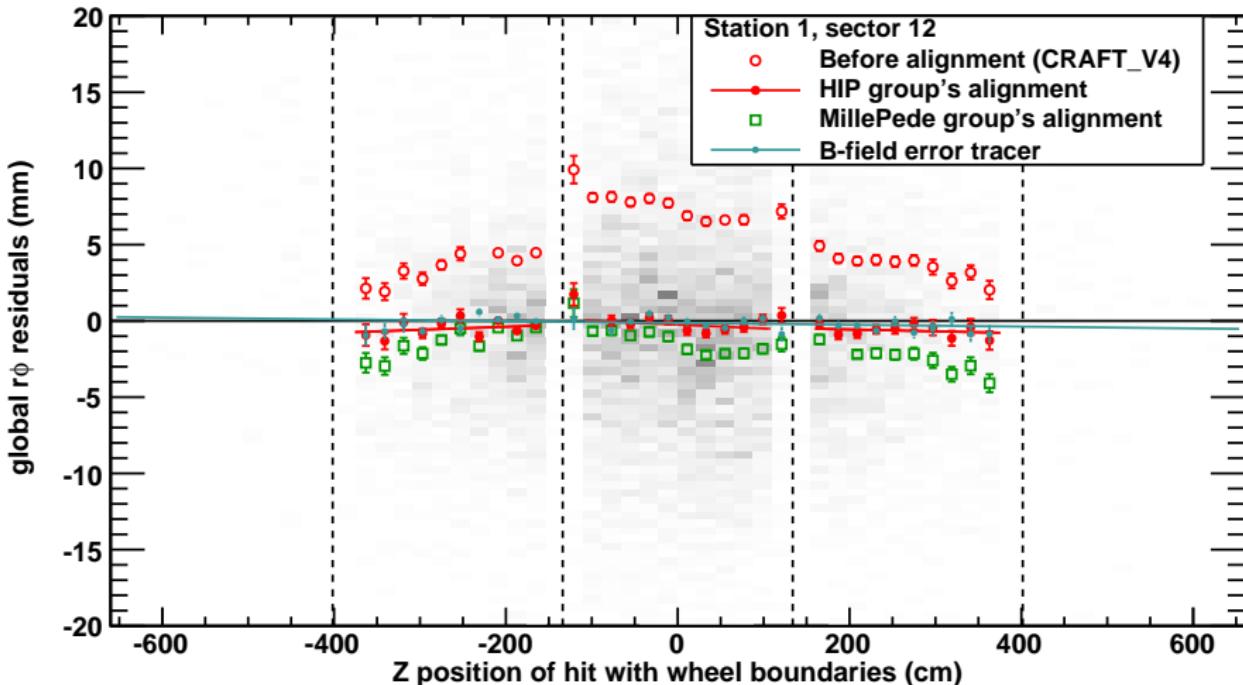
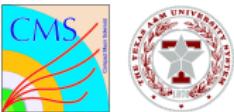
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Track-based validation plots

Jim Pivarski 13/152



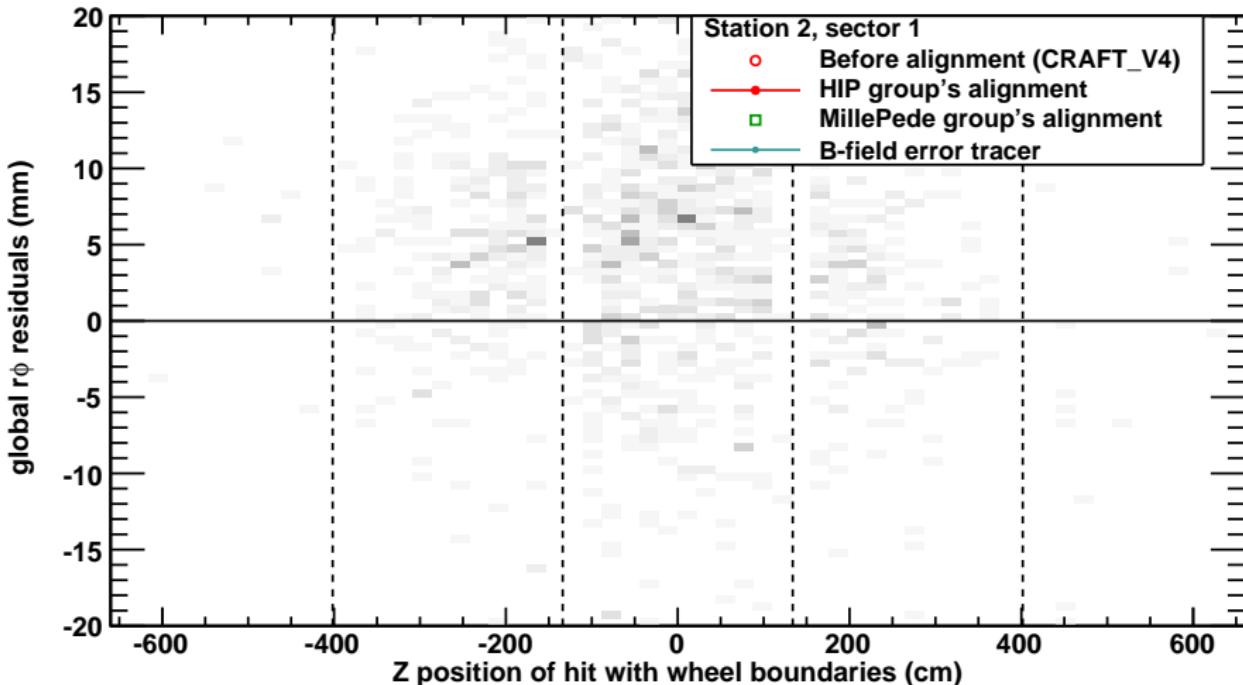
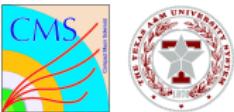
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Track-based validation plots

Jim Pivarski 14/152



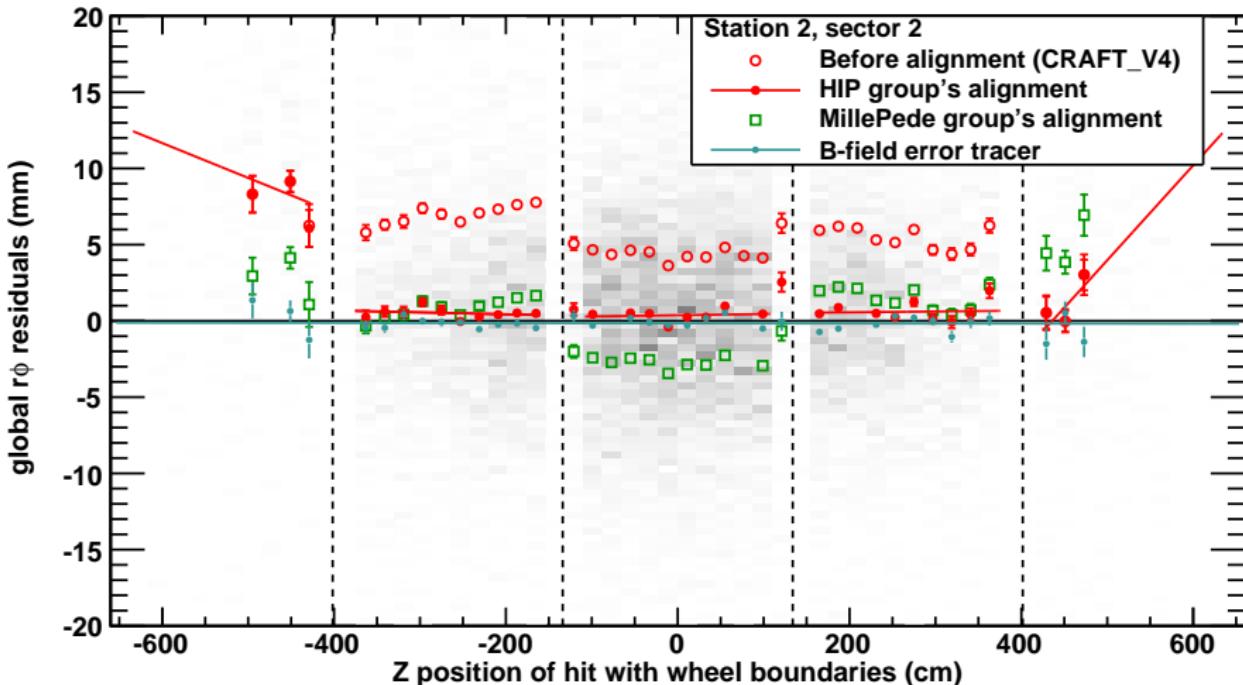
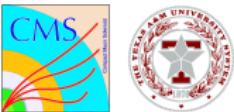
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Track-based validation plots

Jim Pivarski 15/152



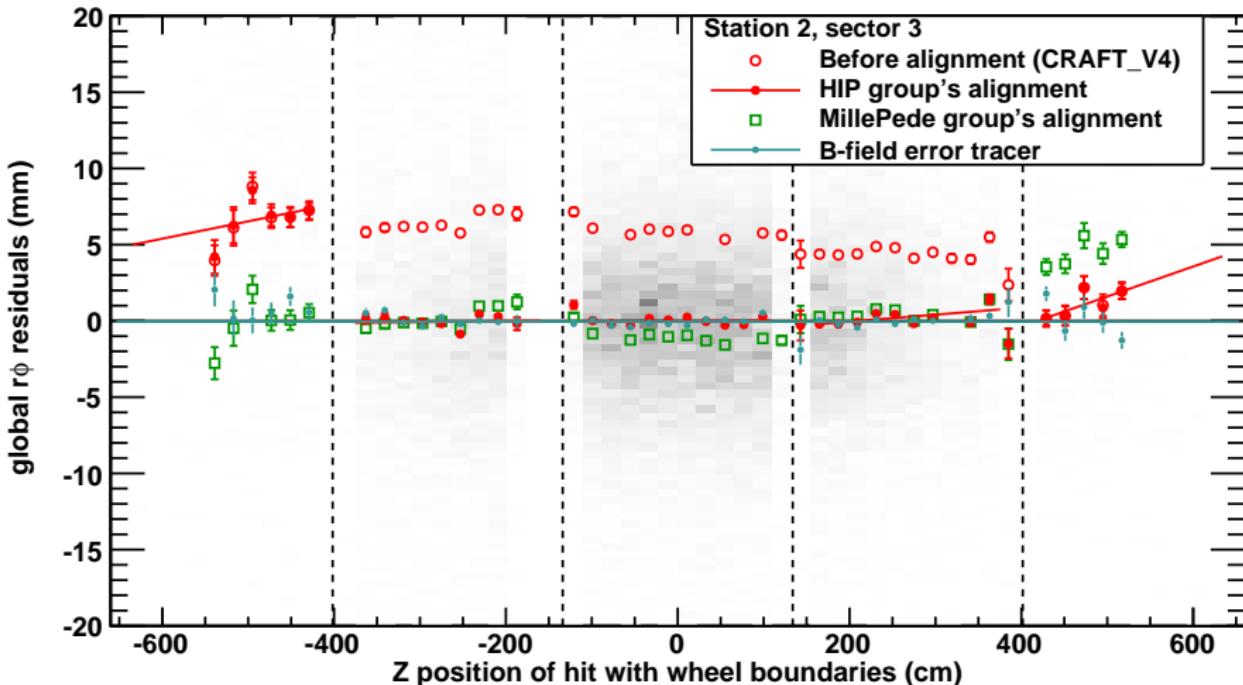
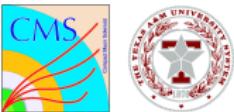
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Track-based validation plots

Jim Pivarski 16/152



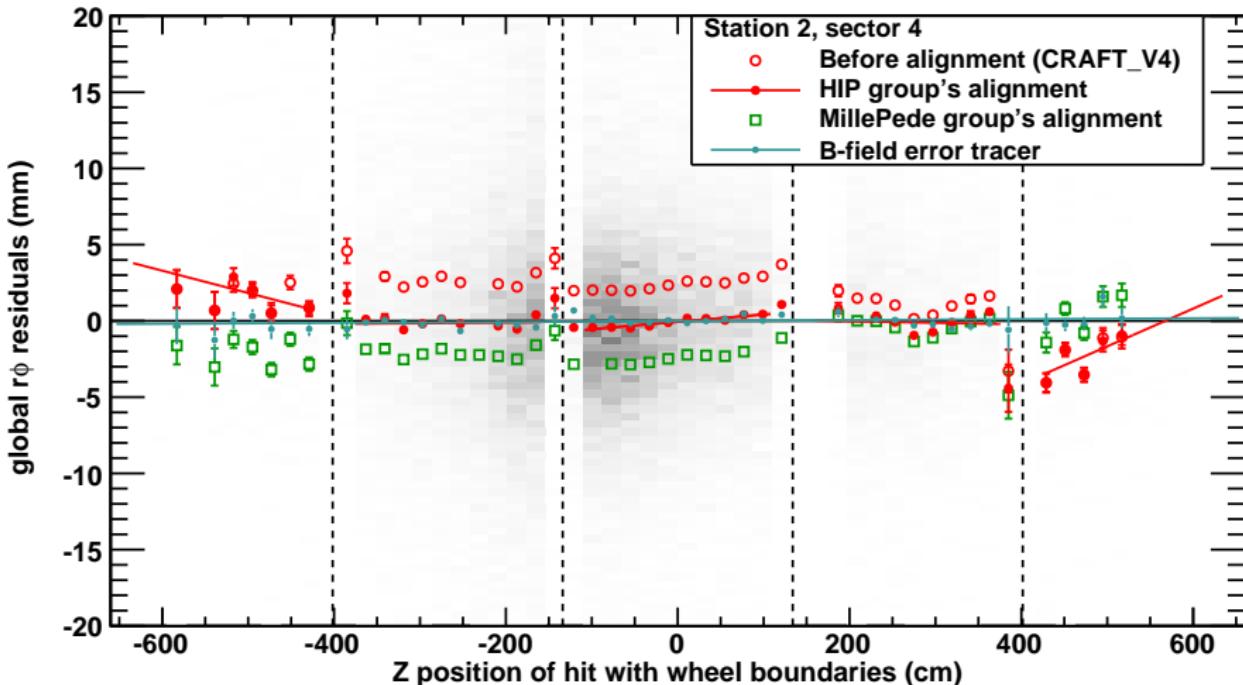
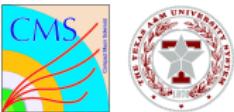
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Track-based validation plots

Jim Pivarski 17/152



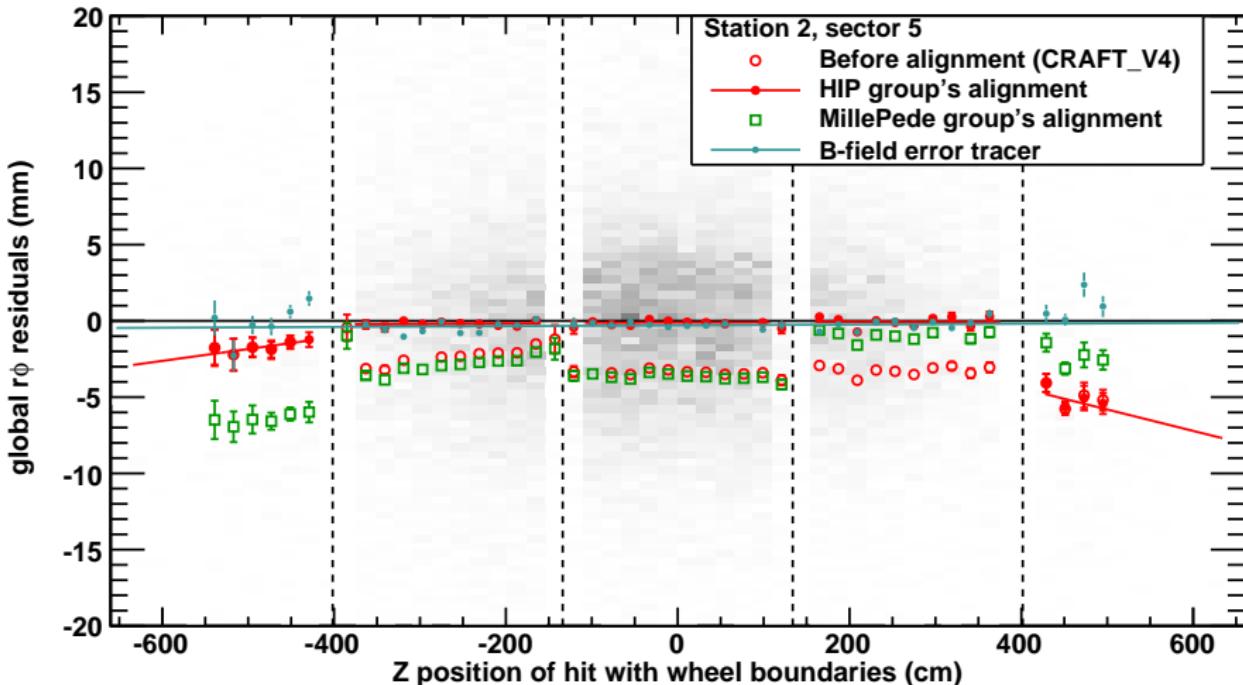
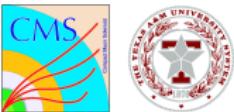
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Track-based validation plots

Jim Pivarski 18/152



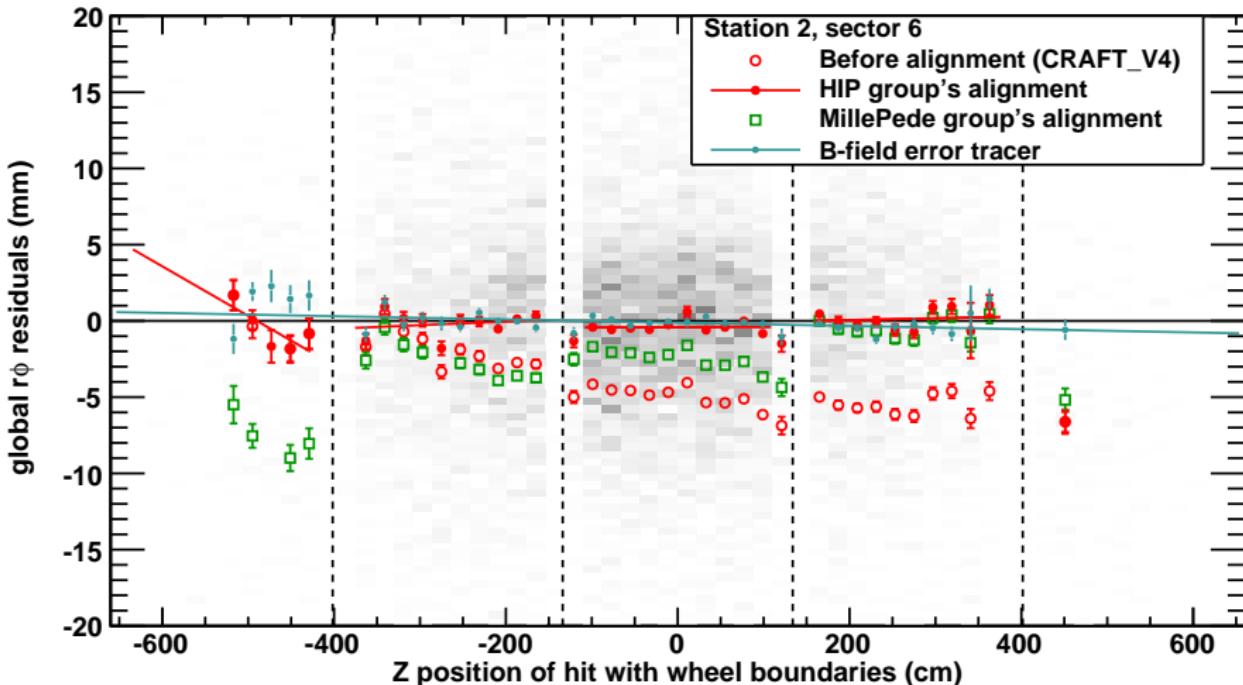
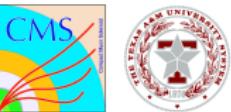
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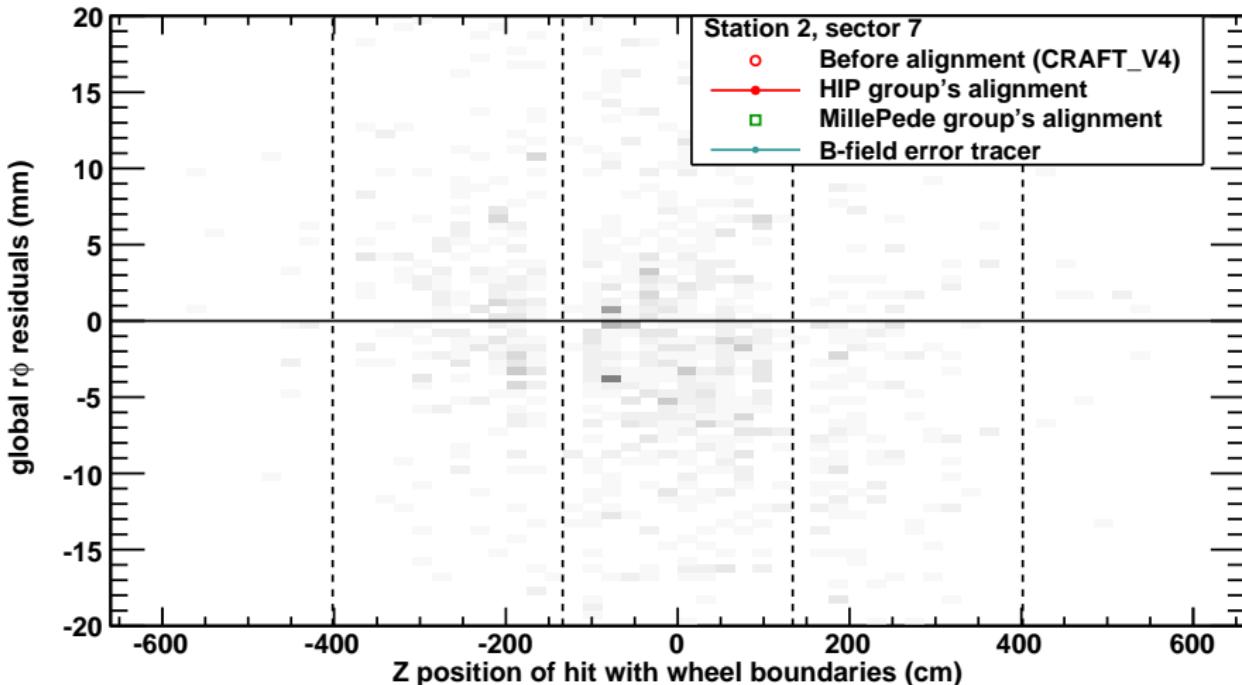
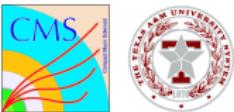
Track-based validation plots

Jim Pivarski 19/152



Track-based validation plots

Jim Pivarski 20/152



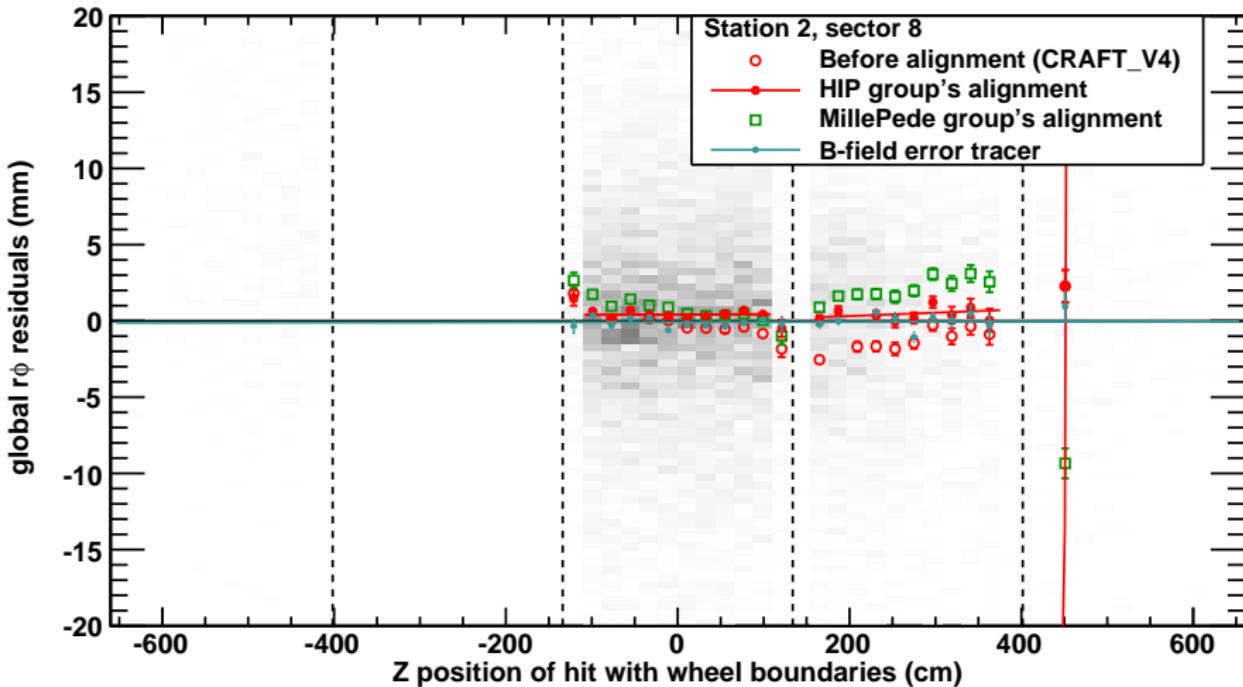
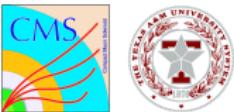
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Track-based validation plots

Jim Pivarski 21/152



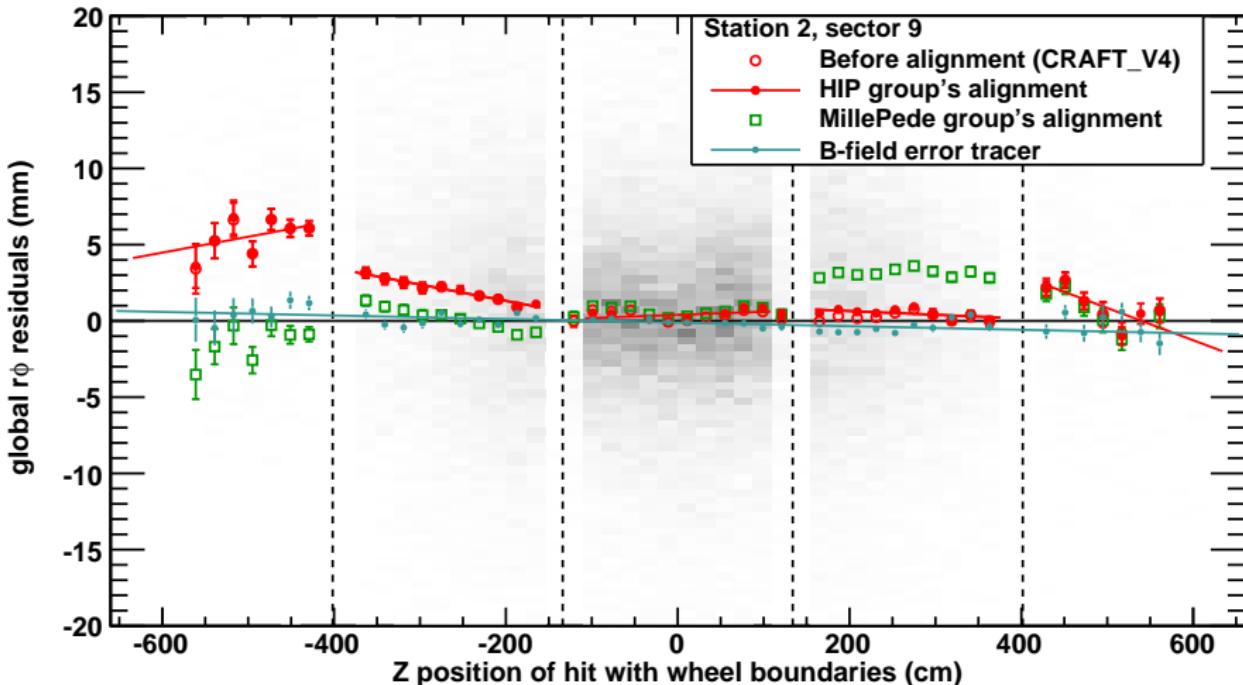
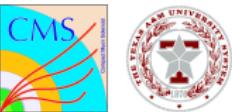
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Track-based validation plots

Jim Pivarski 22/152



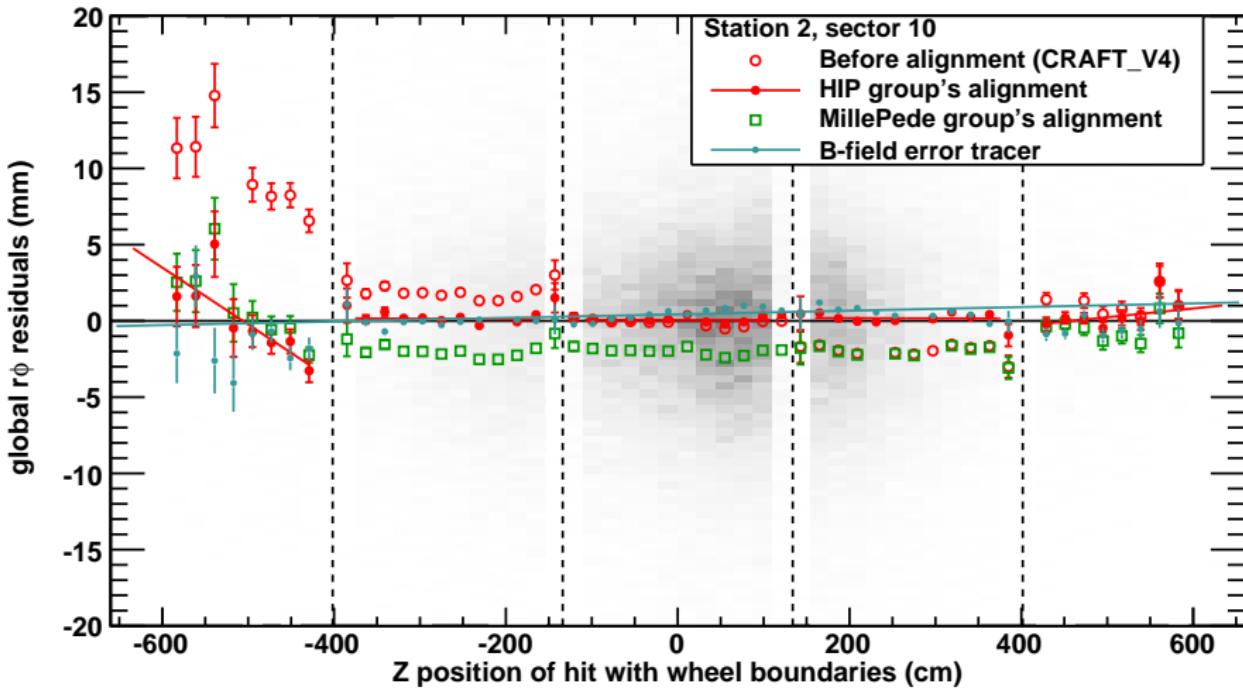
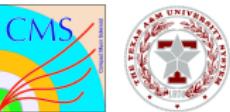
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Track-based validation plots

Jim Pivarski 23/152



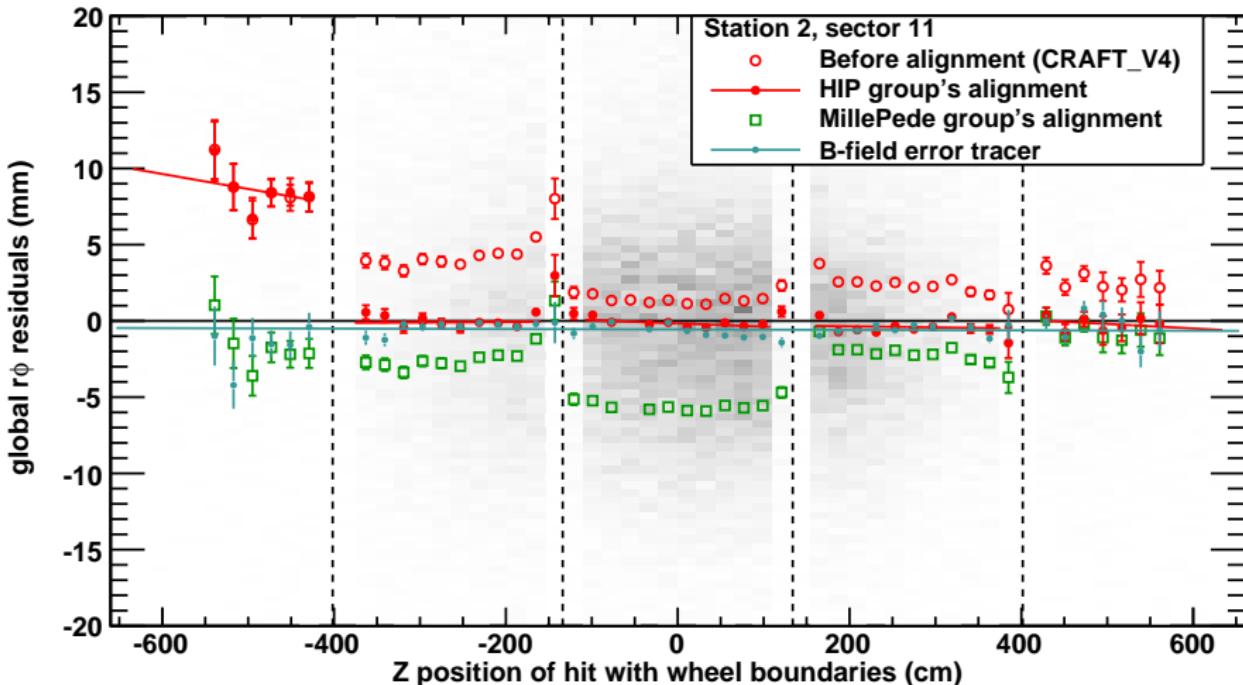
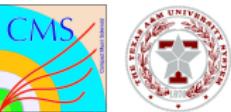
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Track-based validation plots

Jim Pivarski 24/152



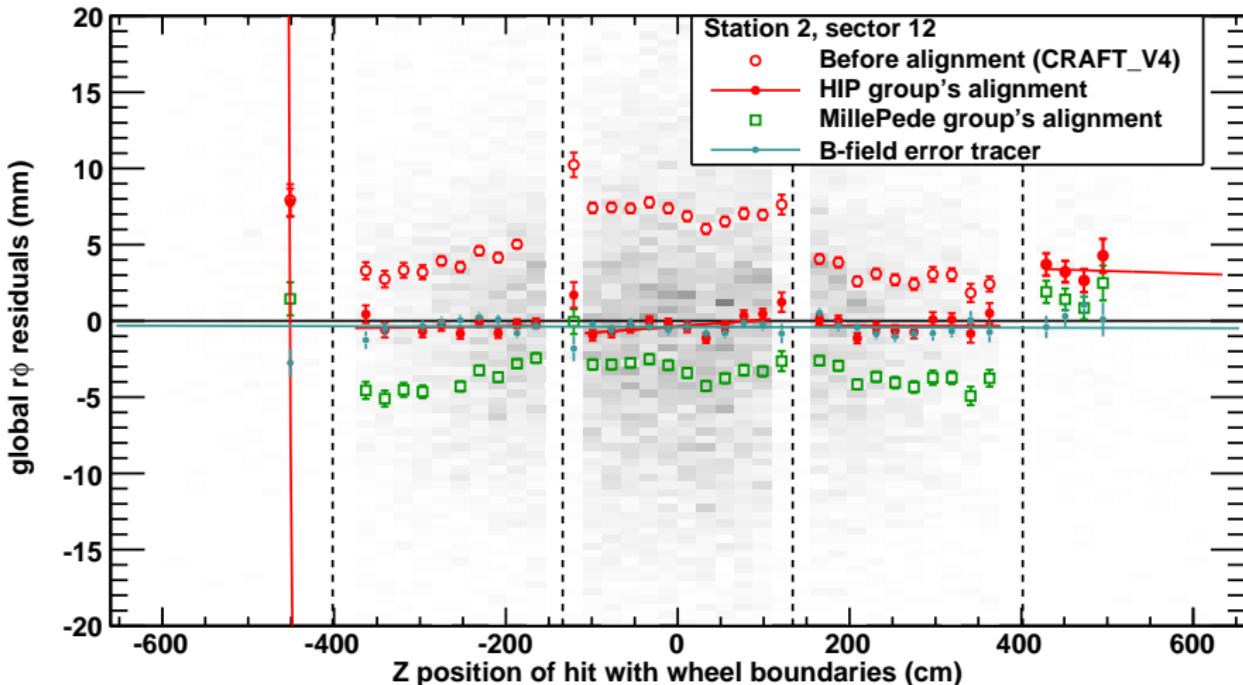
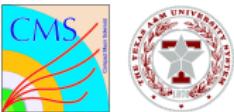
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Track-based validation plots

Jim Pivarski 25/152



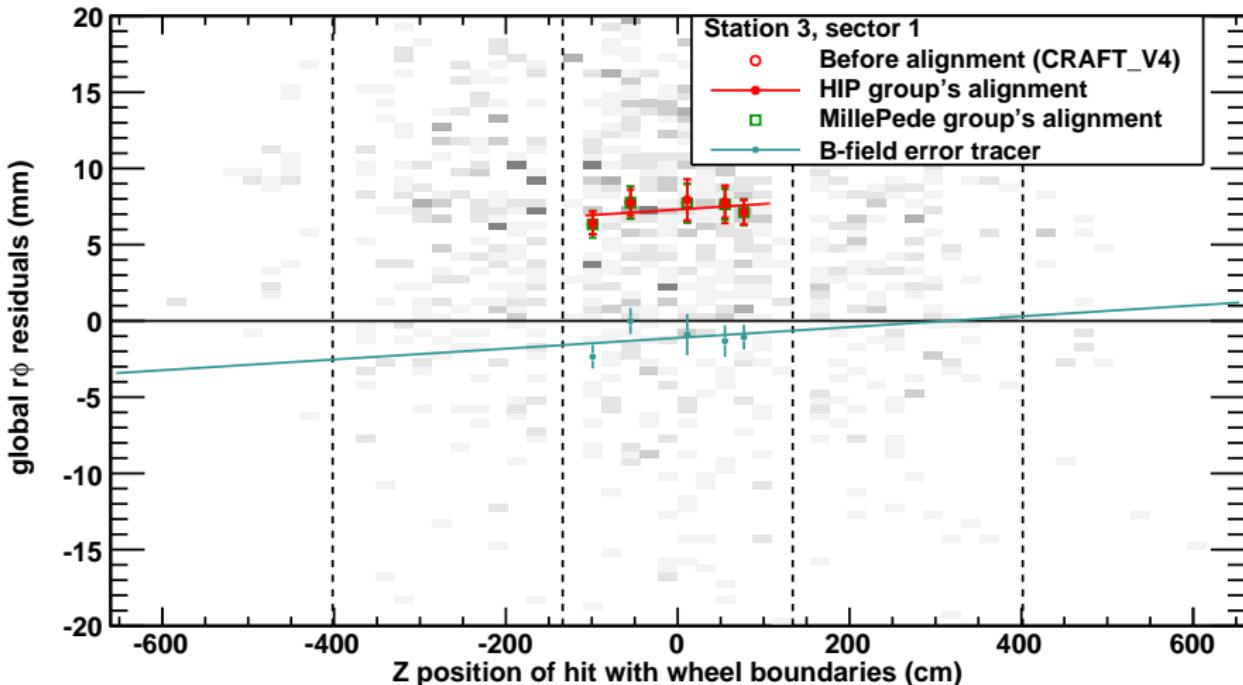
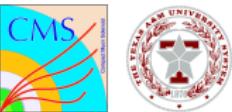
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Track-based validation plots

Jim Pivarski 26/152



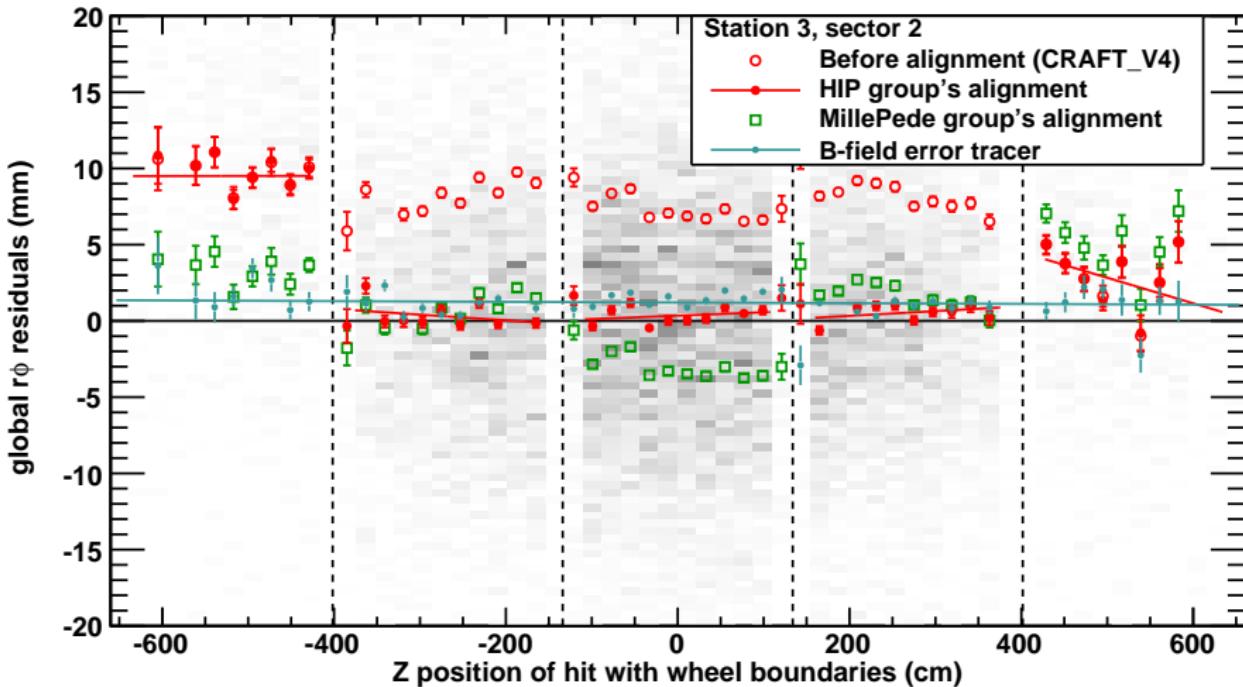
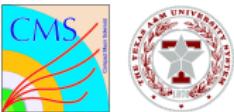
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Track-based validation plots

Jim Pivarski 27/152



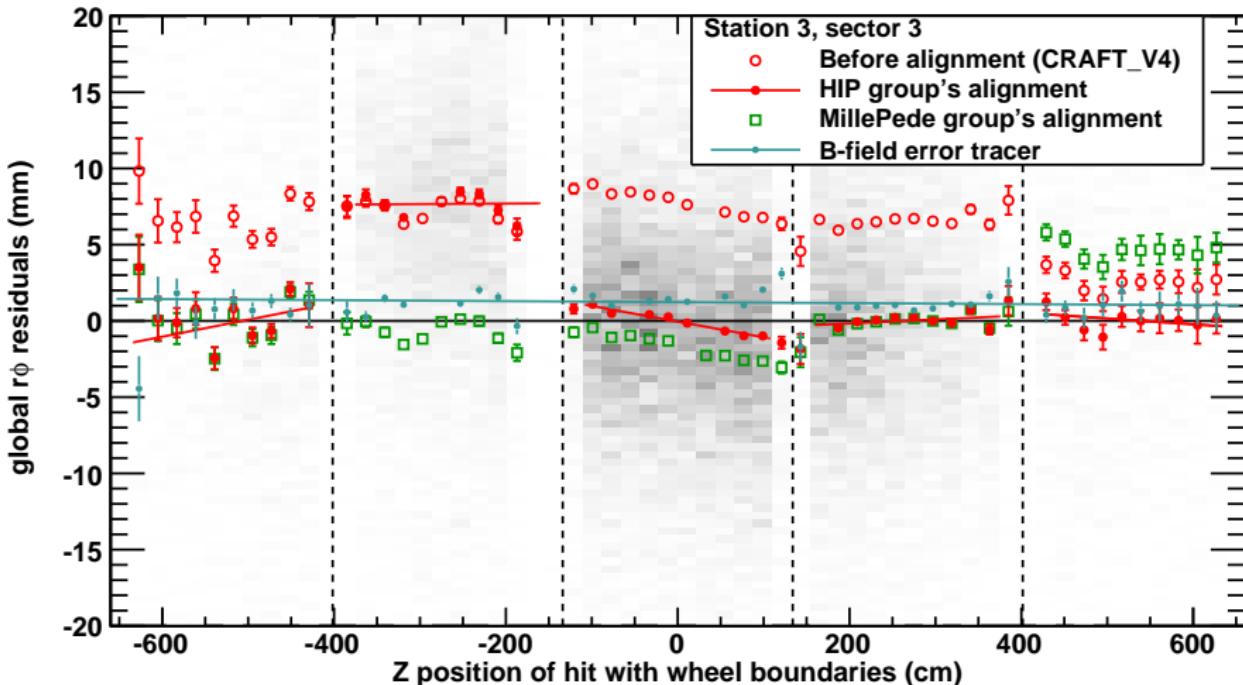
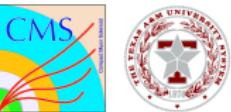
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Track-based validation plots

Jim Pivarski 28/152



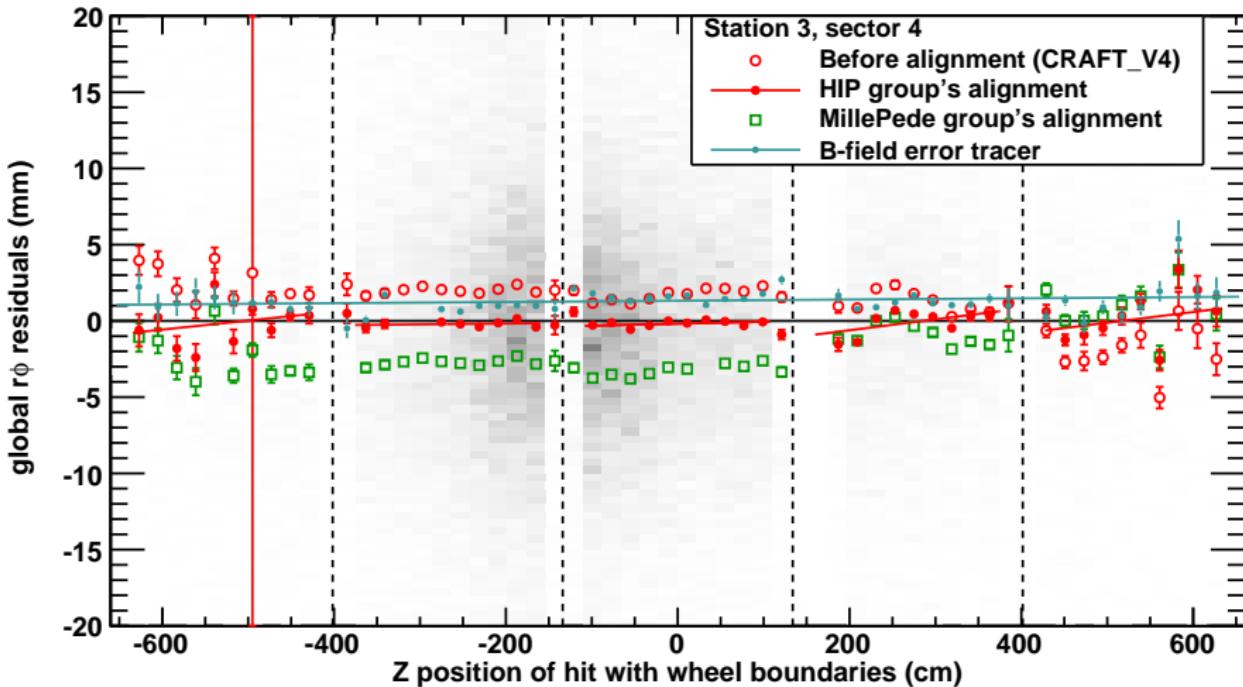
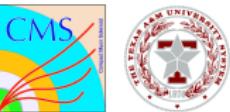
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Track-based validation plots

Jim Pivarski 29/152



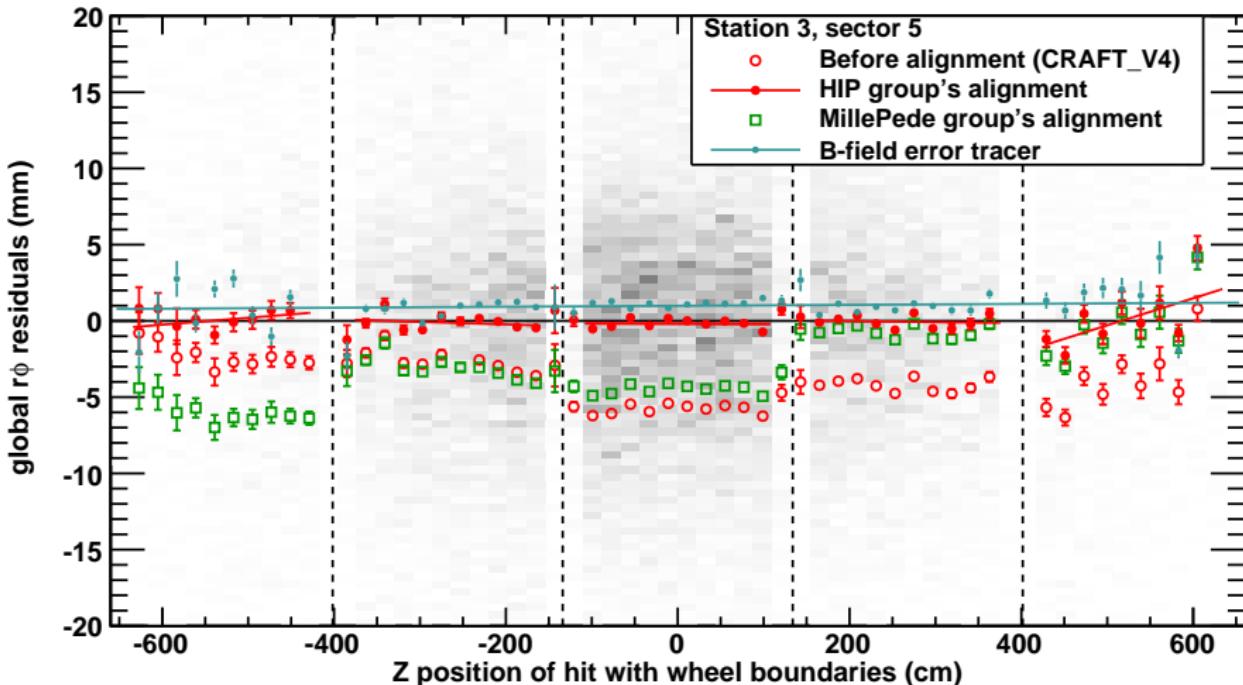
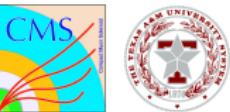
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Track-based validation plots

Jim Pivarski 30/152



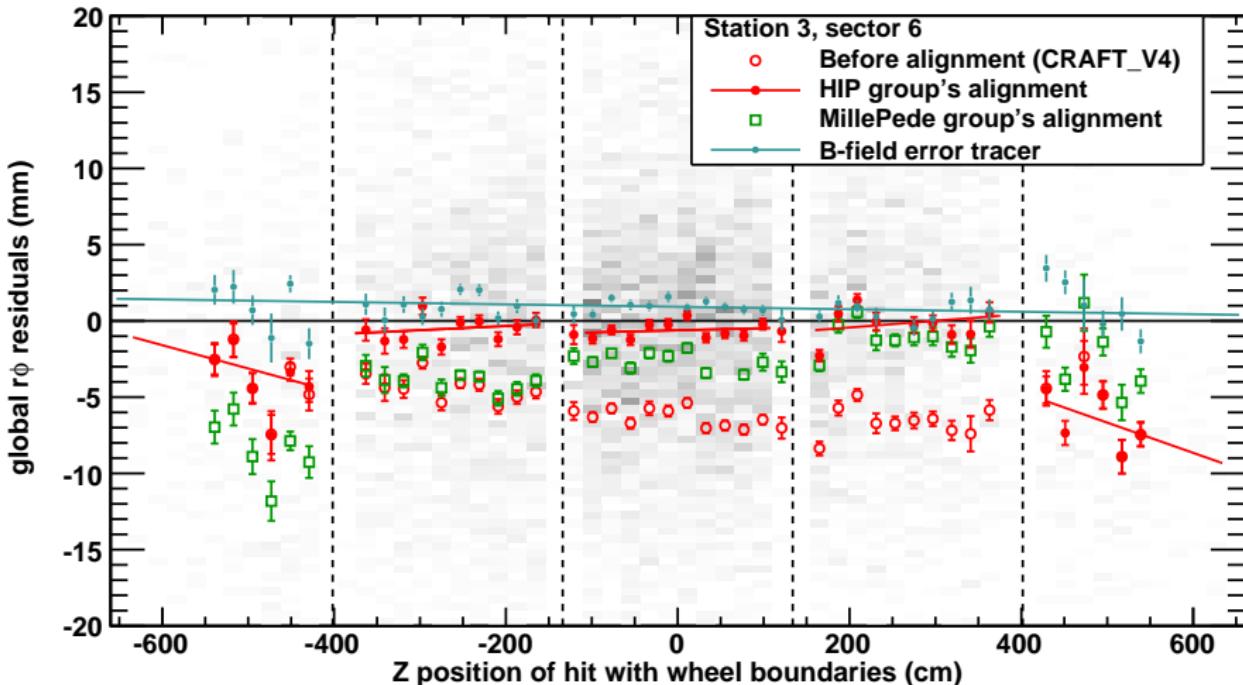
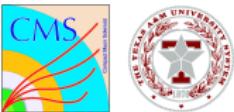
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Track-based validation plots

Jim Pivarski 31/152



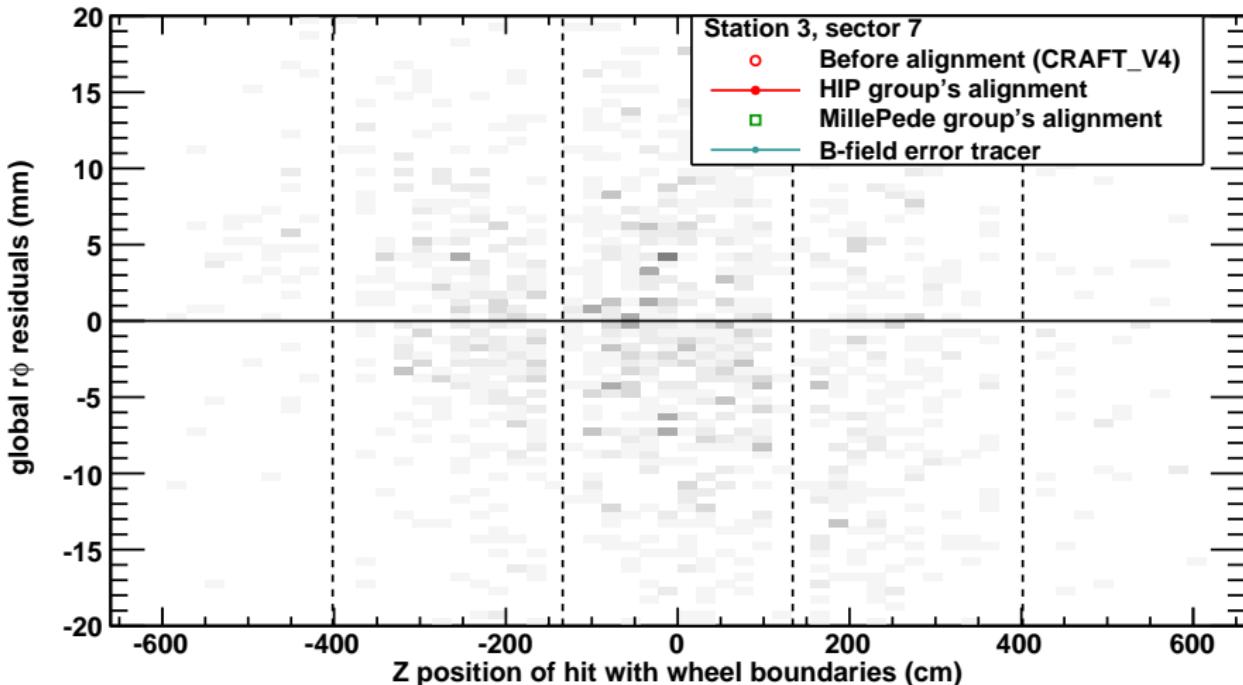
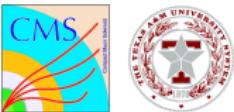
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Jim Pivarski 32/152



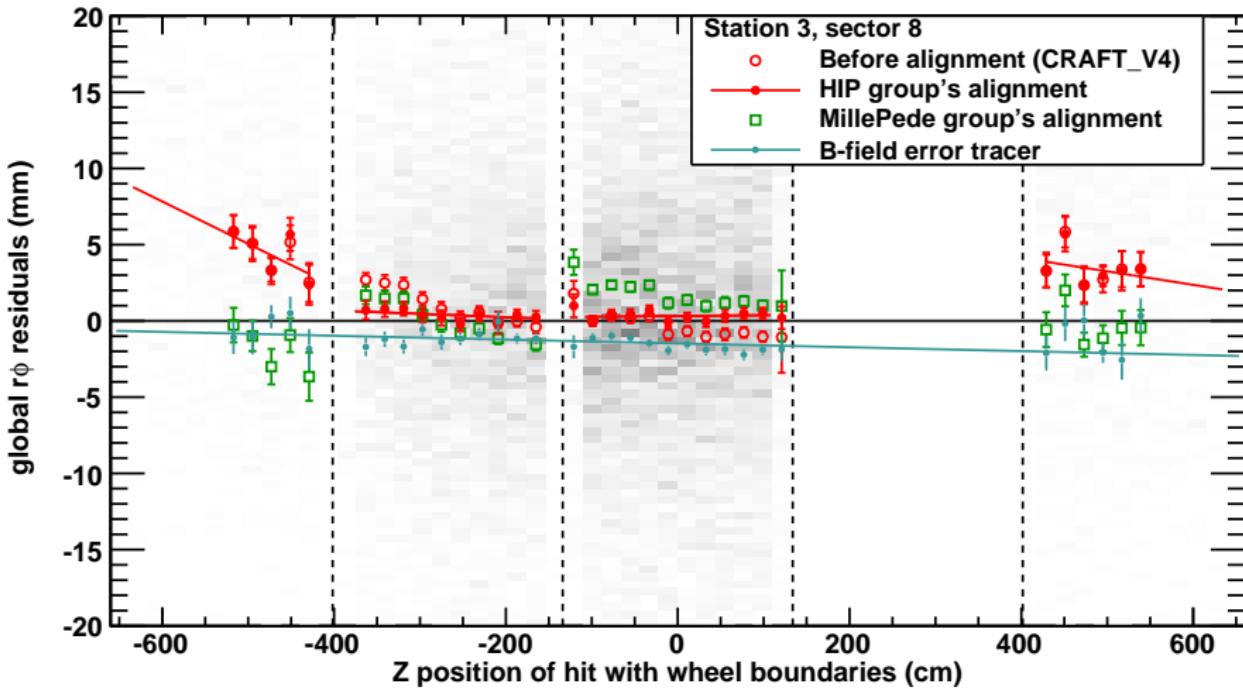
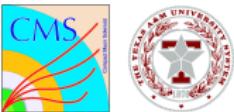
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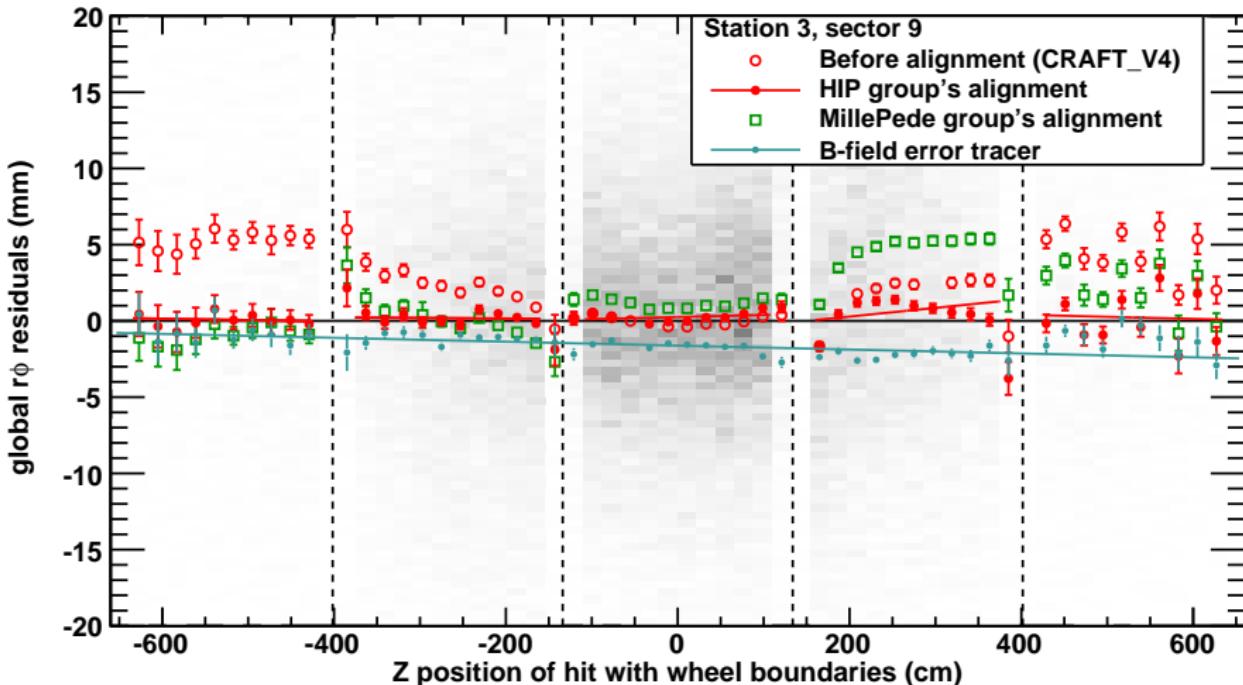
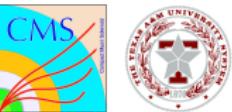
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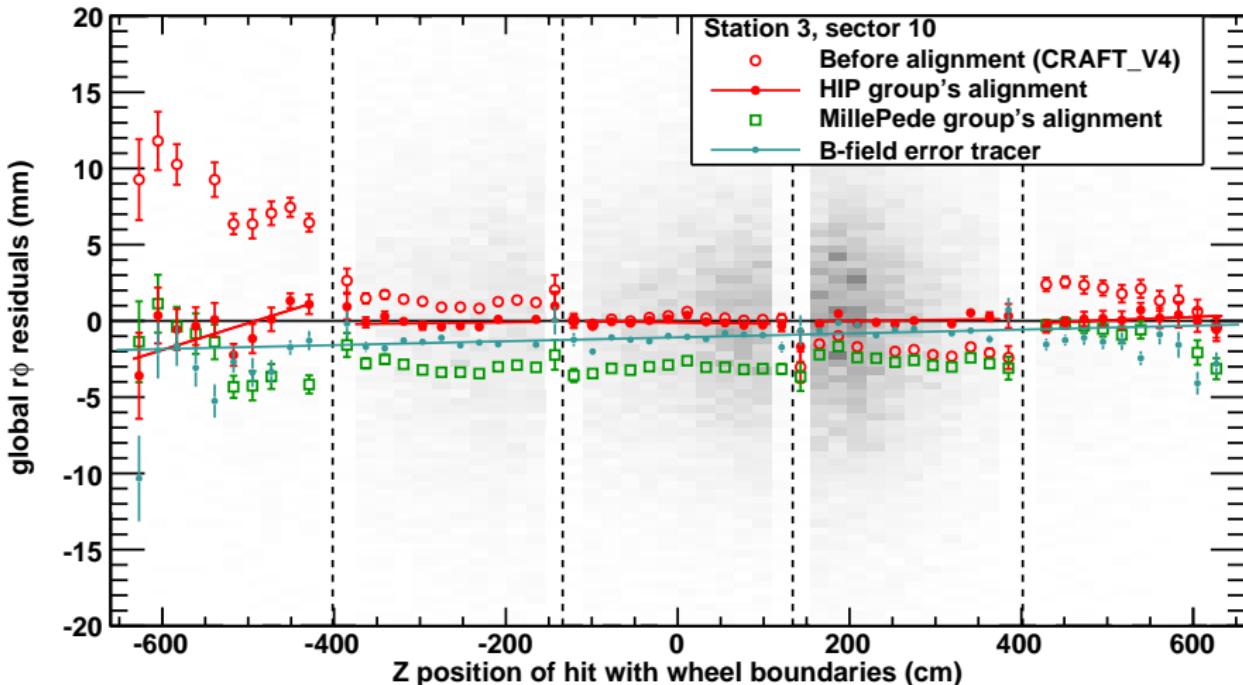
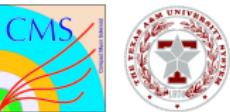
Track-based validation plots

Jim Pivarski 34/152



Track-based validation plots

Jim Pivarski 35/152



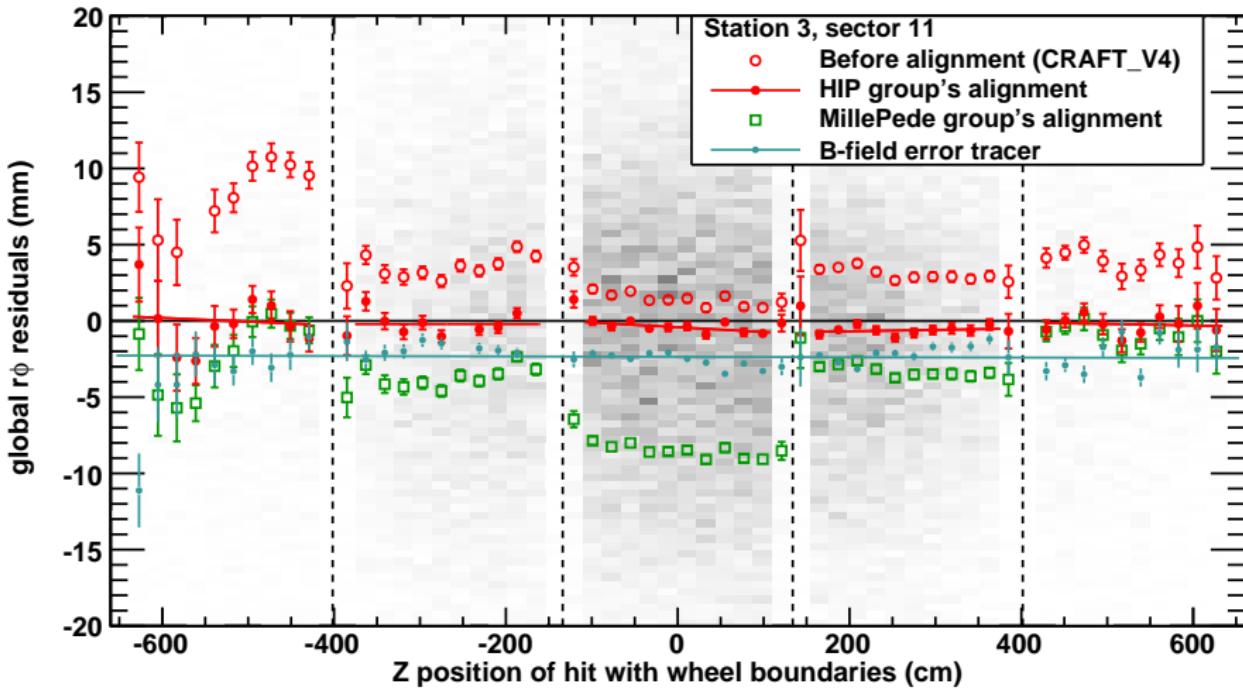
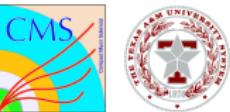
grey background is the raw 2-D residuals distribution

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systematic errors due to \vec{B} -field mismodelling are a small fraction of the “error tracer”

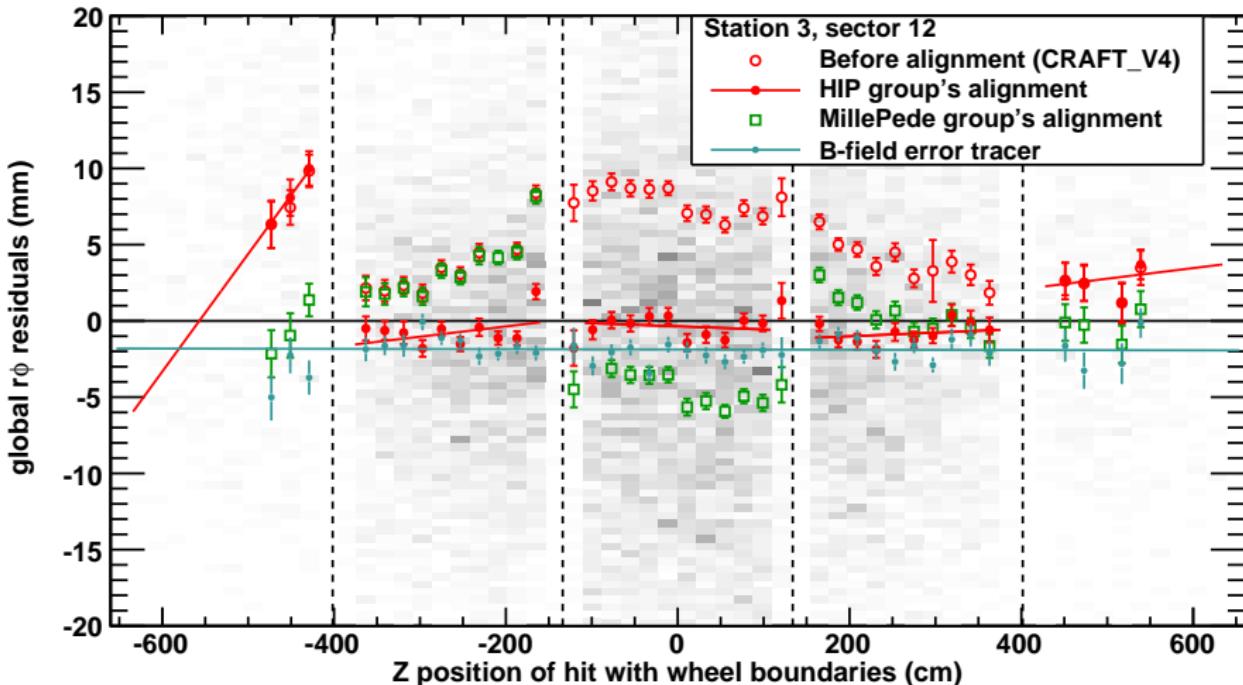
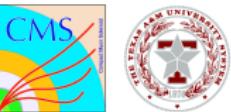
Track-based validation plots

Jim Pivarski 36/152



Track-based validation plots

Jim Pivarski 37/152



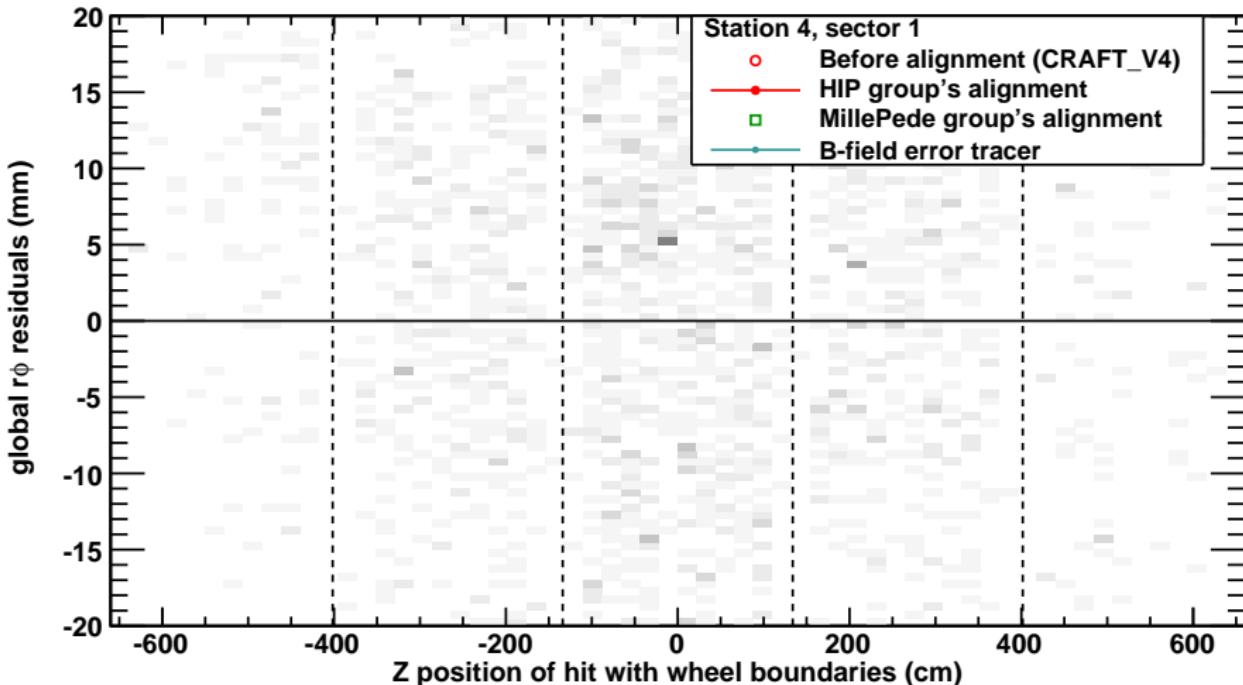
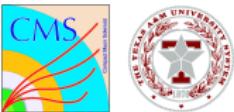
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Track-based validation plots

Jim Pivarski 38/152



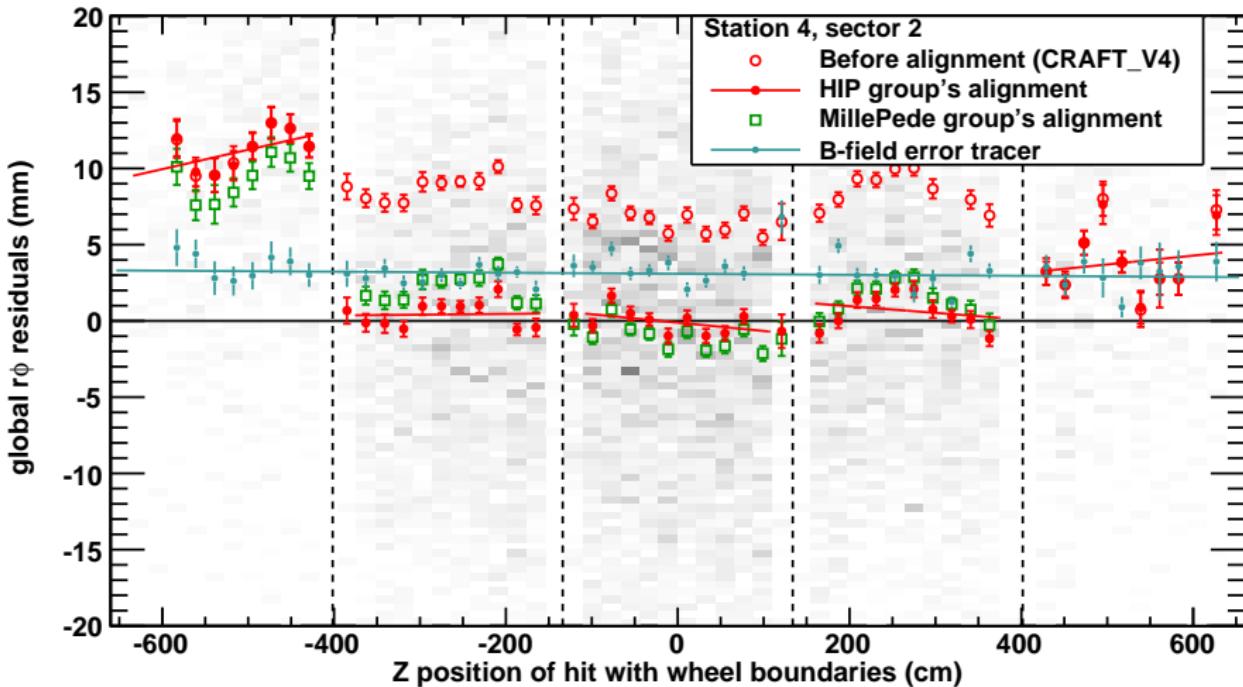
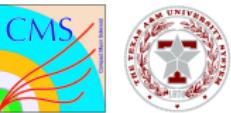
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Track-based validation plots

Jim Pivarski 39/152



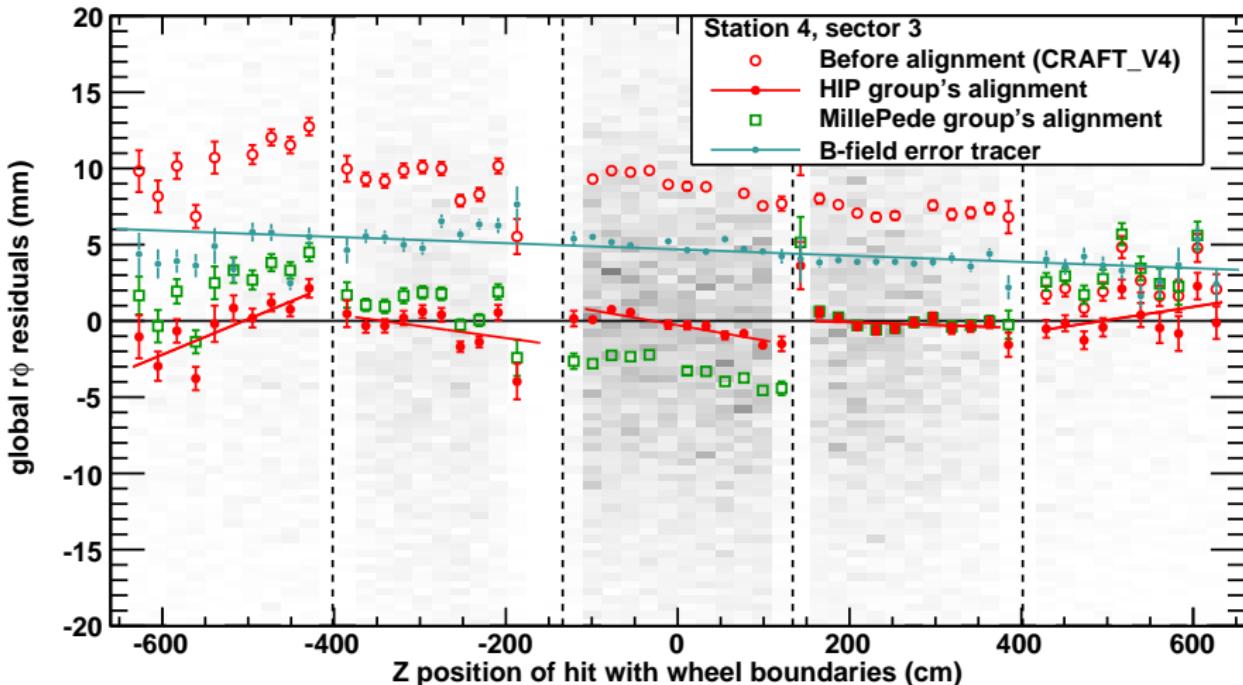
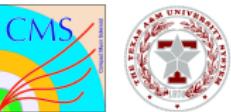
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Track-based validation plots

Jim Pivarski 40/152



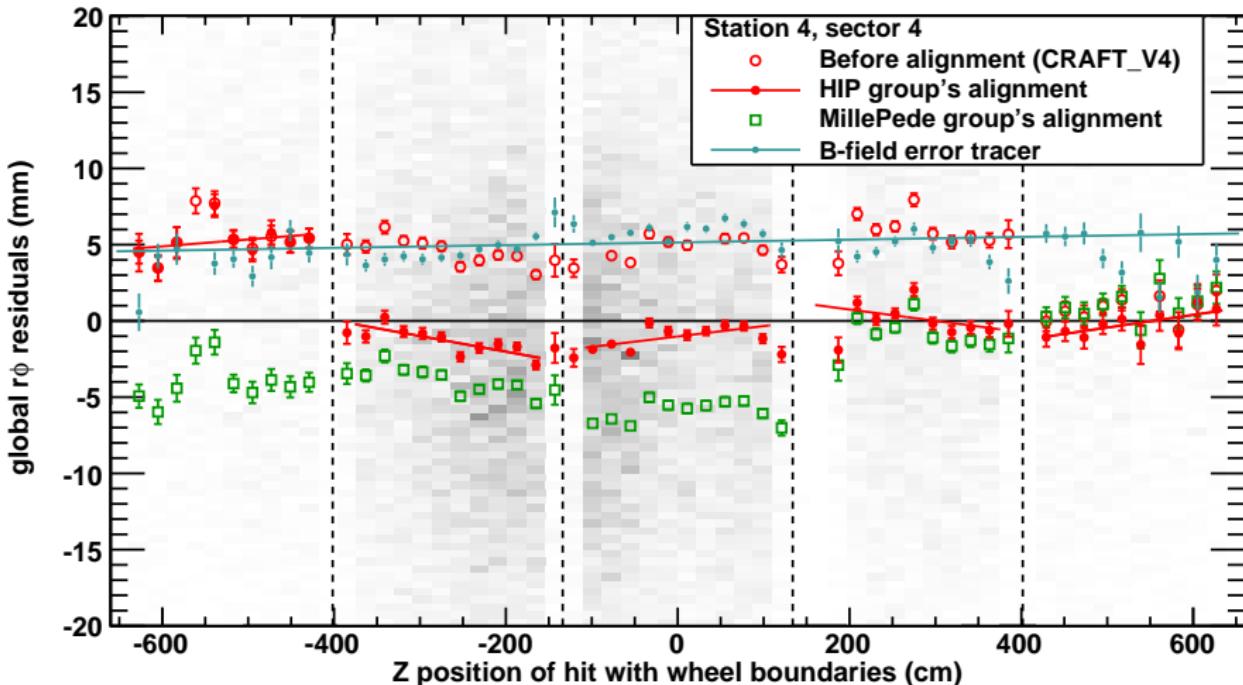
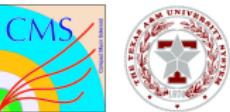
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Track-based validation plots

Jim Pivarski 41/152



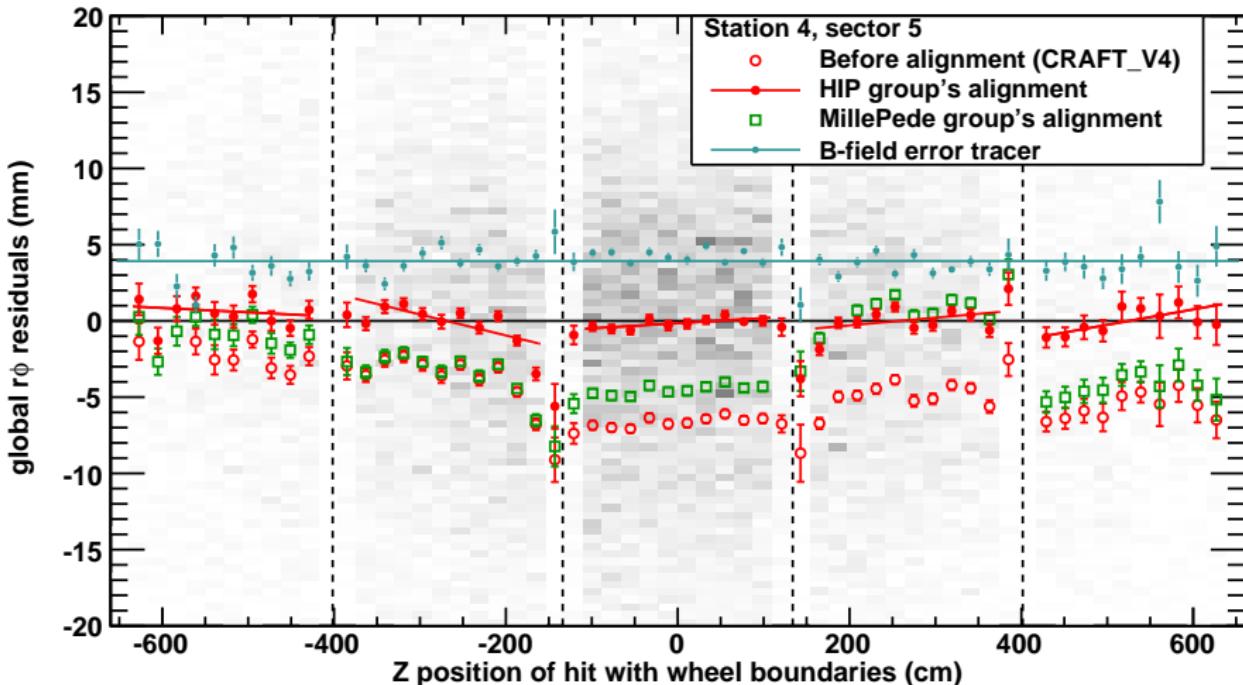
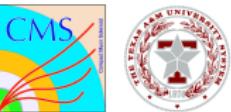
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Track-based validation plots

Jim Pivarski 42/152



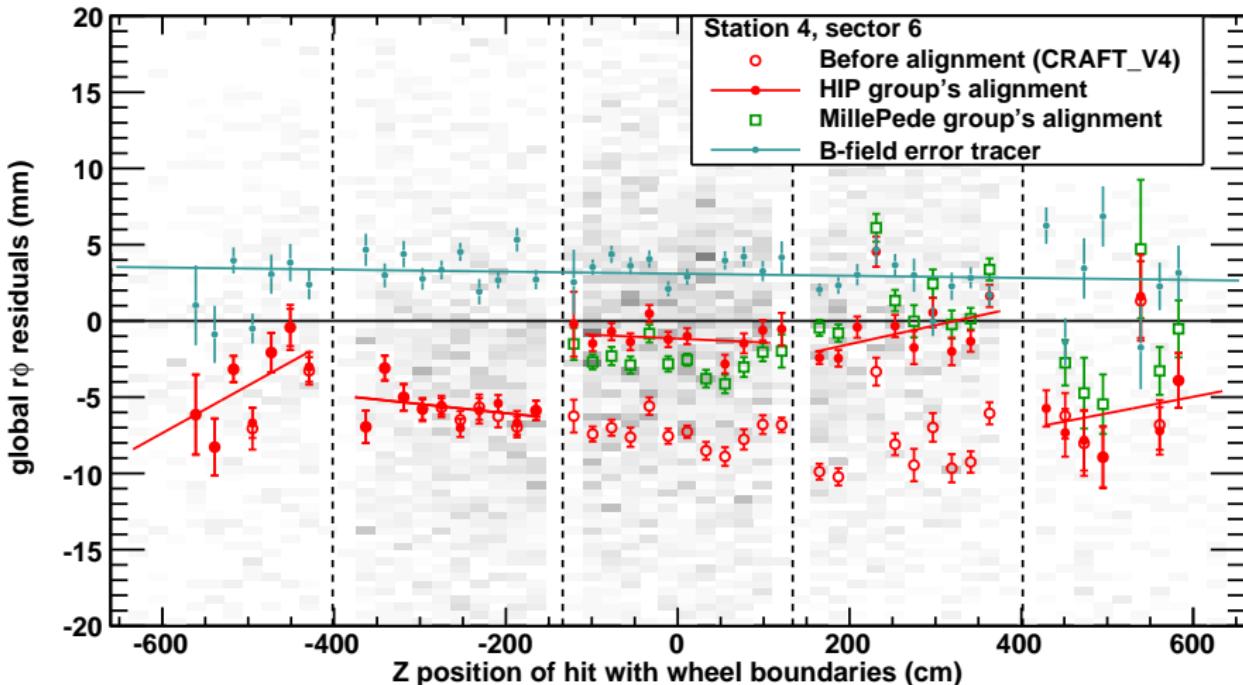
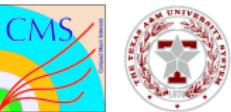
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Track-based validation plots

Jim Pivarski 43/152



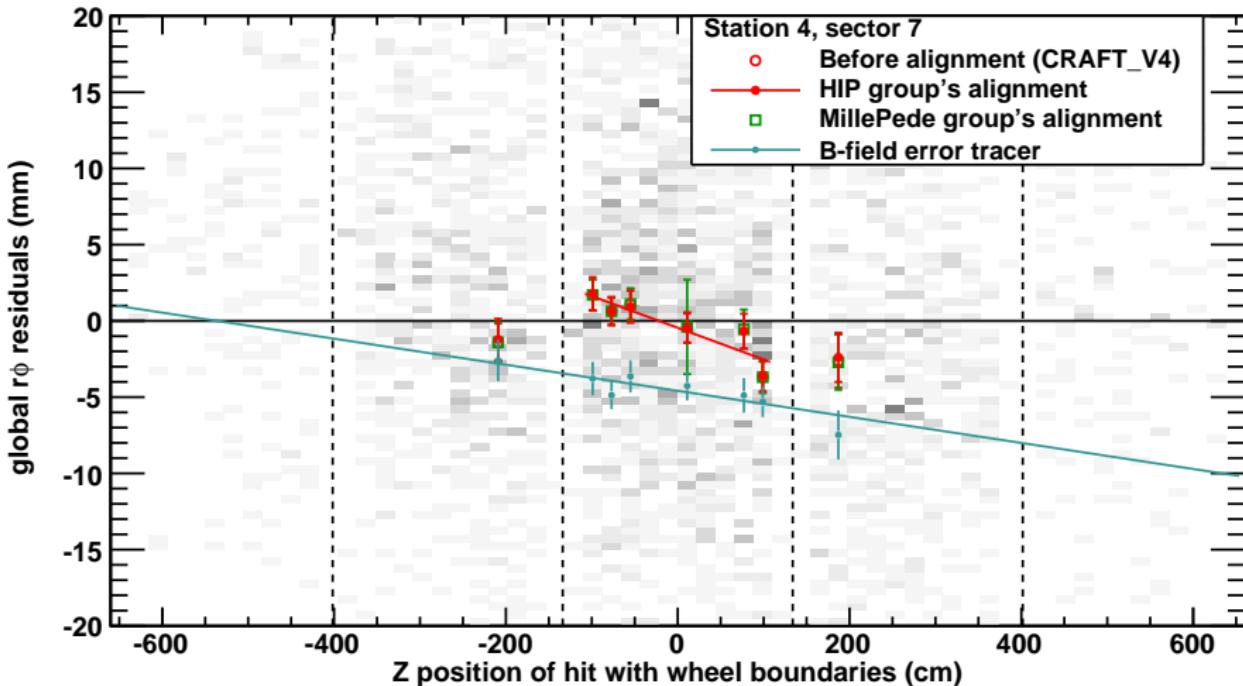
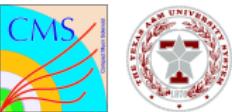
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Track-based validation plots

Jim Pivarski 44/152



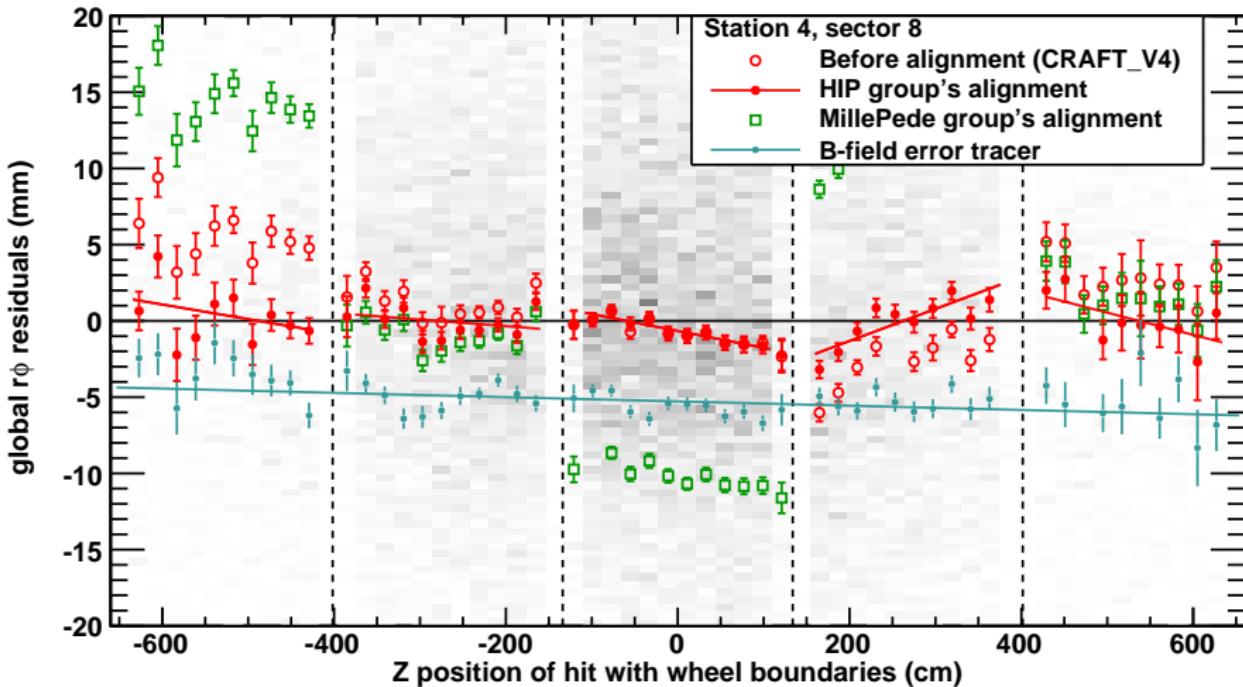
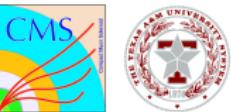
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Track-based validation plots

Jim Pivarski 45/152



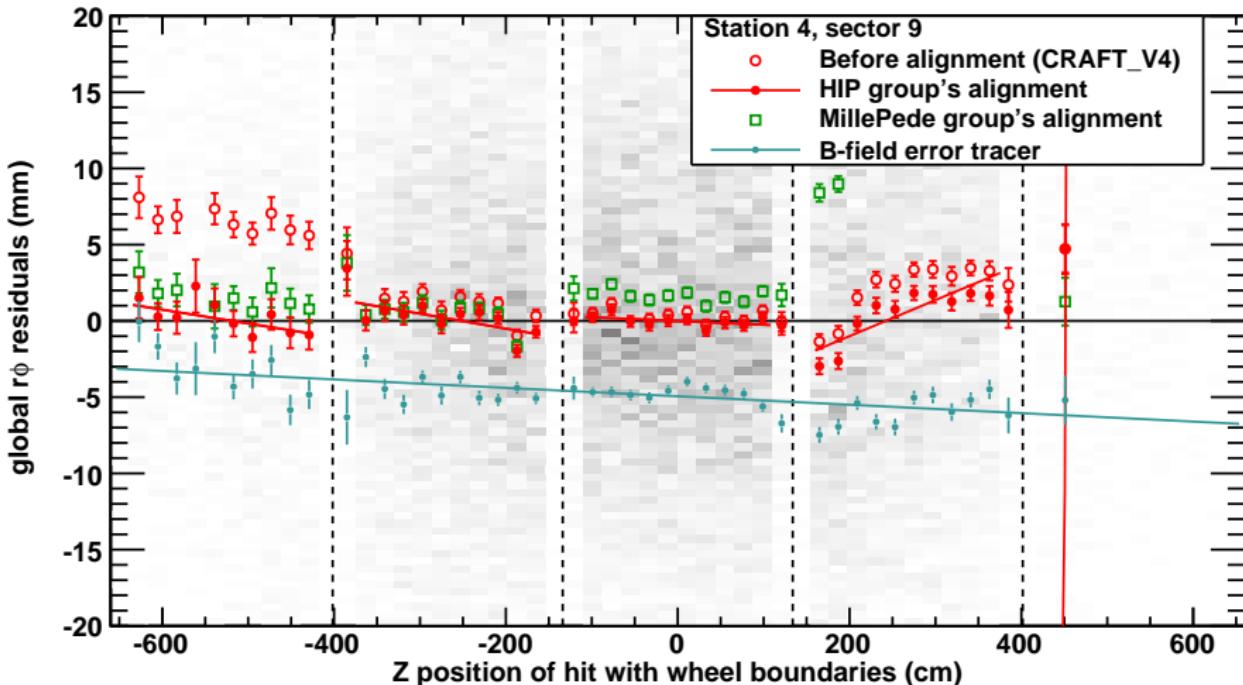
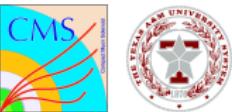
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Track-based validation plots

Jim Pivarski 46/152



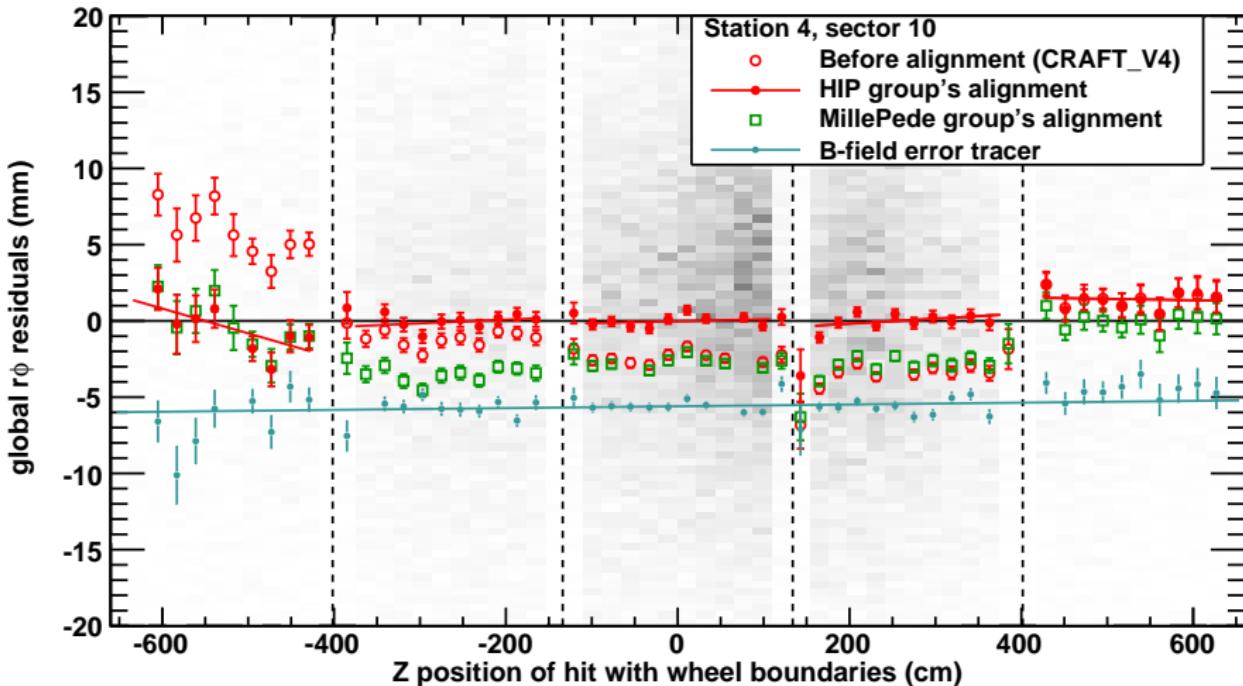
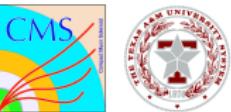
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Track-based validation plots

Jim Pivarski 47/152



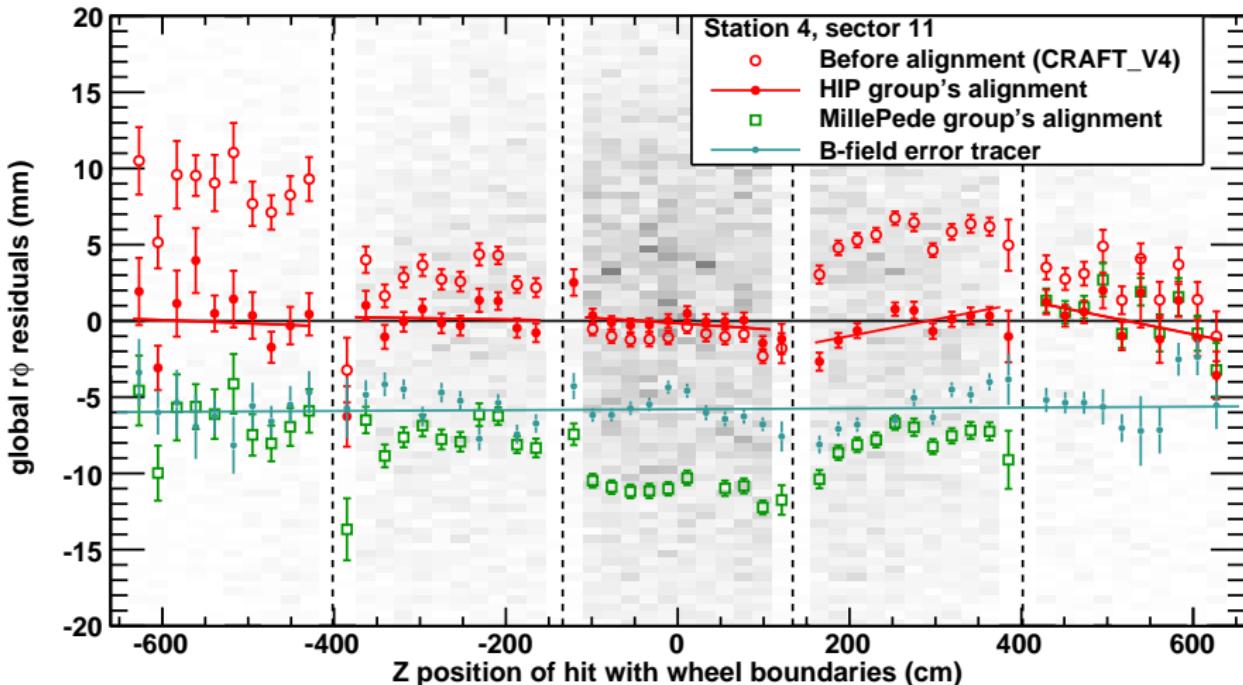
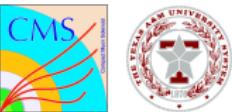
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Track-based validation plots

Jim Pivarski 48/152



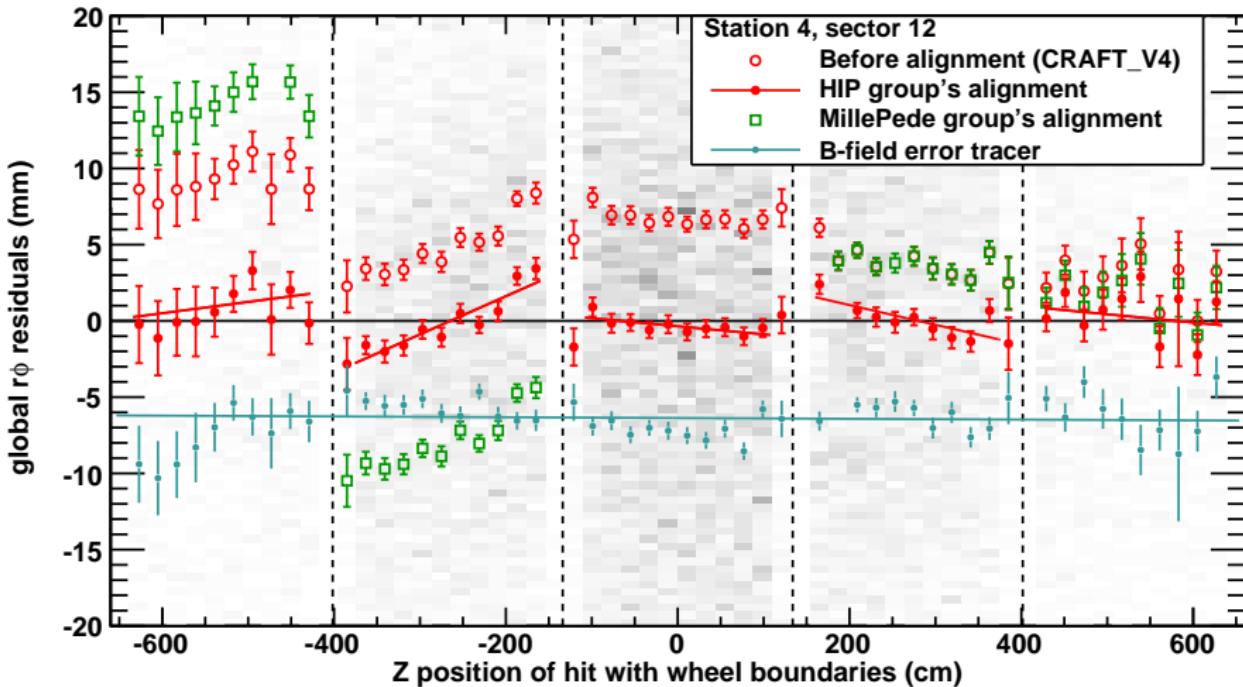
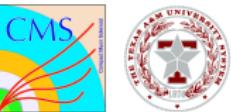
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Track-based validation plots

Jim Pivarski 49/152



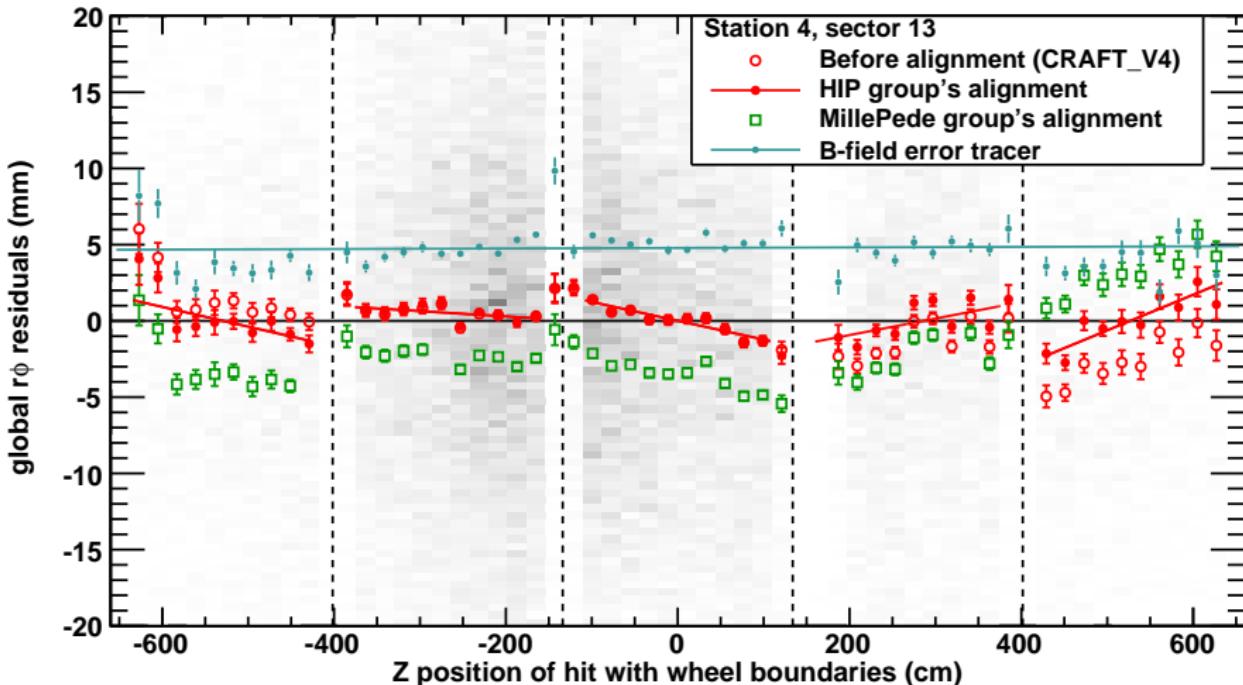
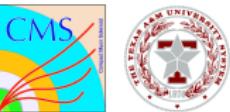
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Track-based validation plots

Jim Pivarski 50/152



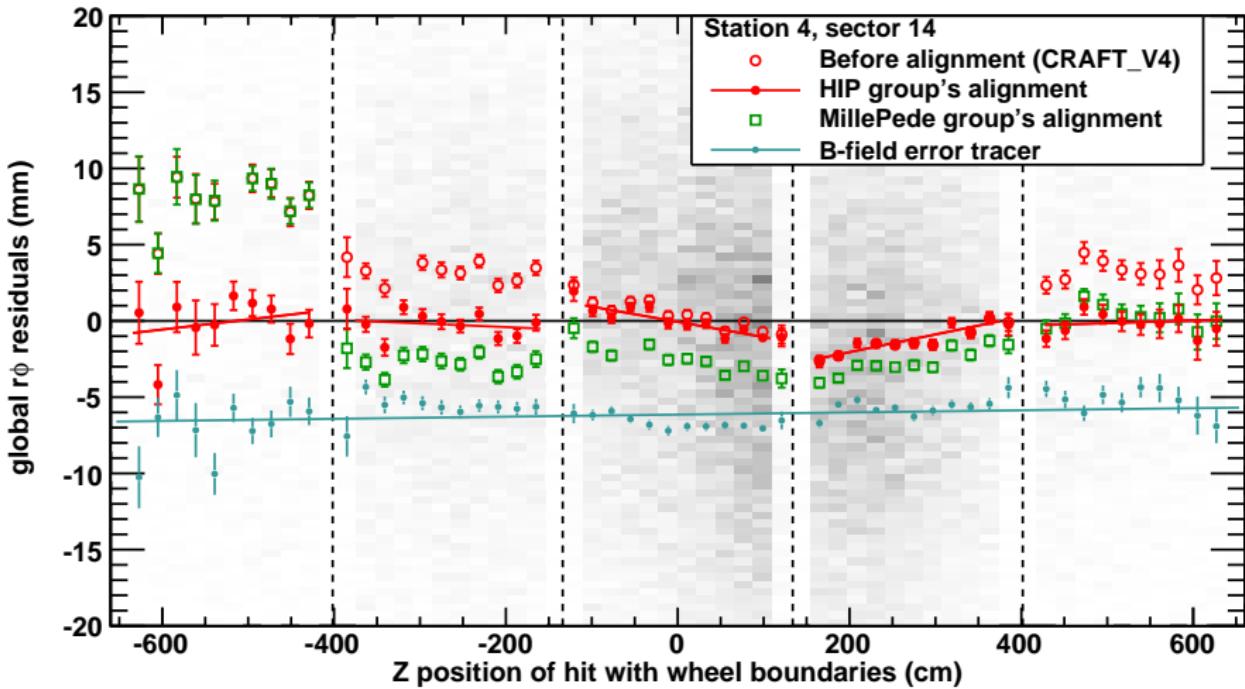
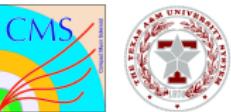
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Track-based validation plots

Jim Pivarski 51/152



grey background is the raw 2-D residuals distribution

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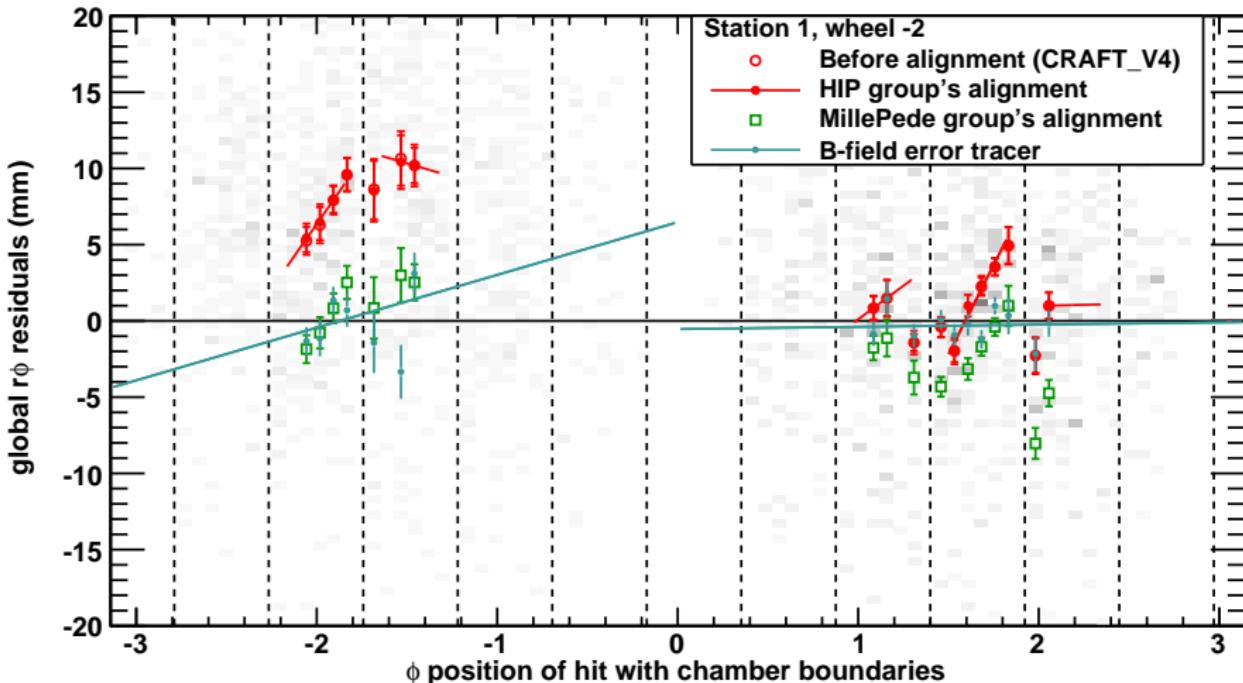
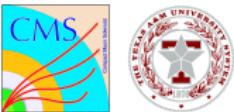
systematic errors due to \vec{B} -field mismodelling are a small fraction of the “error tracer”



$r\phi$ residuals versus ϕ

Track-based validation plots

Jim Pivarski 53/152



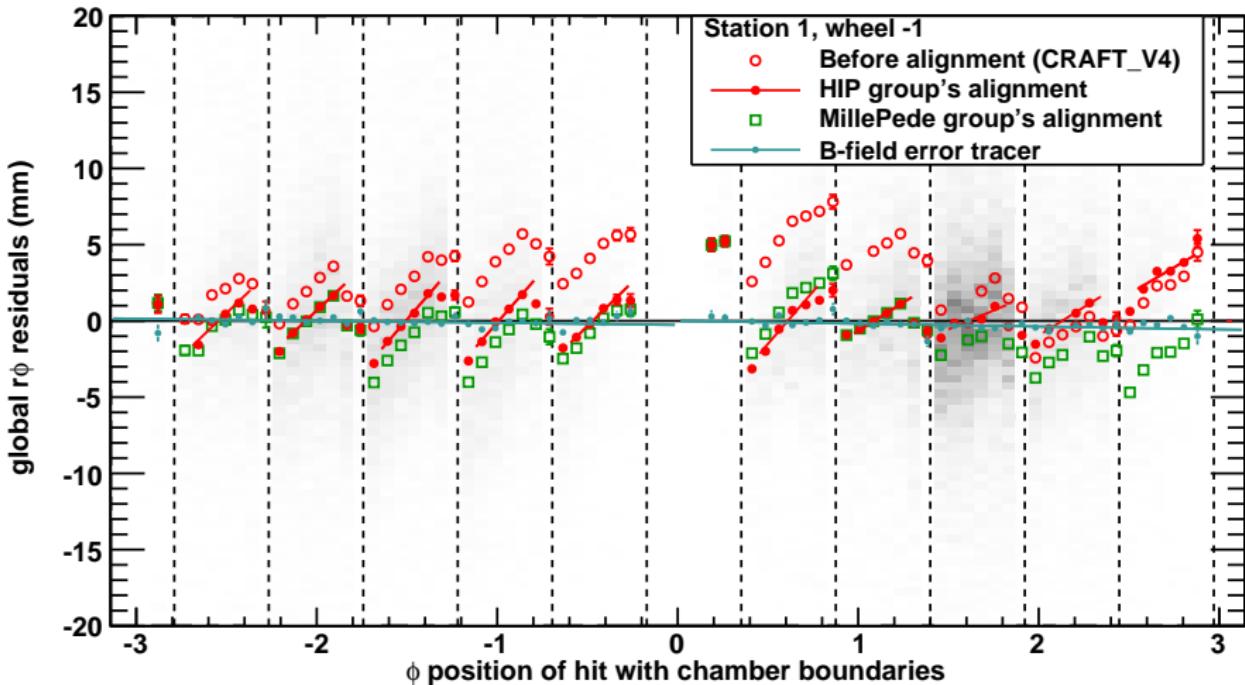
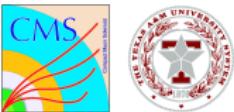
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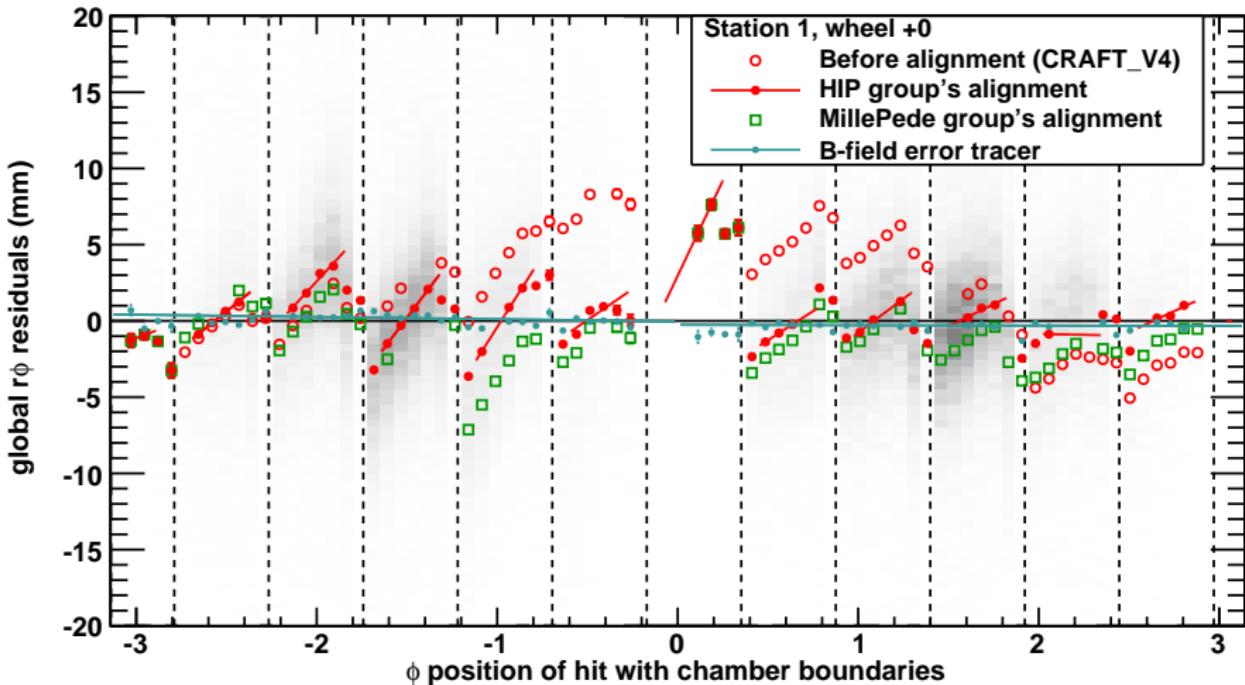
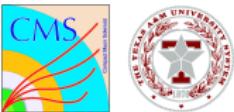
Track-based validation plots

Jim Pivarski 54/152



Track-based validation plots

Jim Pivarski 55/152



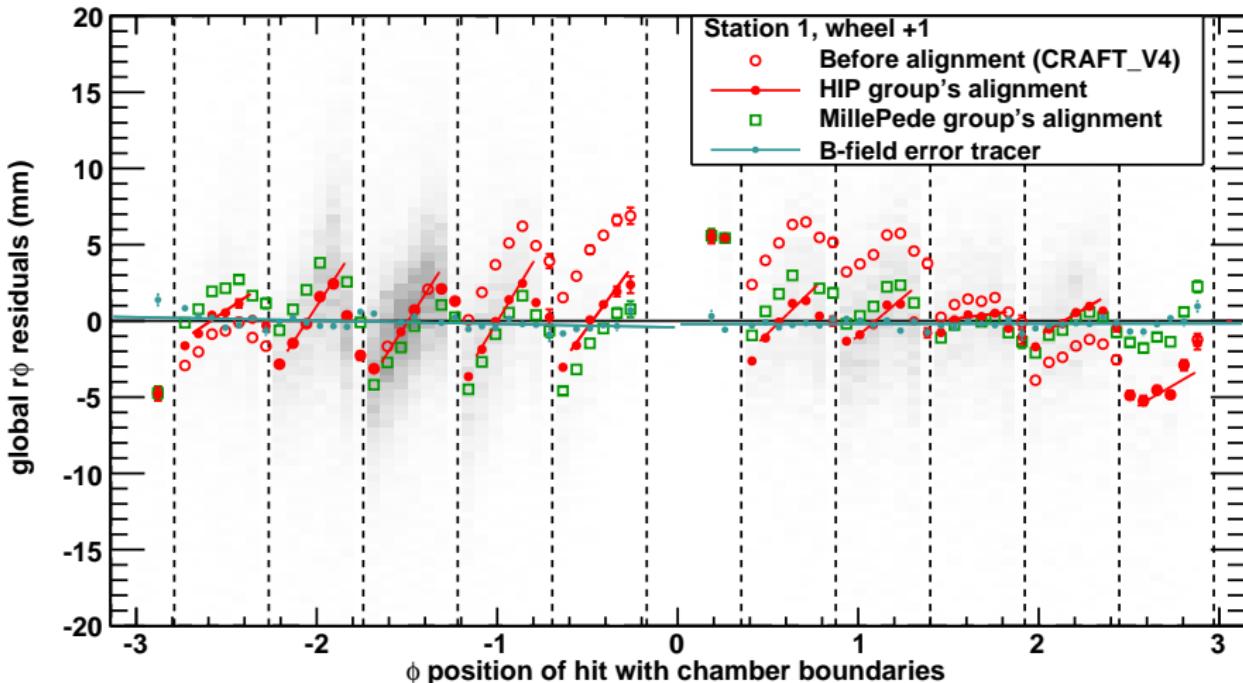
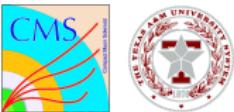
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Track-based validation plots

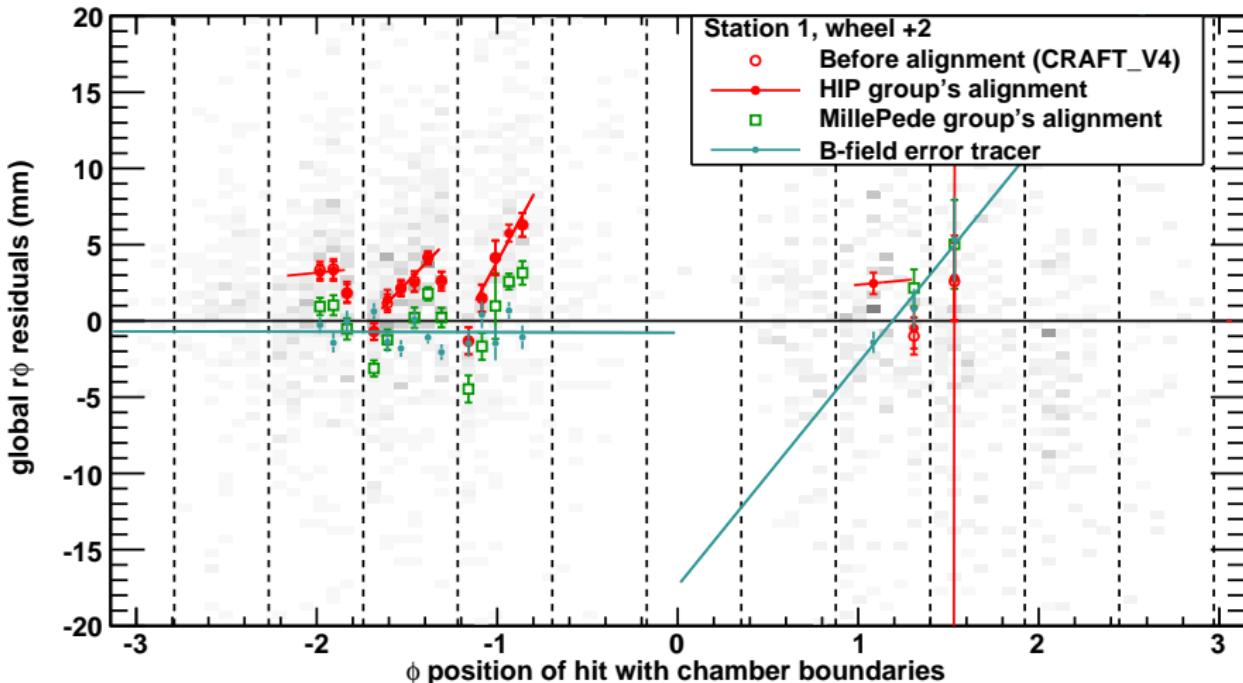
Jim Pivarski 56/152



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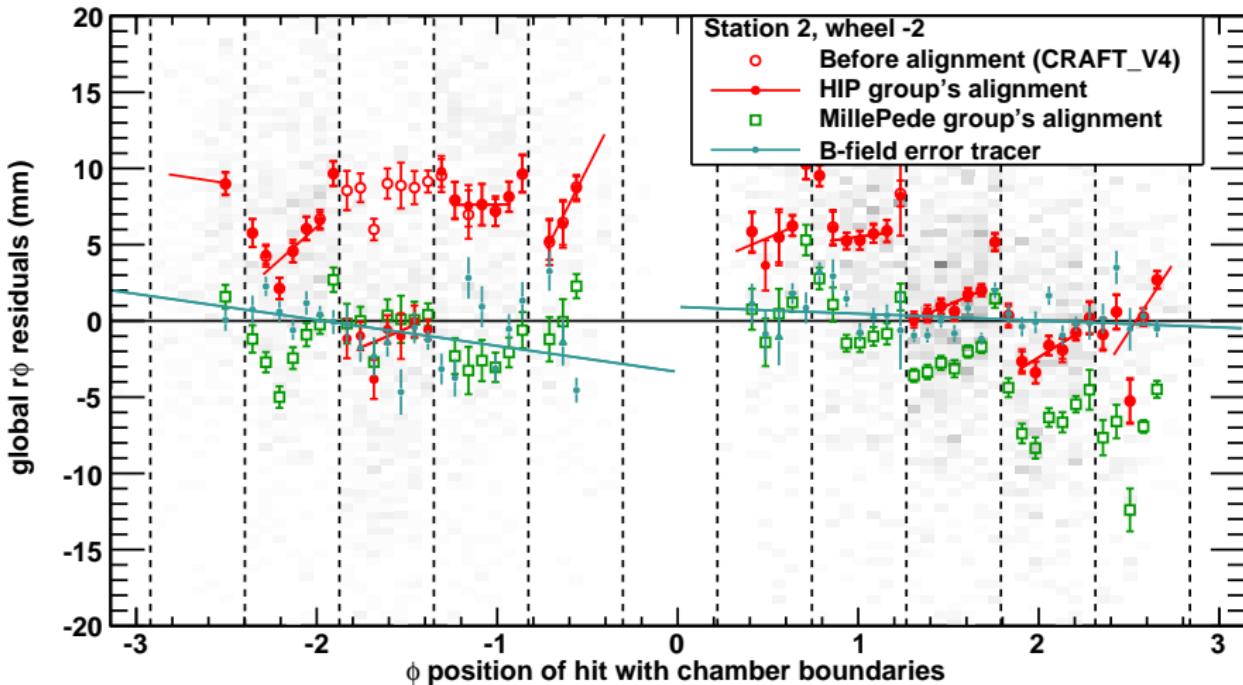
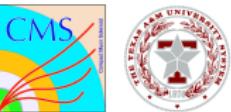
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Track-based validation plots

Jim Pivarski 58/152



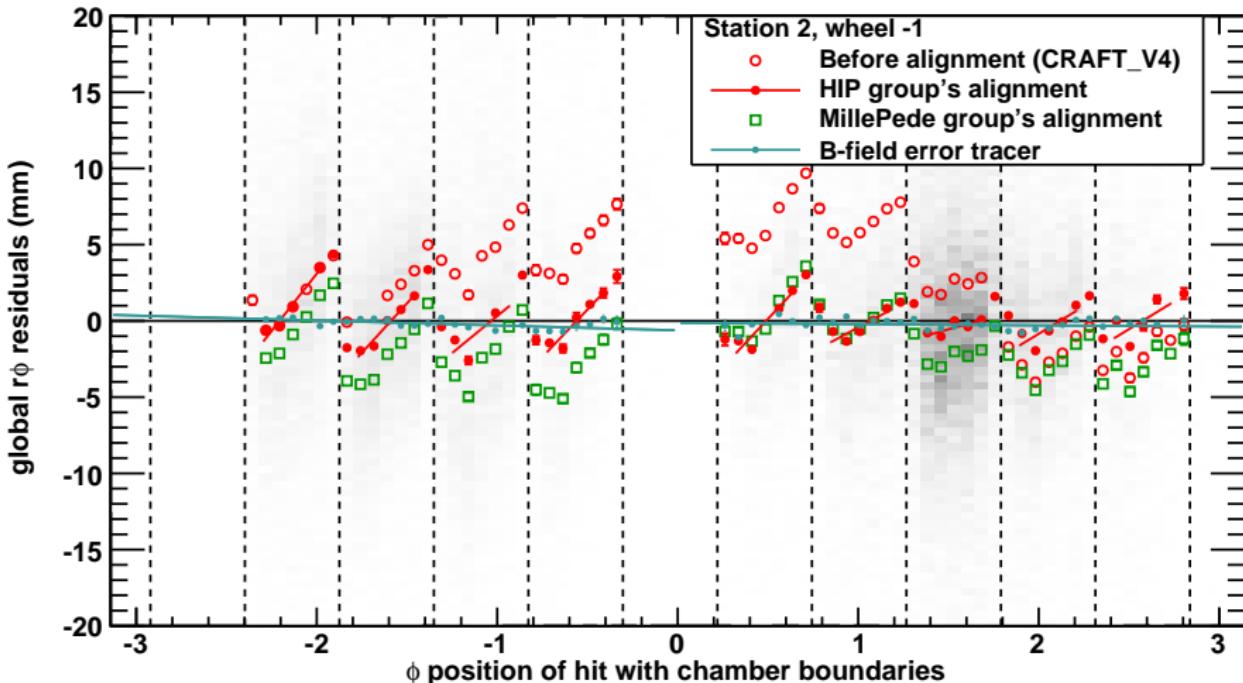
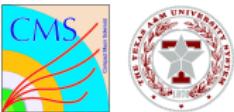
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Track-based validation plots

Jim Pivarski 59/152



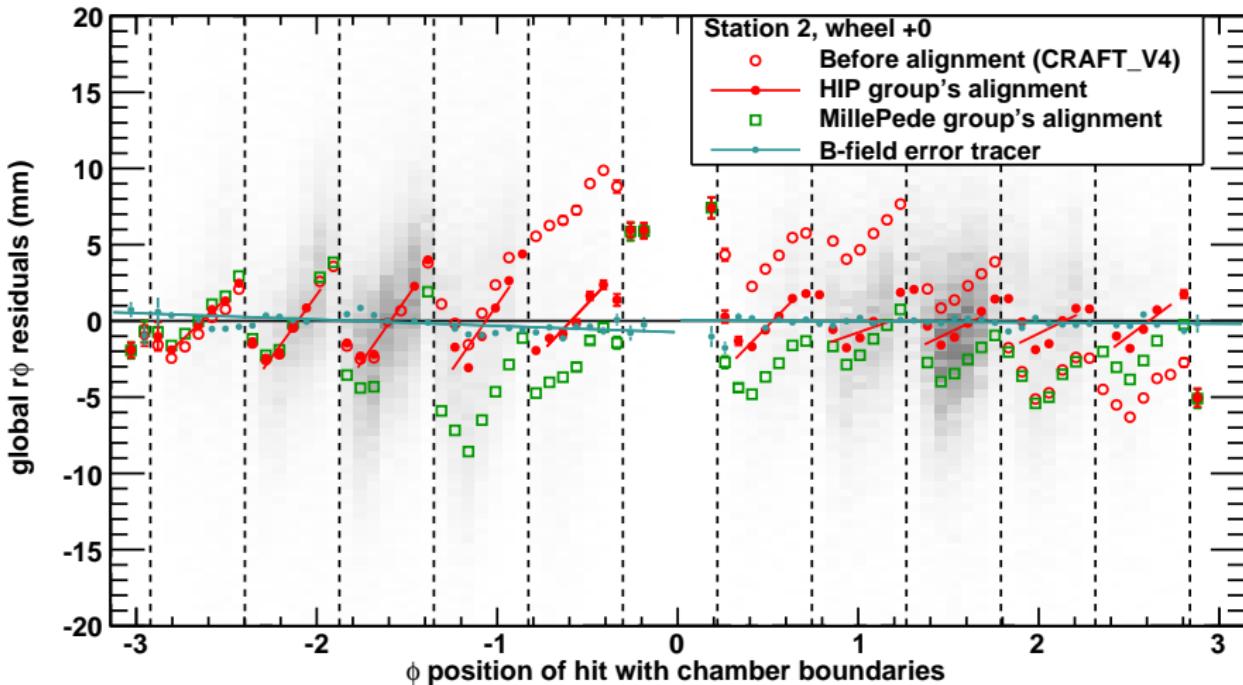
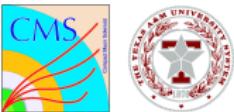
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Track-based validation plots

Jim Pivarski 60/152



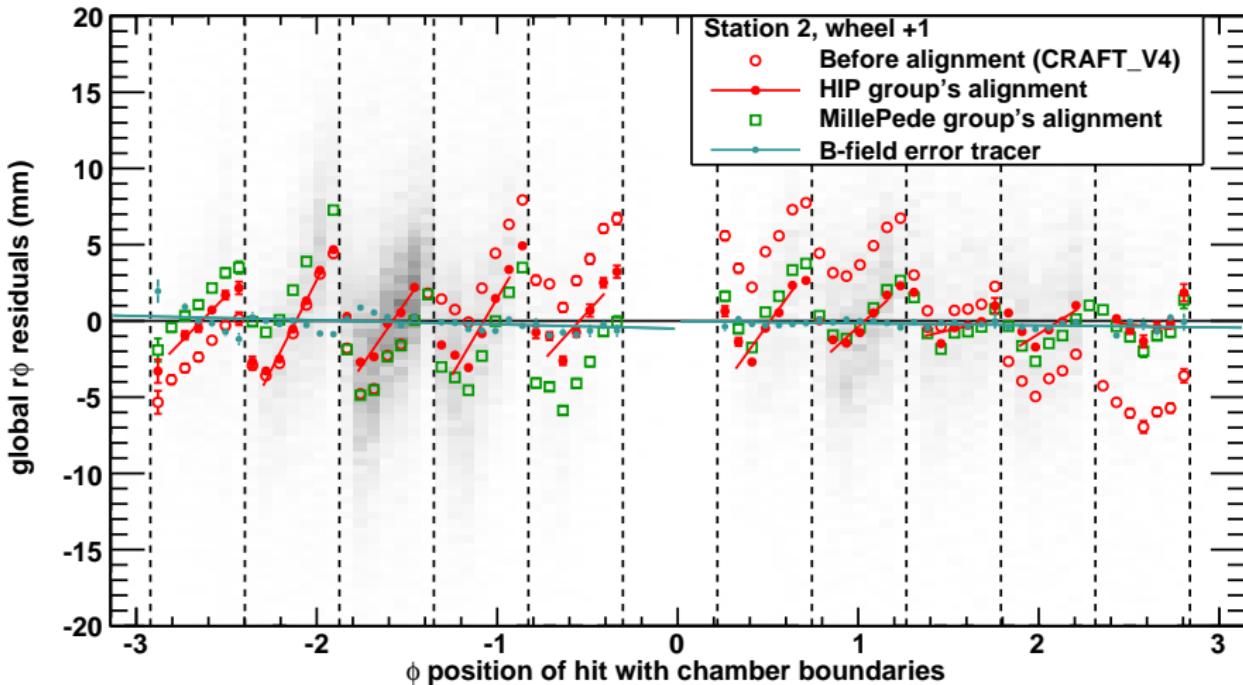
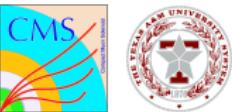
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Track-based validation plots

Jim Pivarski 61/152



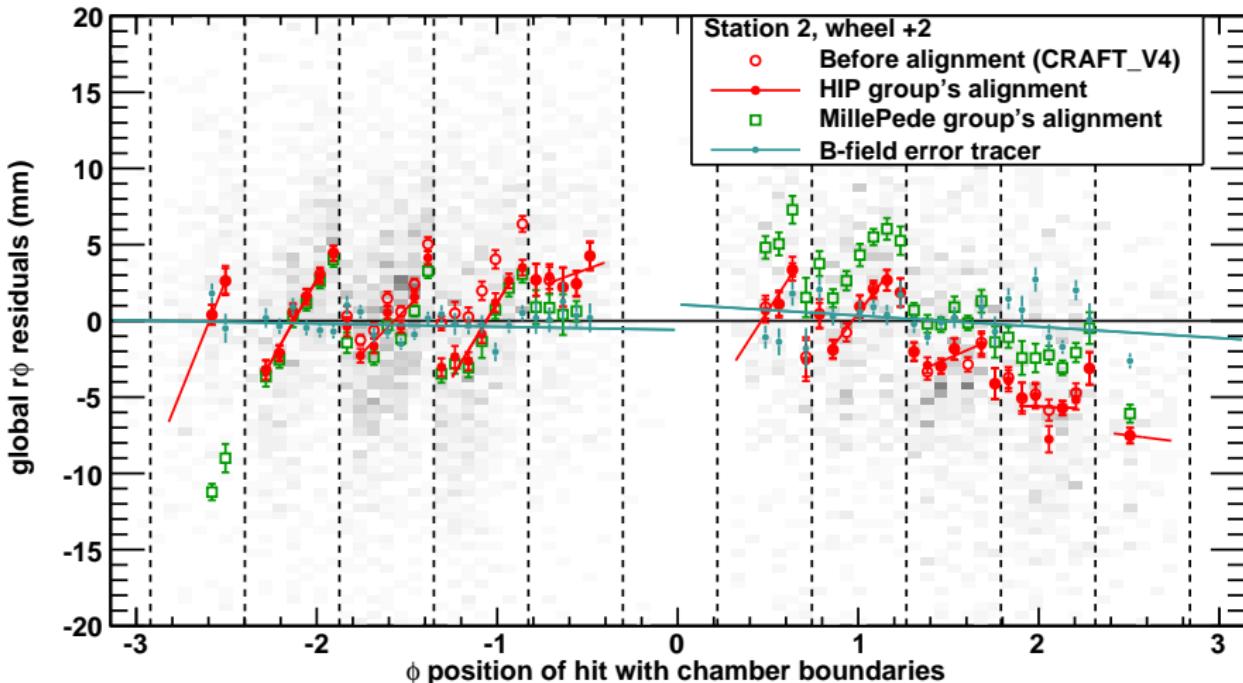
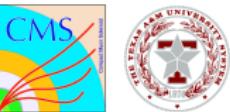
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Track-based validation plots

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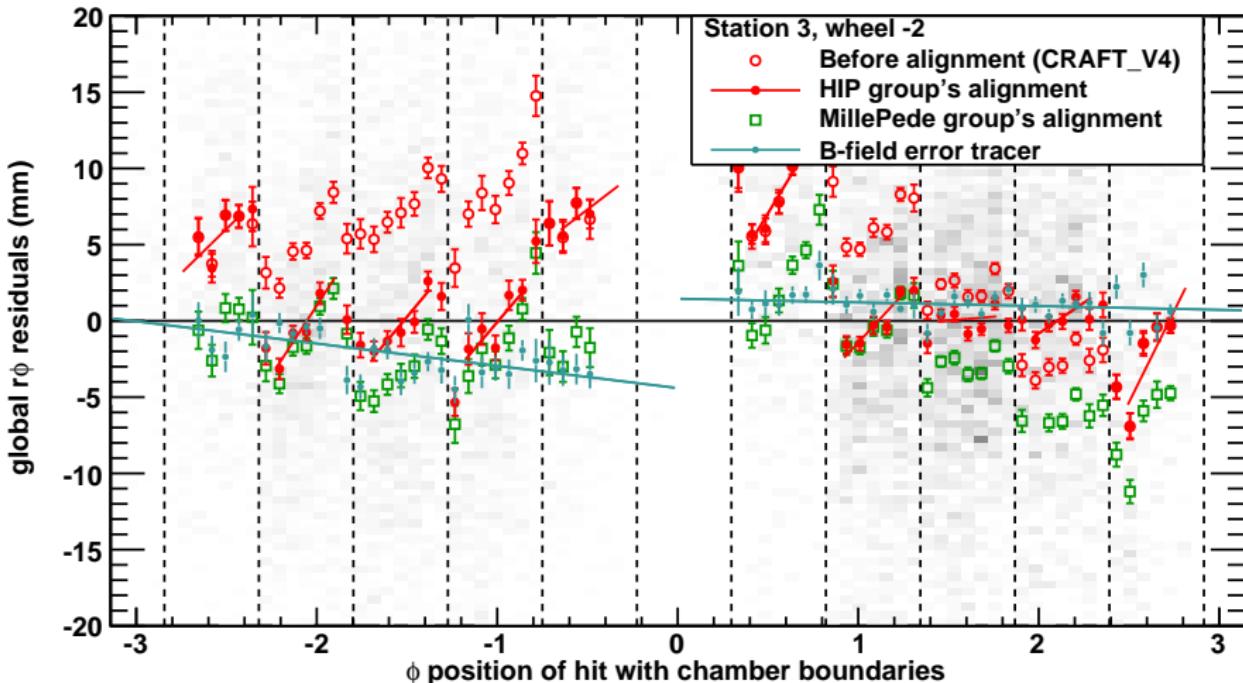
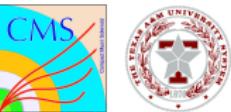
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Track-based validation plots

Jim Pivarski 63/152



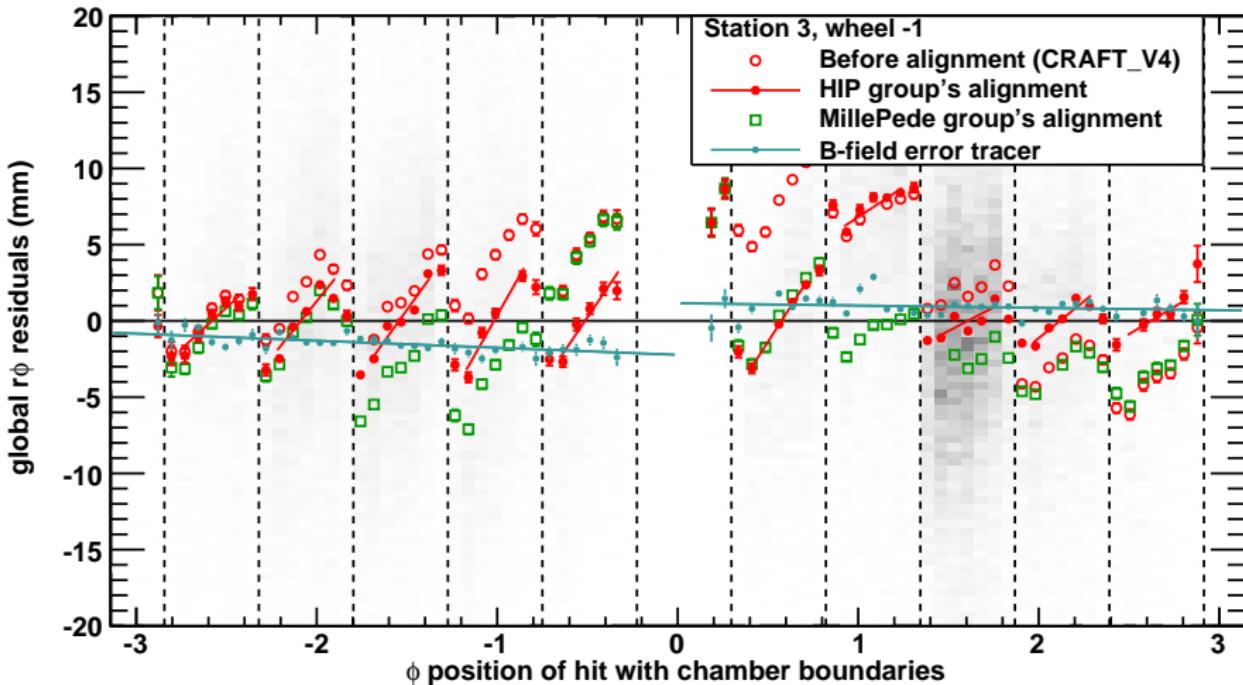
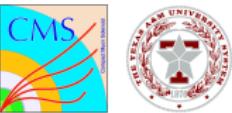
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Track-based validation plots

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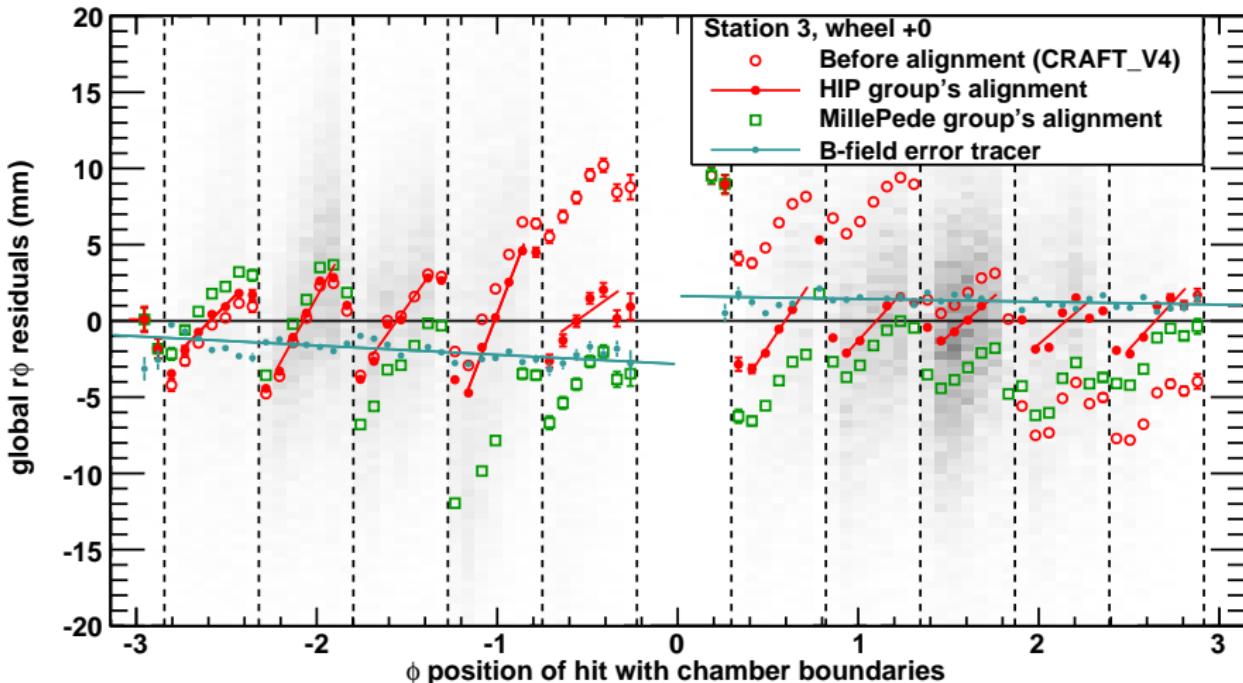
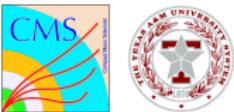
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Track-based validation plots

Jim Pivarski 65/152



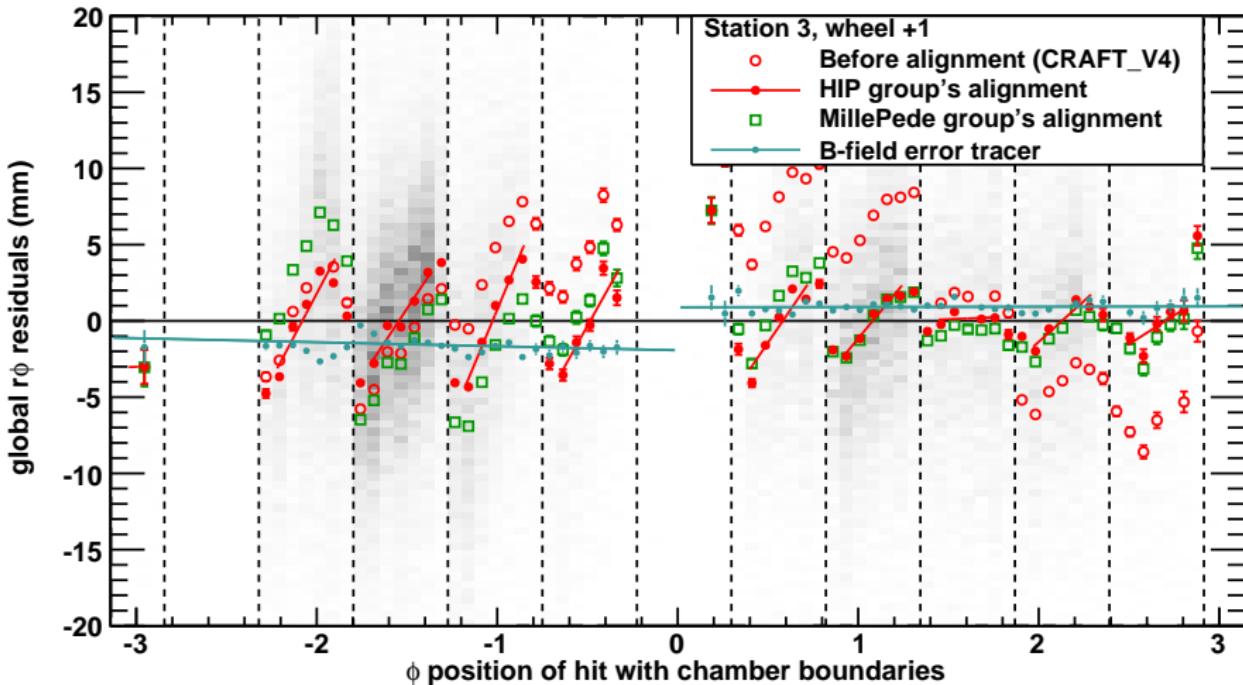
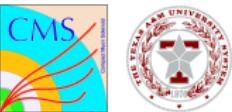
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Track-based validation plots

Jim Pivarski 66/152



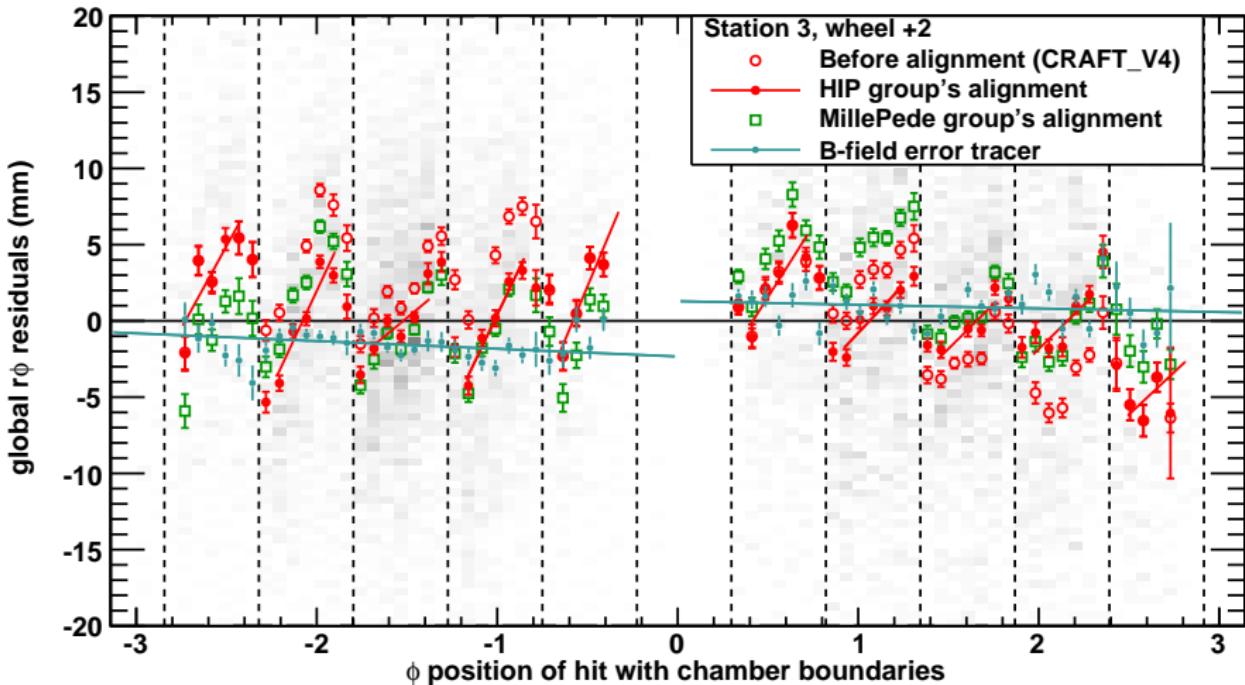
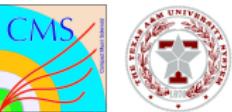
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Track-based validation plots

Jim Pivarski 67/152



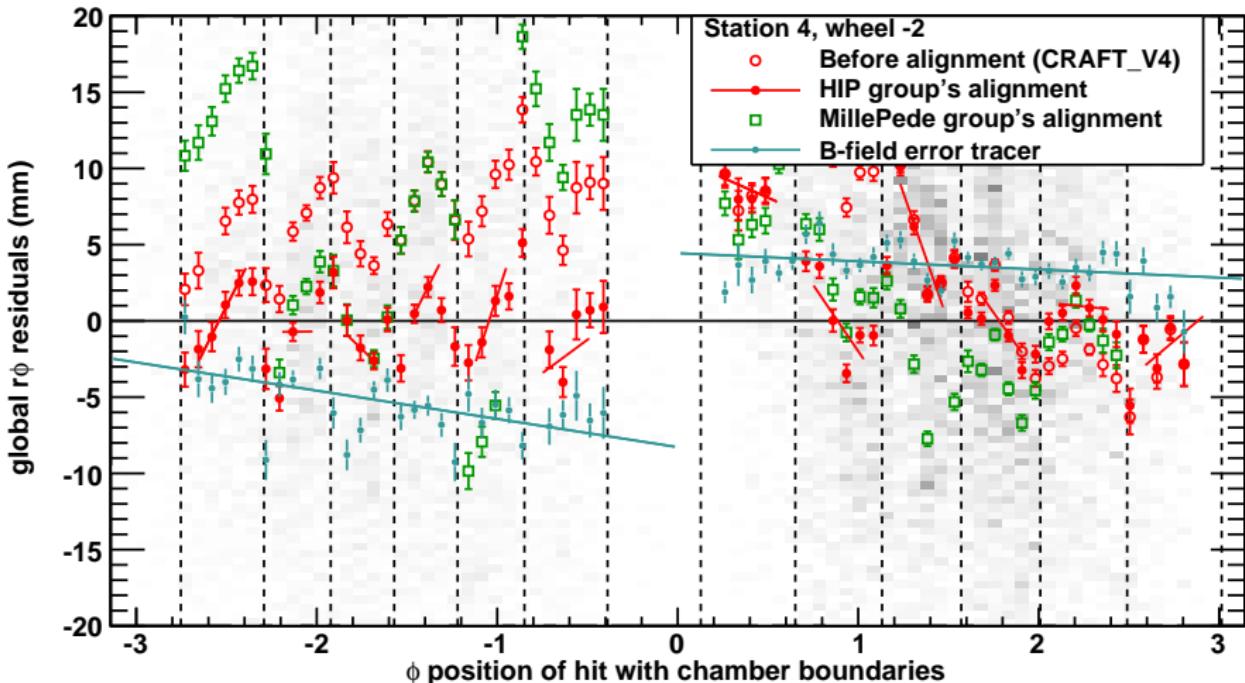
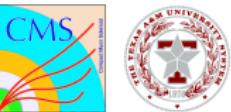
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Track-based validation plots

Jim Pivarski 68/152



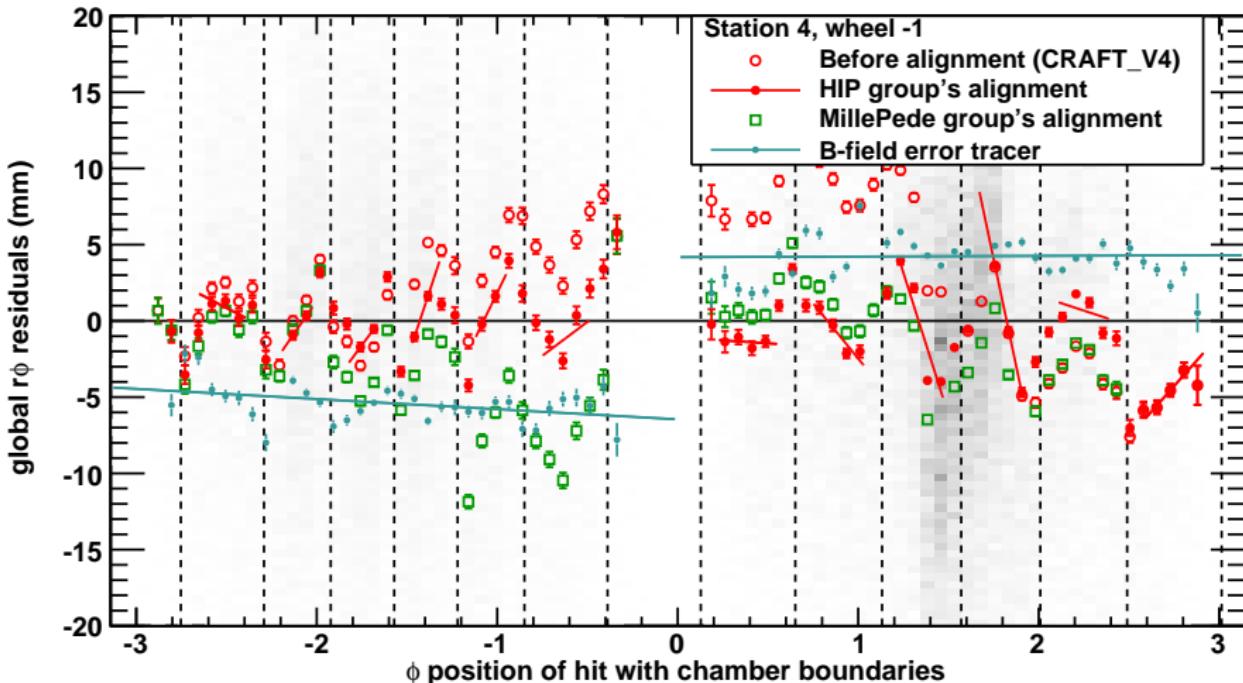
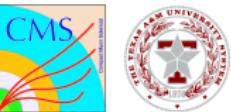
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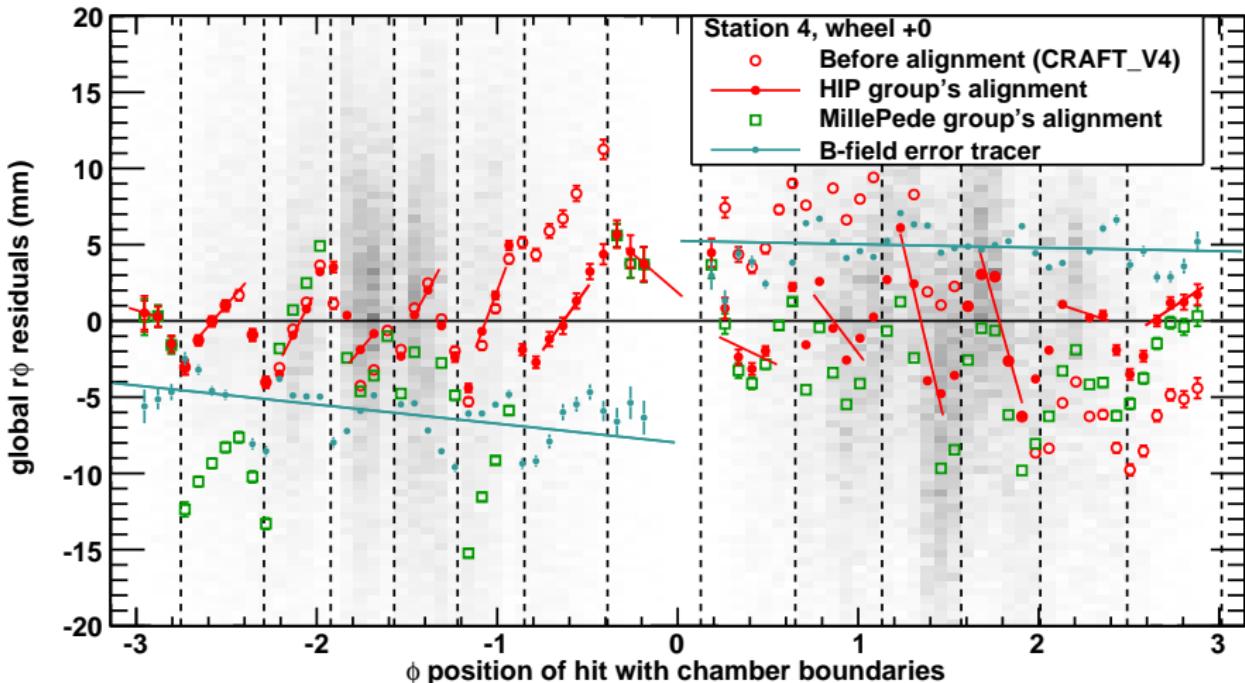
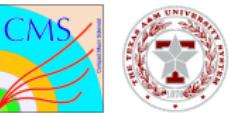
Track-based validation plots

Jim Pivarski 69/152



Track-based validation plots

Jim Pivarski 70/152



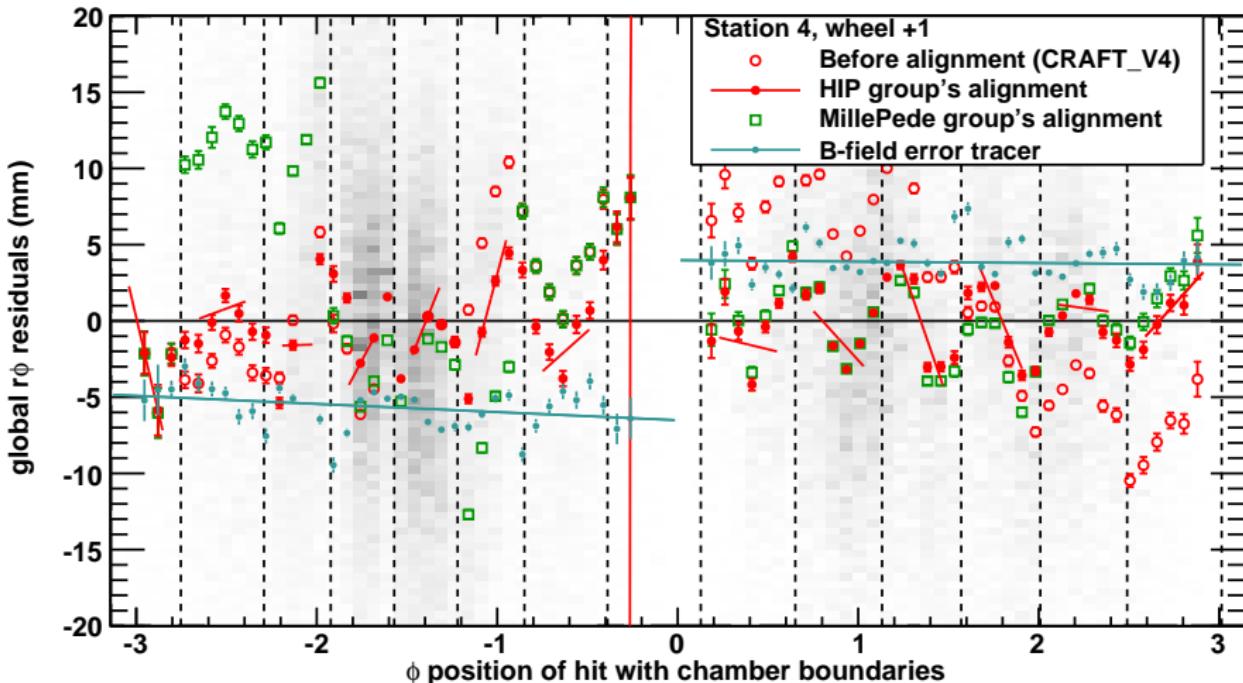
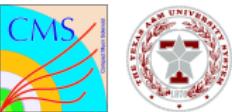
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Track-based validation plots

Jim Pivarski 71/152



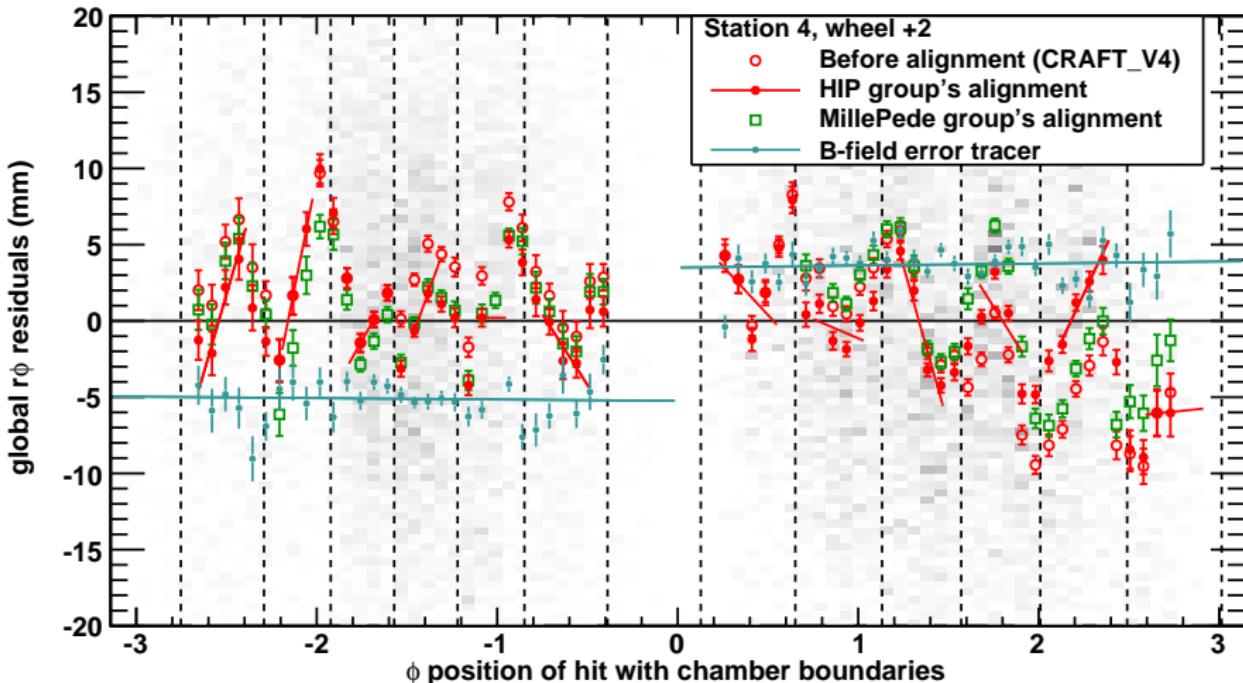
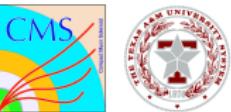
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Jim Pivarski 72/152



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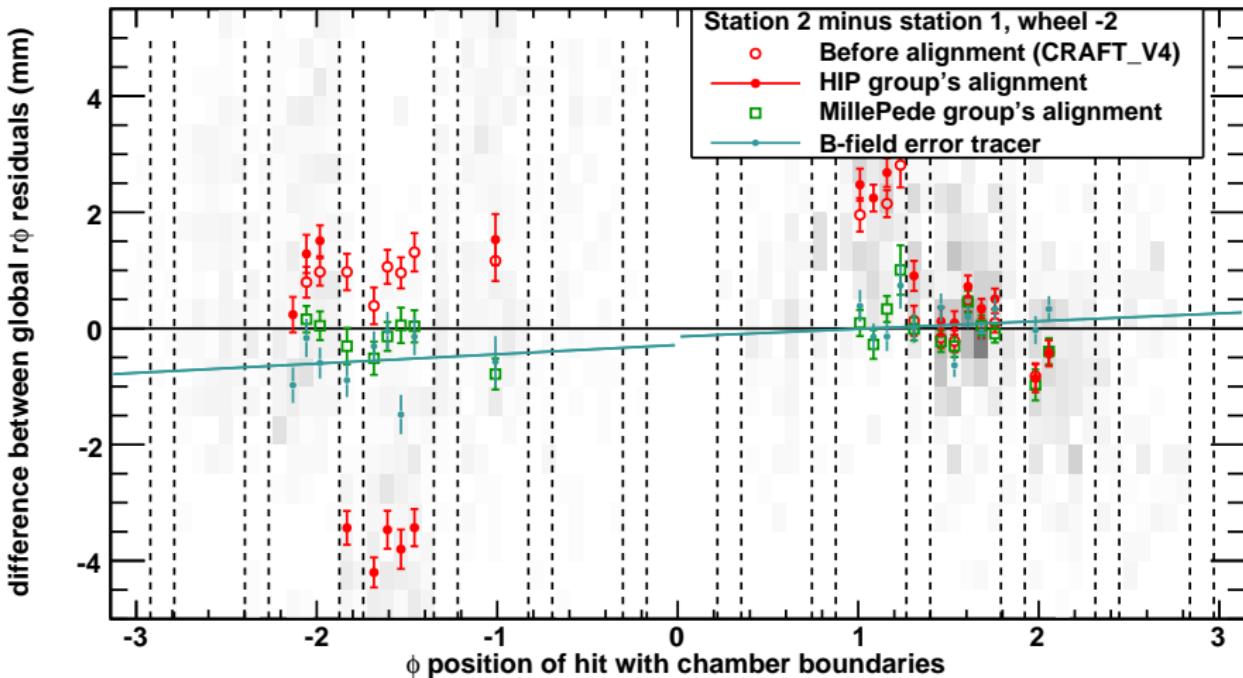
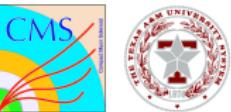
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$r\phi$ differences versus ϕ

Track-based validation plots

Jim Pivarski 74/152



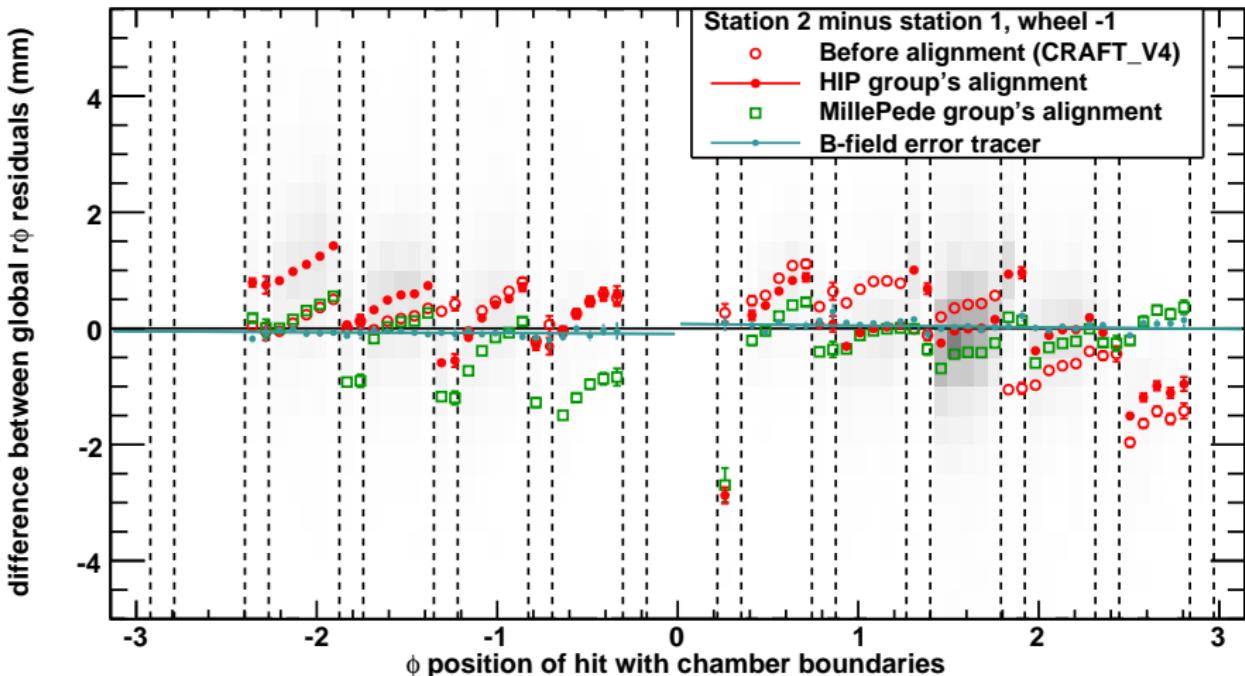
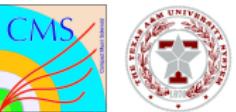
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Track-based validation plots

Jim Pivarski 75/152



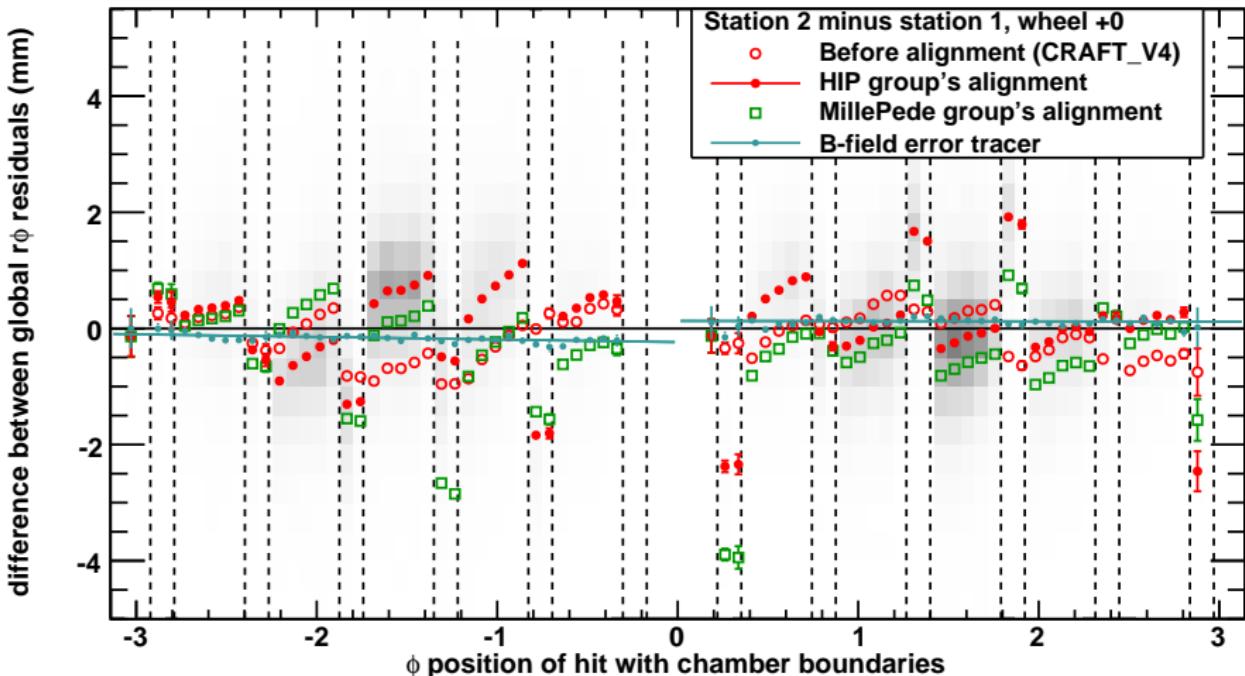
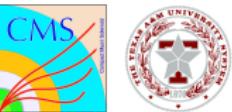
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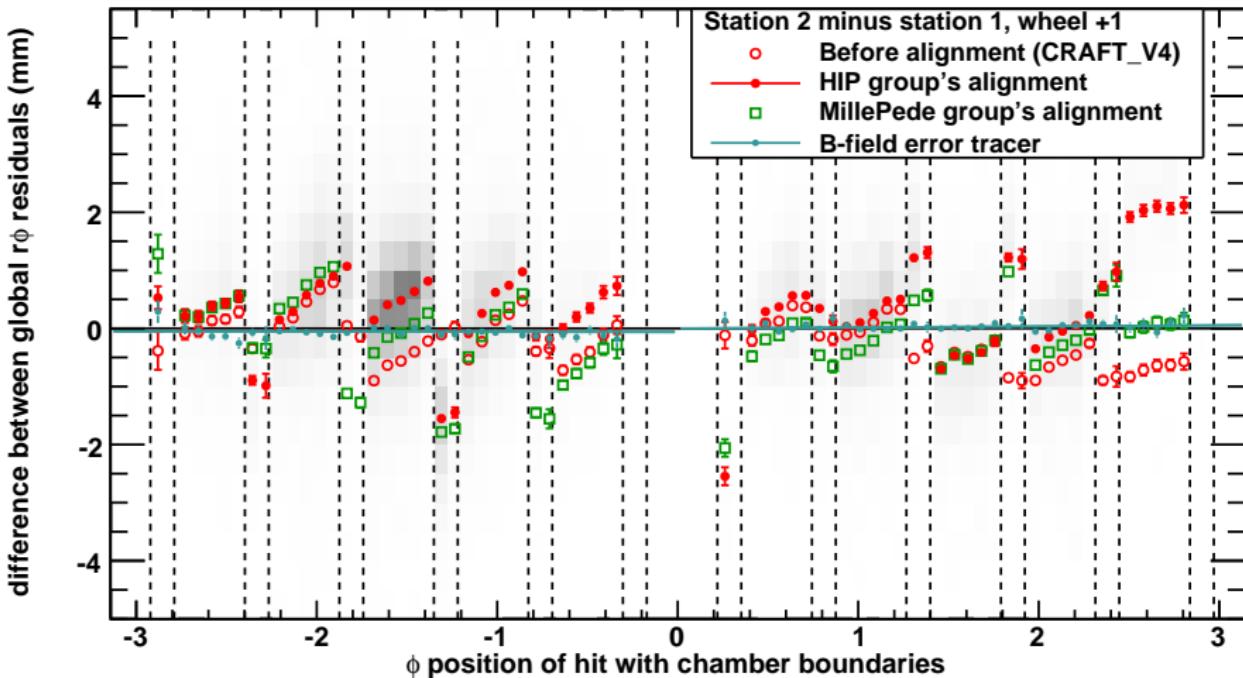
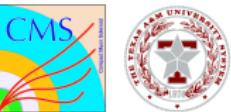
Track-based validation plots

Jim Pivarski 76/152



Track-based validation plots

Jim Pivarski 77/152



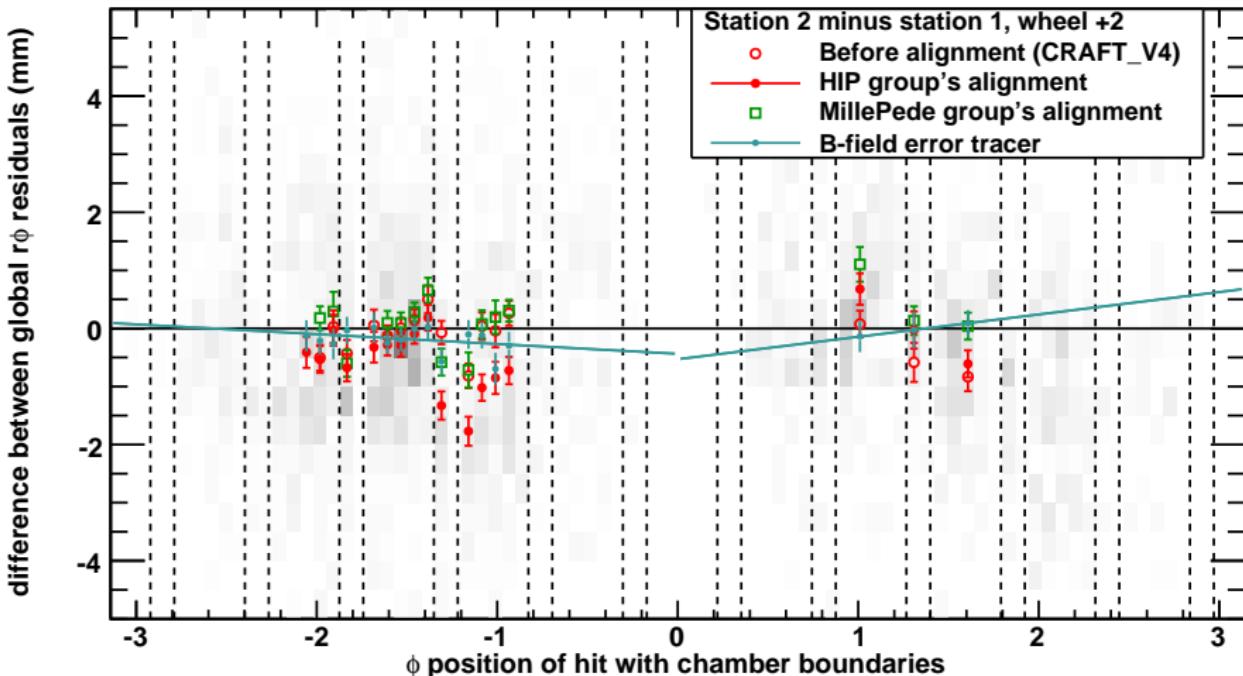
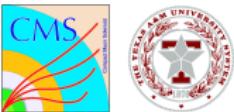
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Track-based validation plots

Jim Pivarski 78/152



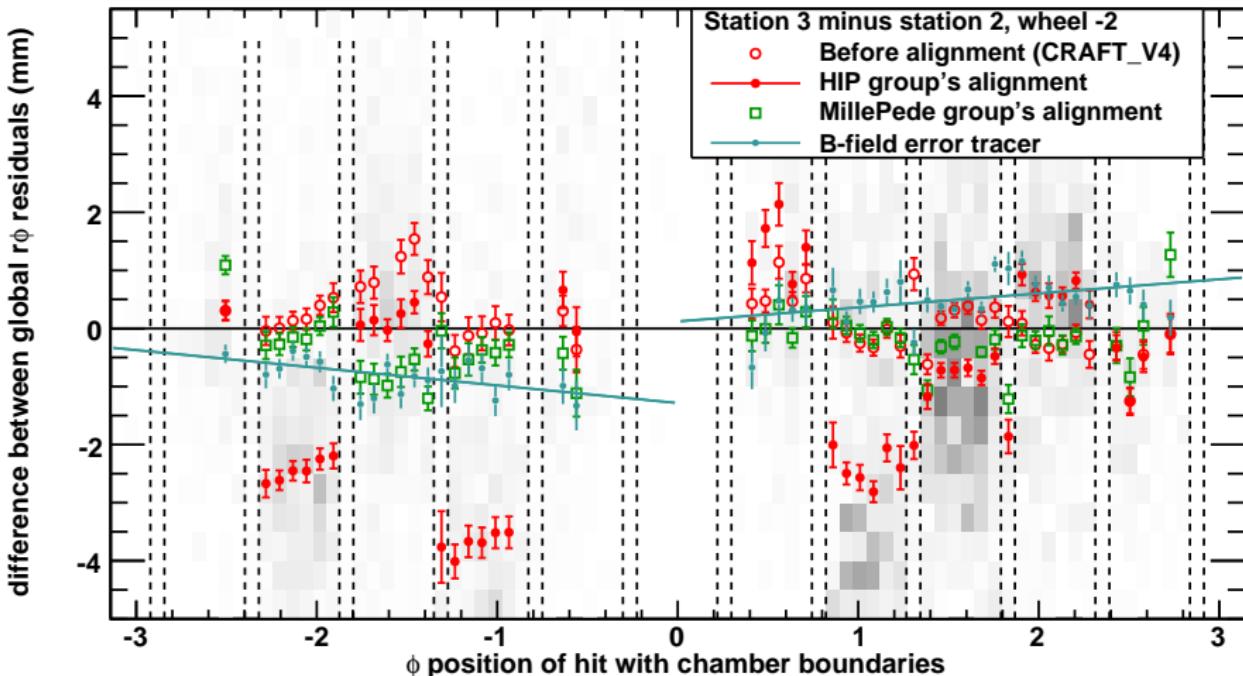
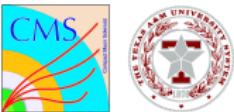
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Track-based validation plots

Jim Pivarski 79/152



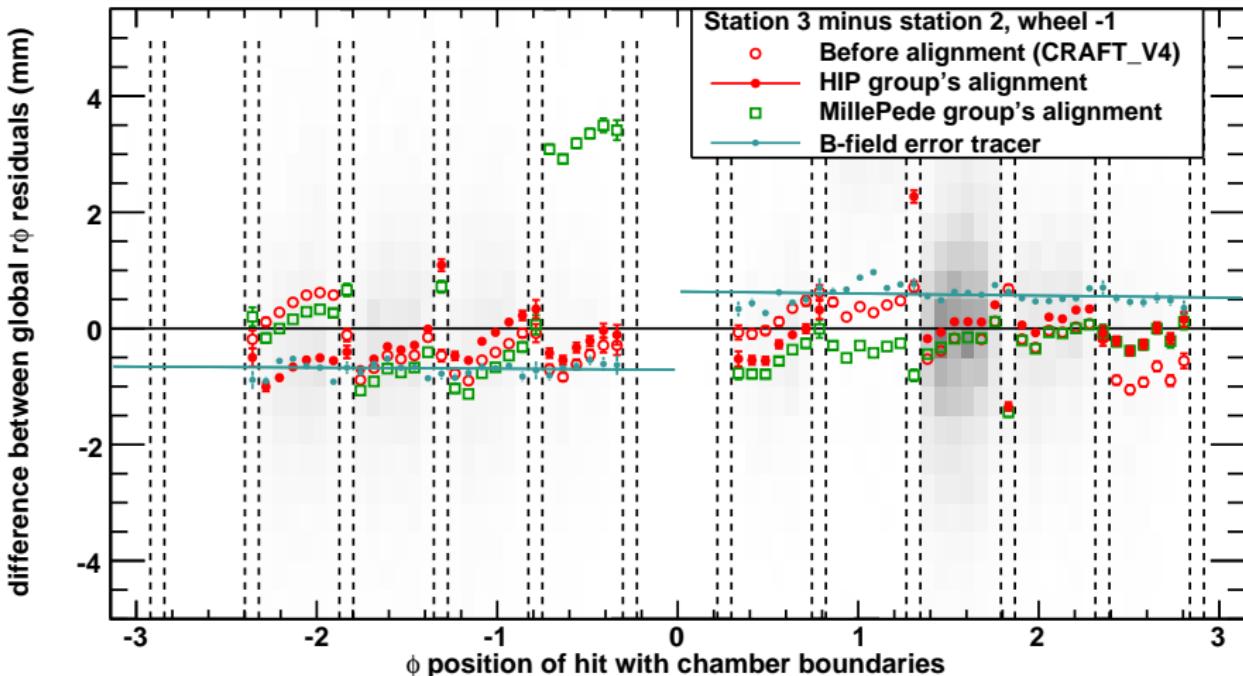
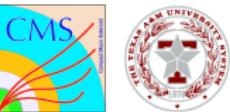
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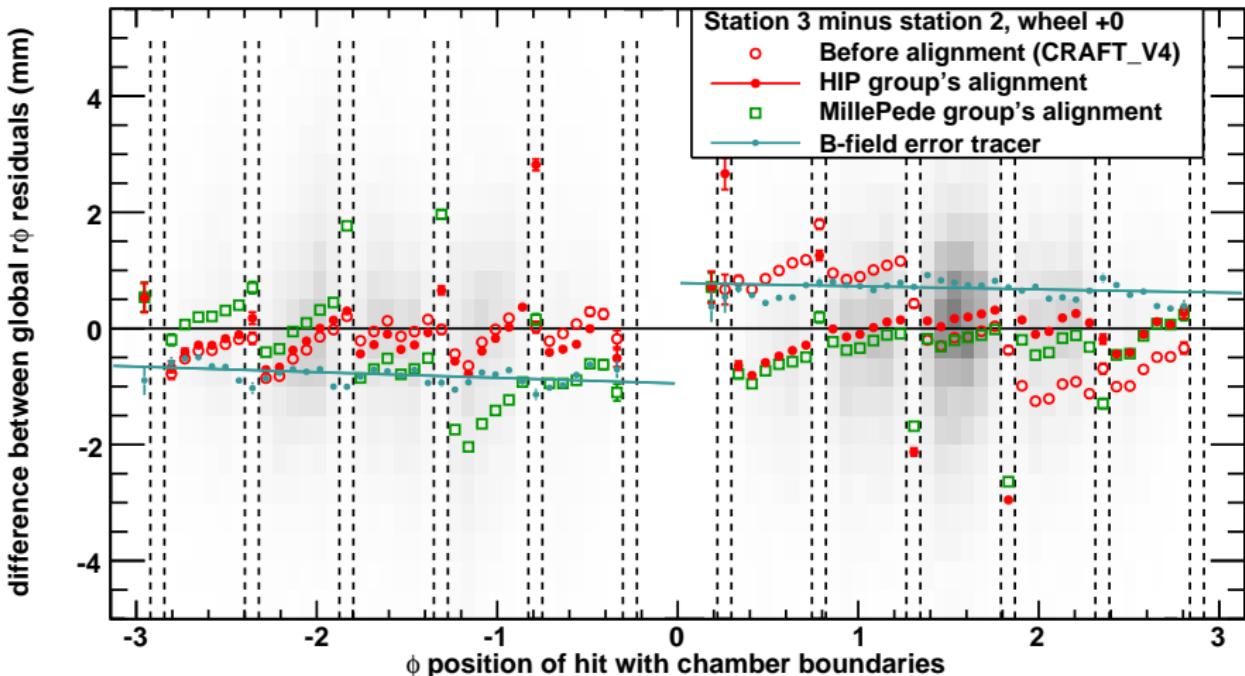
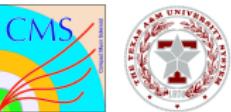
Track-based validation plots

Jim Pivarski 80/152



Track-based validation plots

Jim Pivarski 81/152



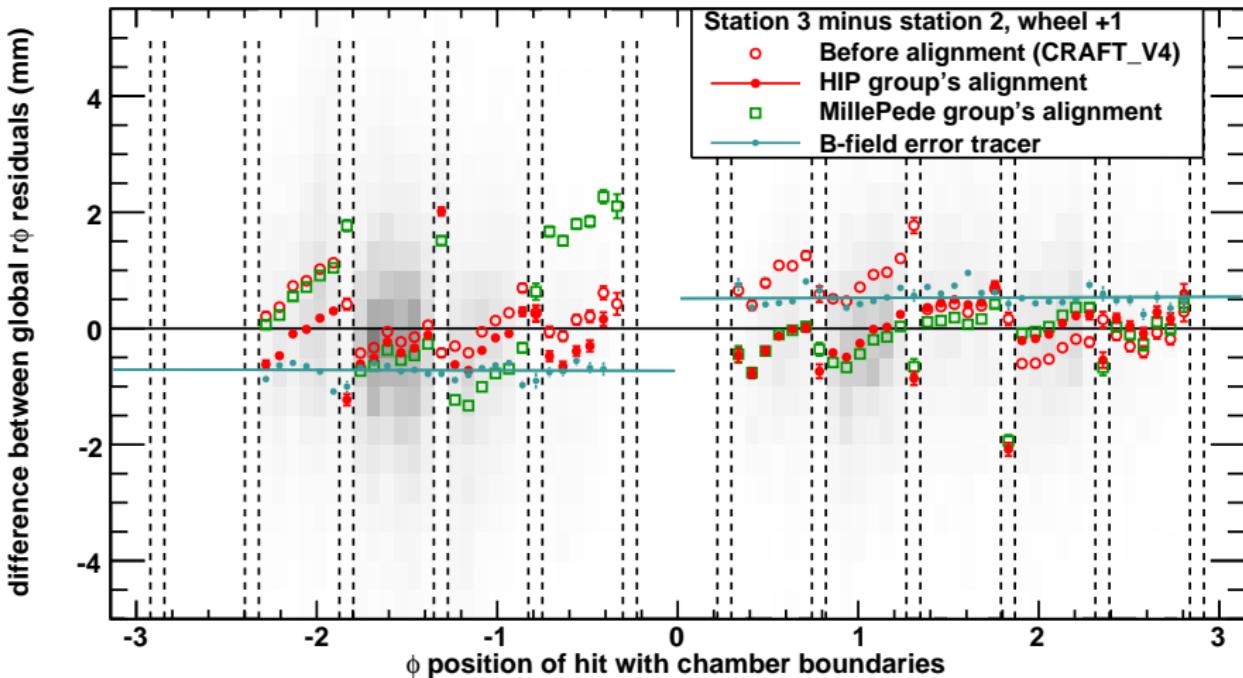
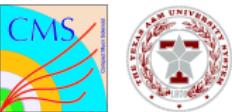
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Track-based validation plots

Jim Pivarski 82/152



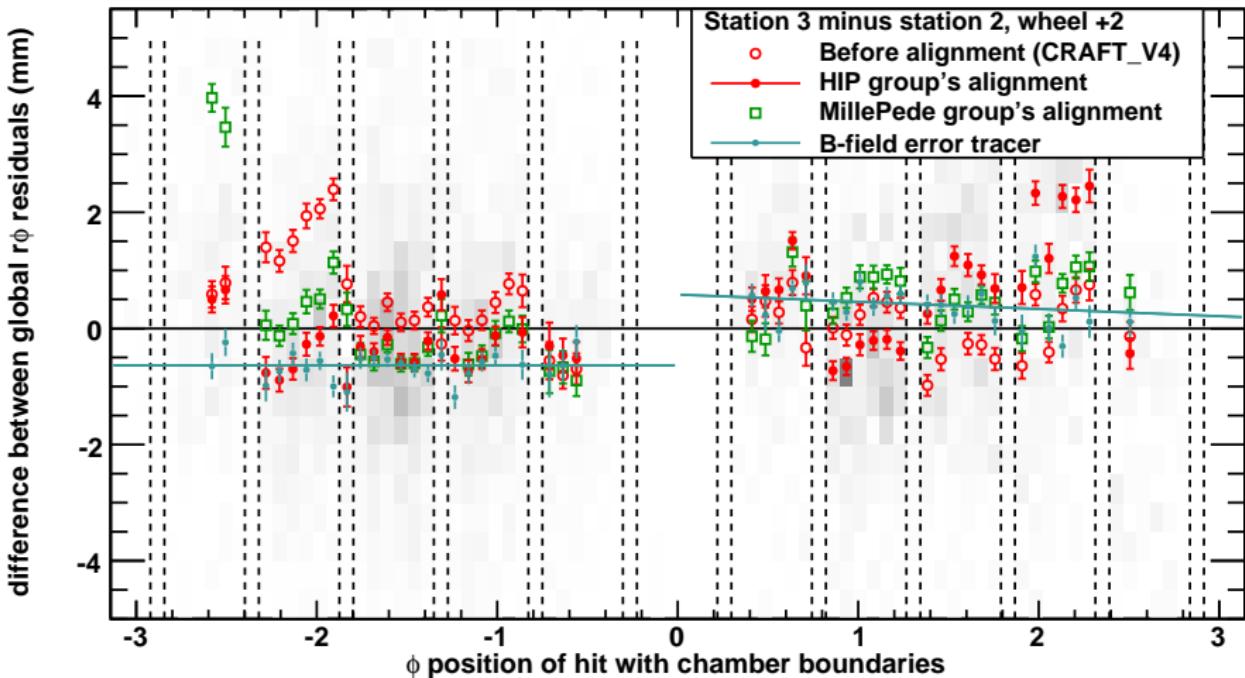
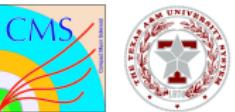
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Track-based validation plots

Jim Pivarski 83/152



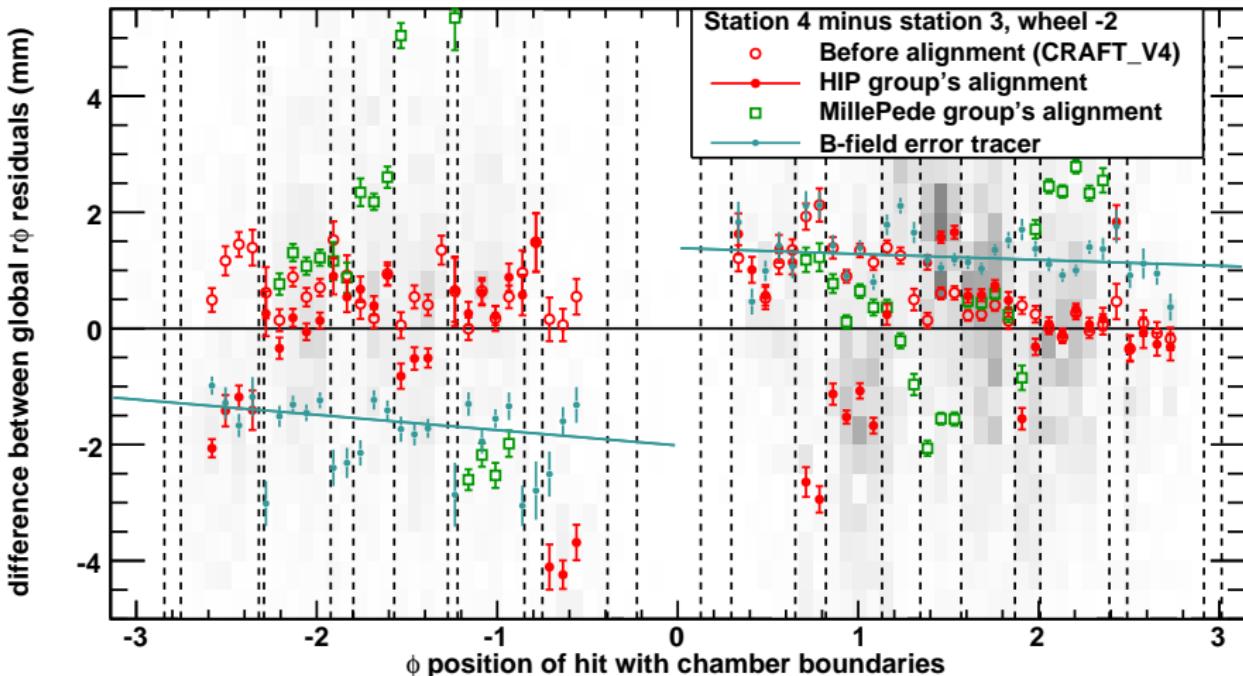
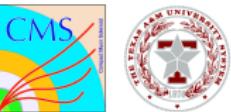
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Track-based validation plots

Jim Pivarski 84/152



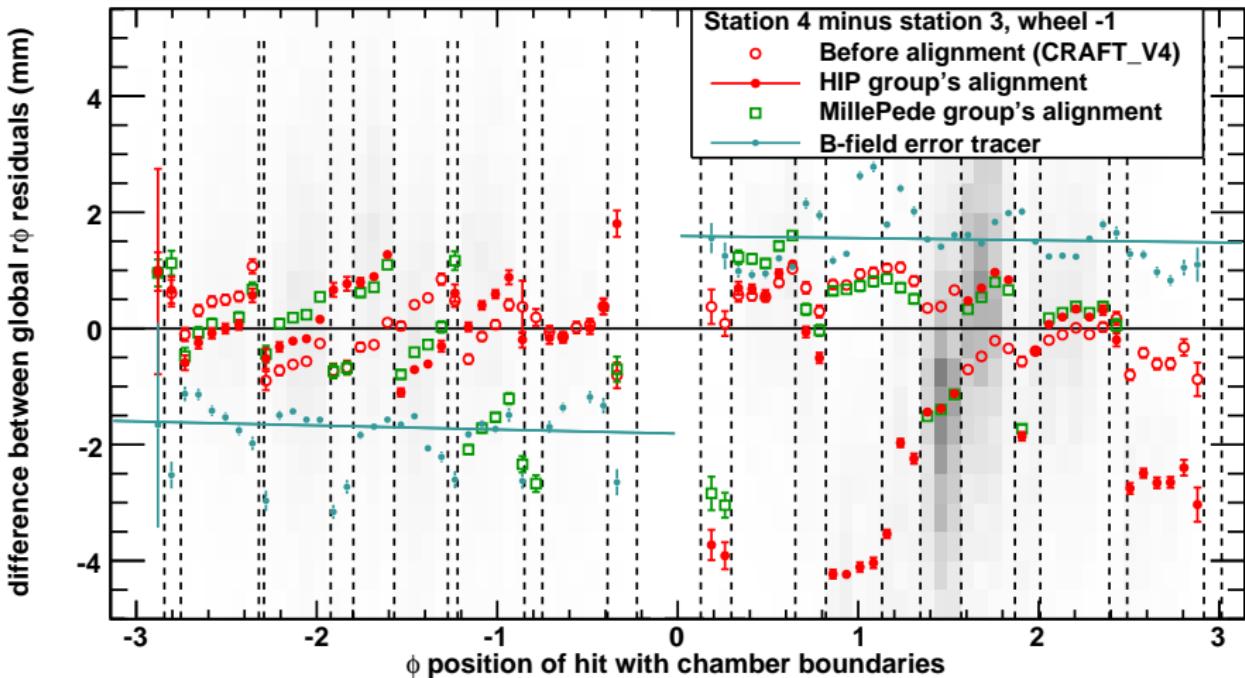
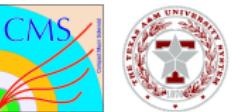
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Track-based validation plots

Jim Pivarski 85/152



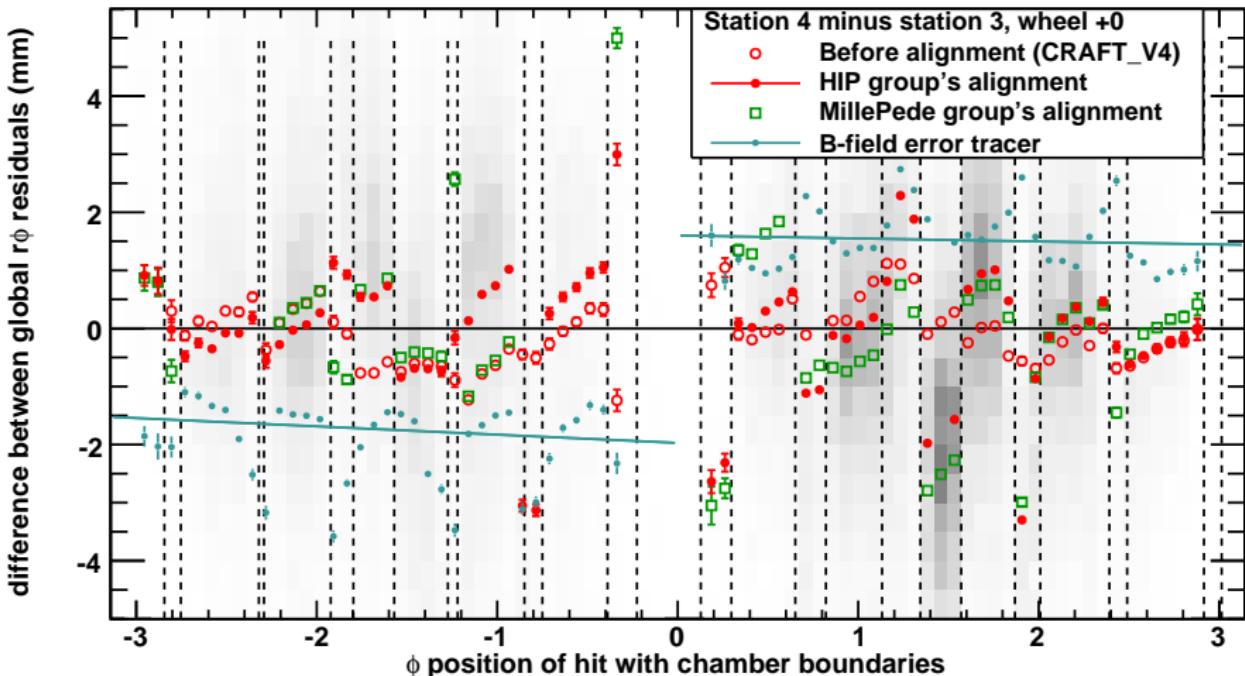
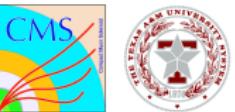
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Track-based validation plots

Jim Pivarski 86/152



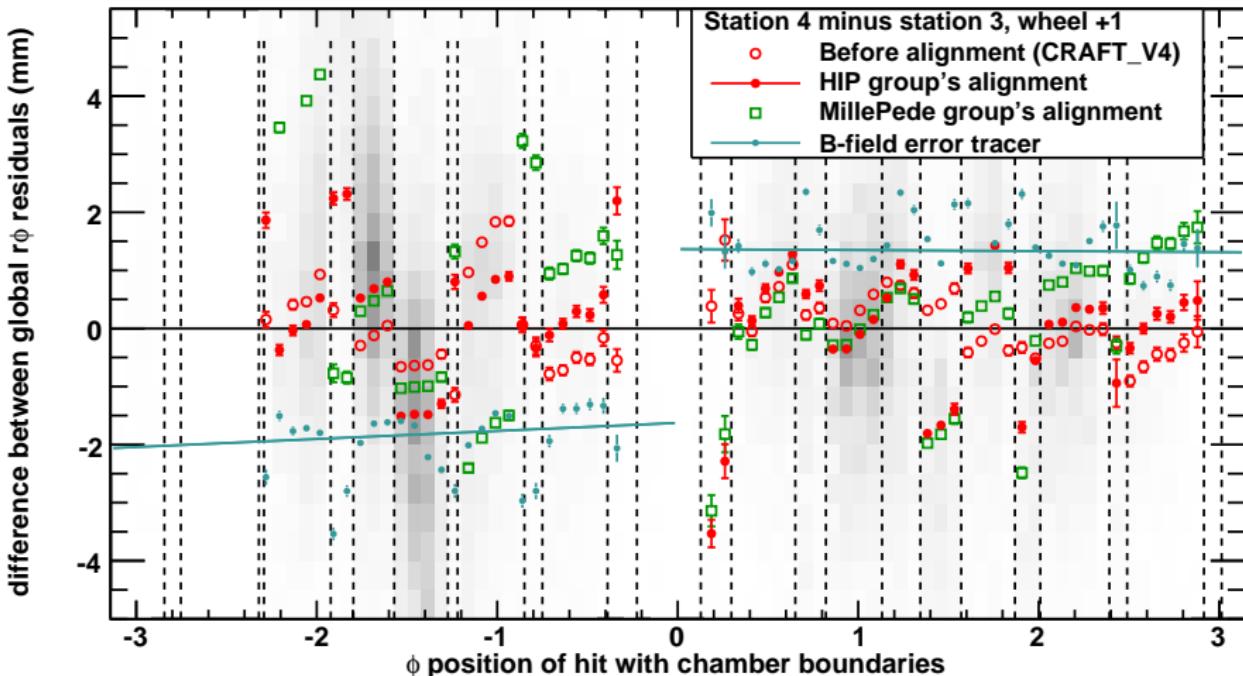
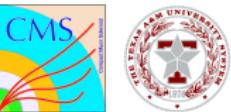
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Track-based validation plots

Jim Pivarski 87/152



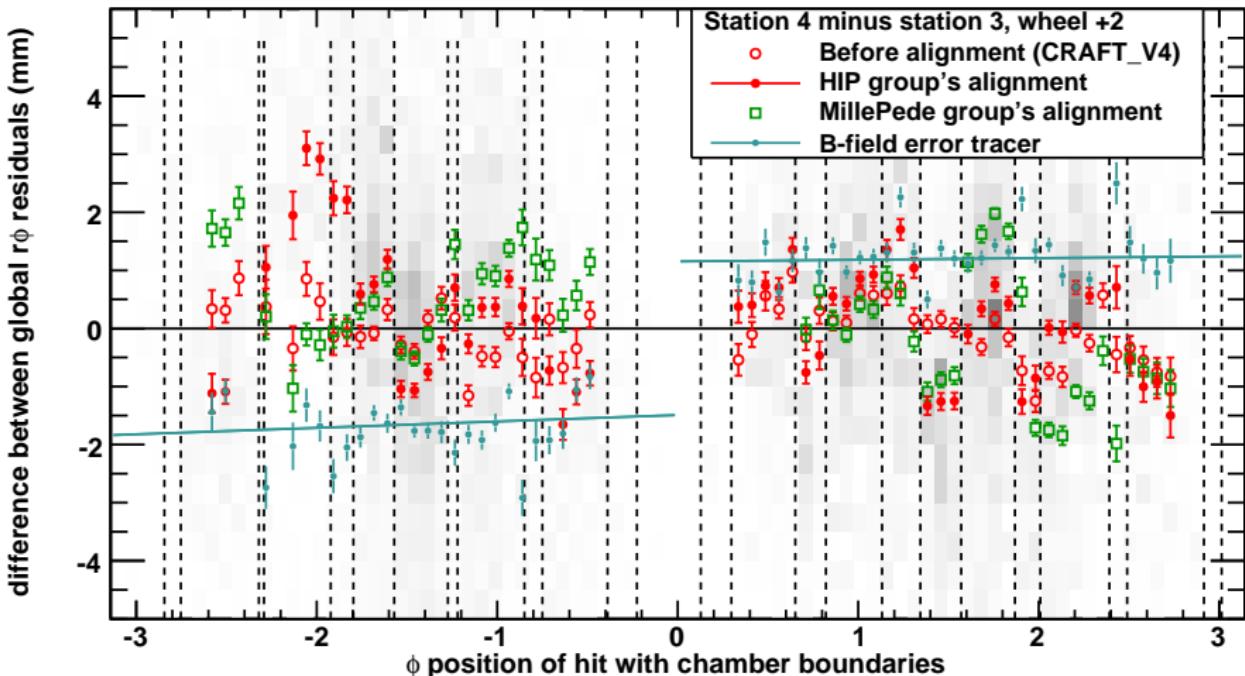
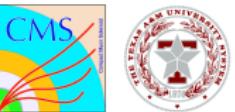
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Track-based validation plots

Jim Pivarski 88/152



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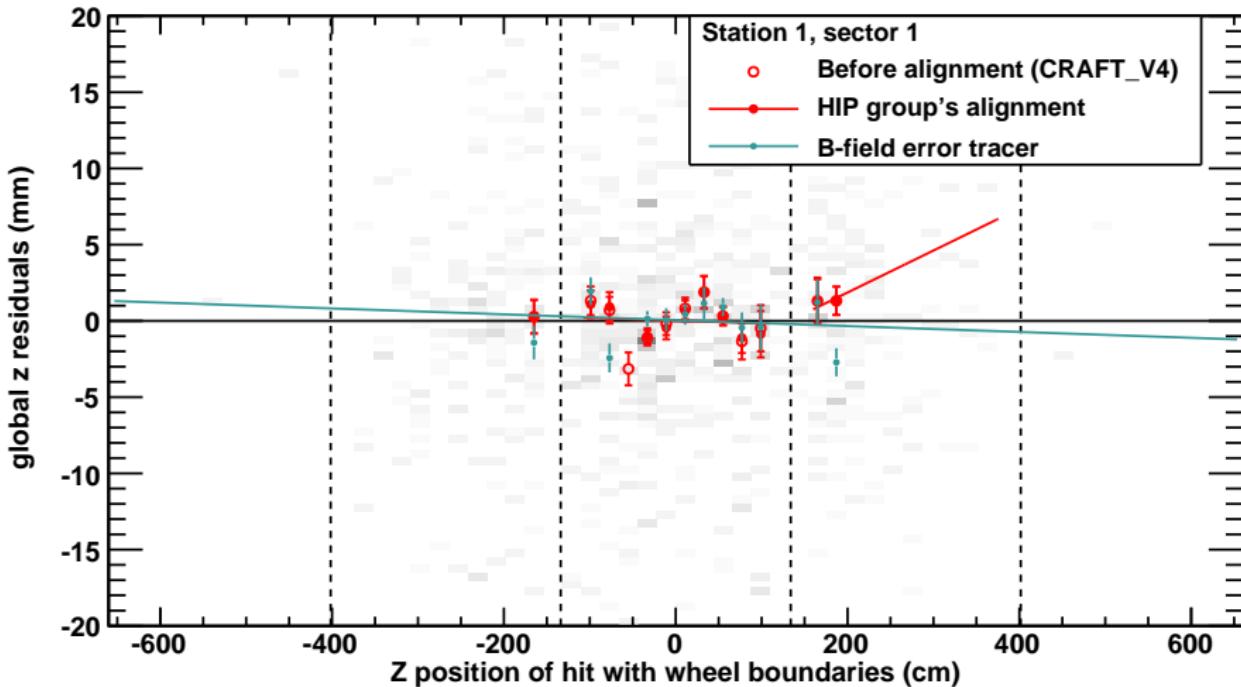
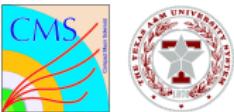
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$r\phi$ residuals versus z

Track-based validation plots

Jim Pivarski 90/152



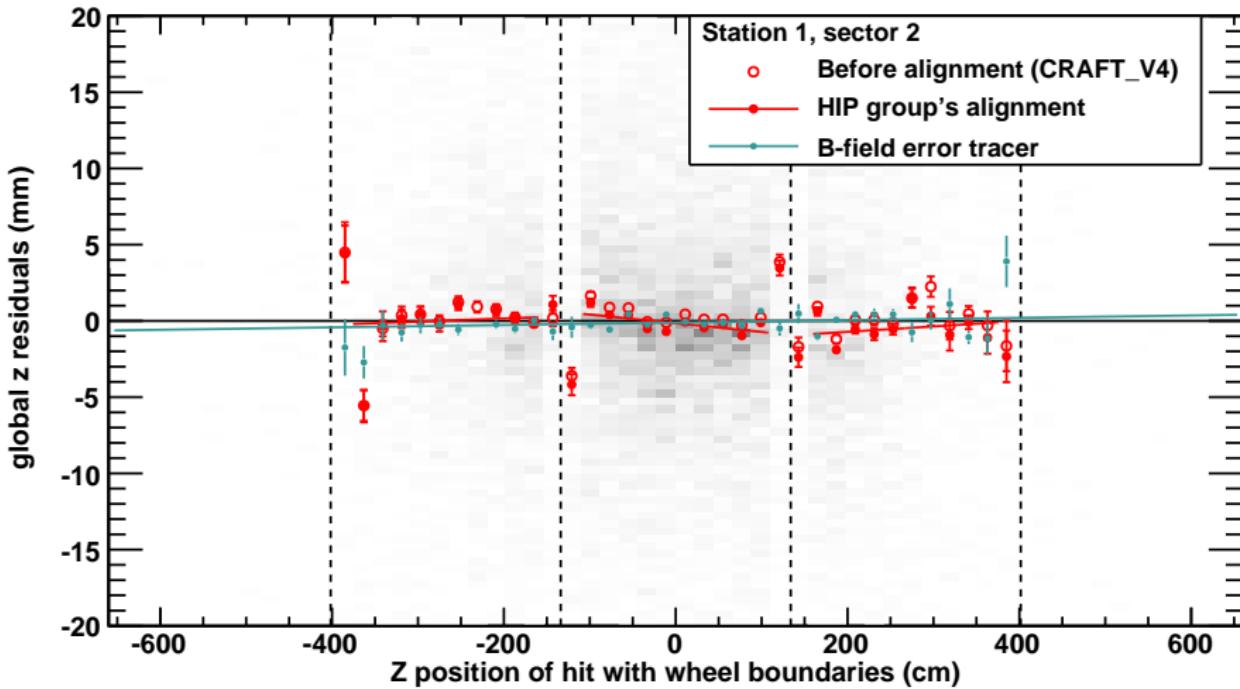
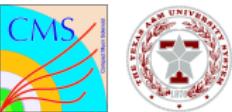
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Track-based validation plots

Jim Pivarski 91/152



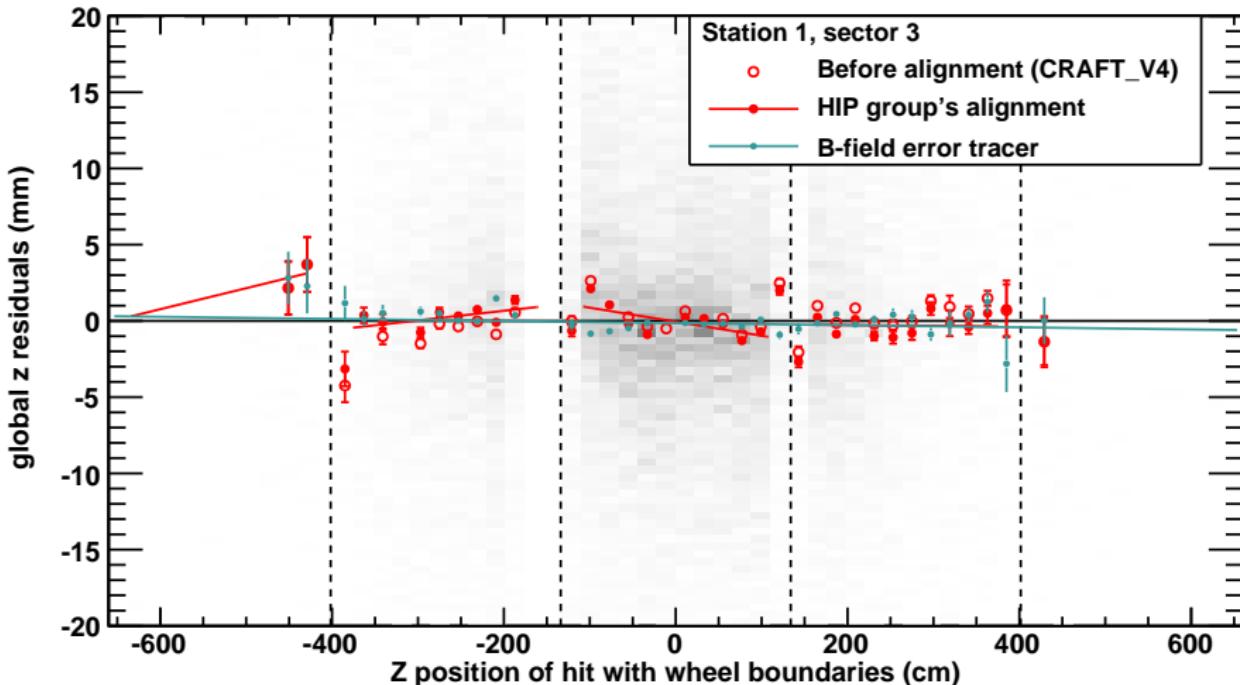
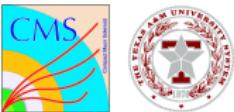
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Track-based validation plots

Jim Pivarski 92/152



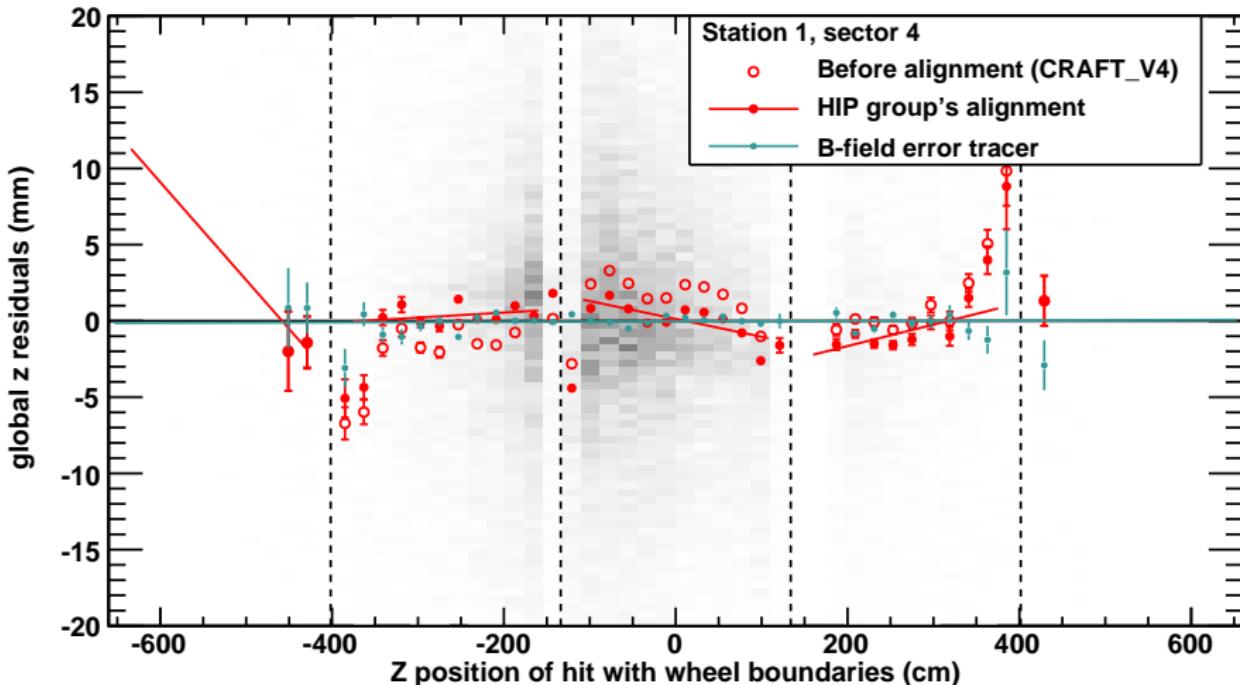
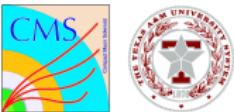
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Track-based validation plots

Jim Pivarski 93/152



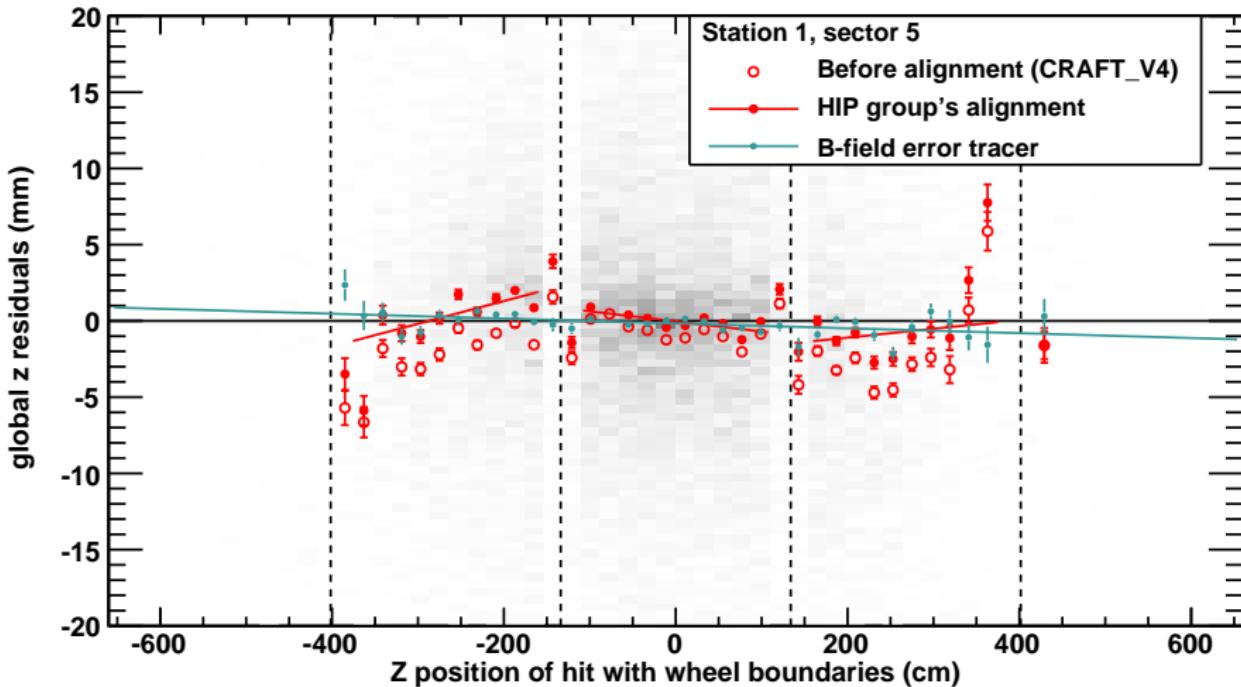
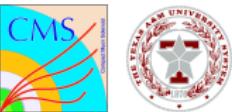
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Track-based validation plots

Jim Pivarski 94/152



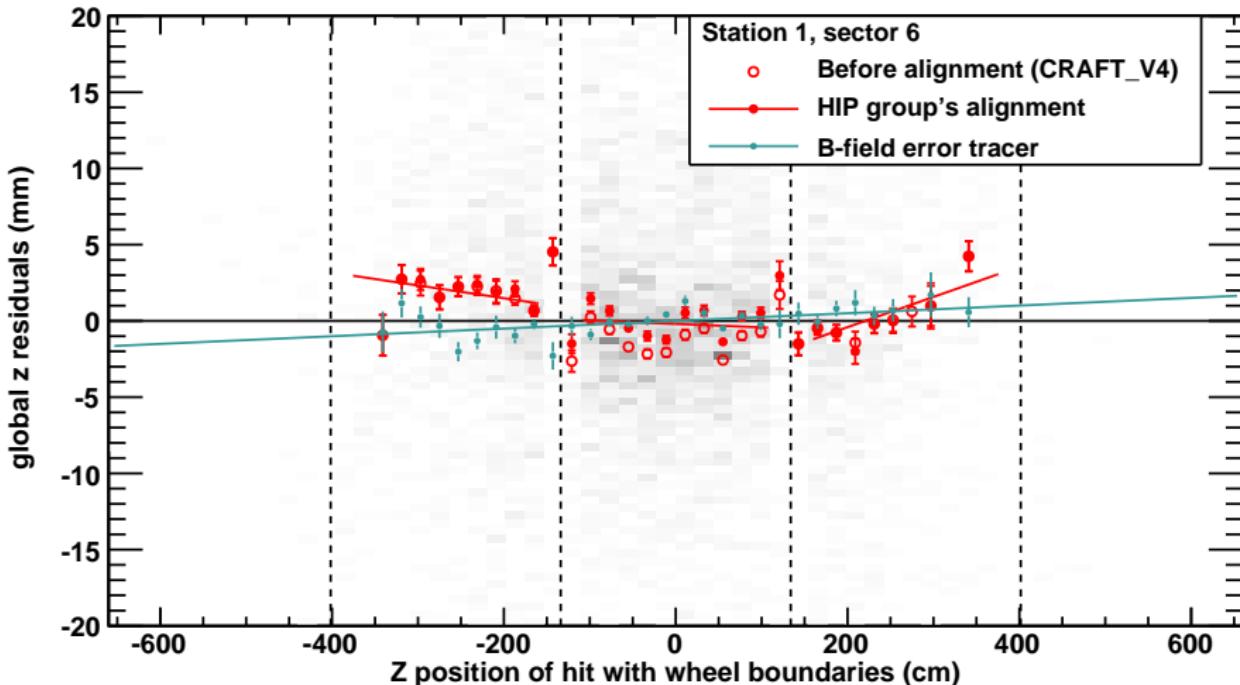
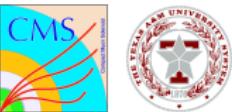
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Track-based validation plots

Jim Pivarski 95/152



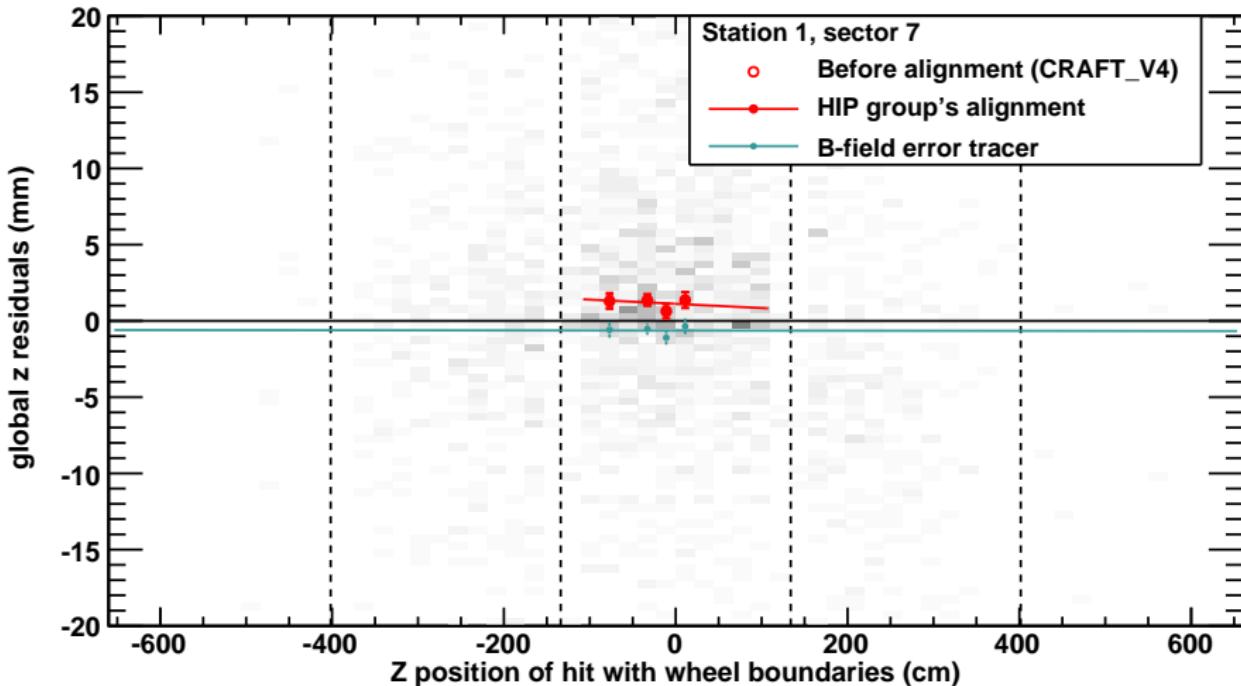
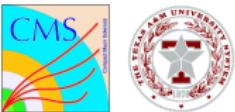
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Track-based validation plots

Jim Pivarski 96/152



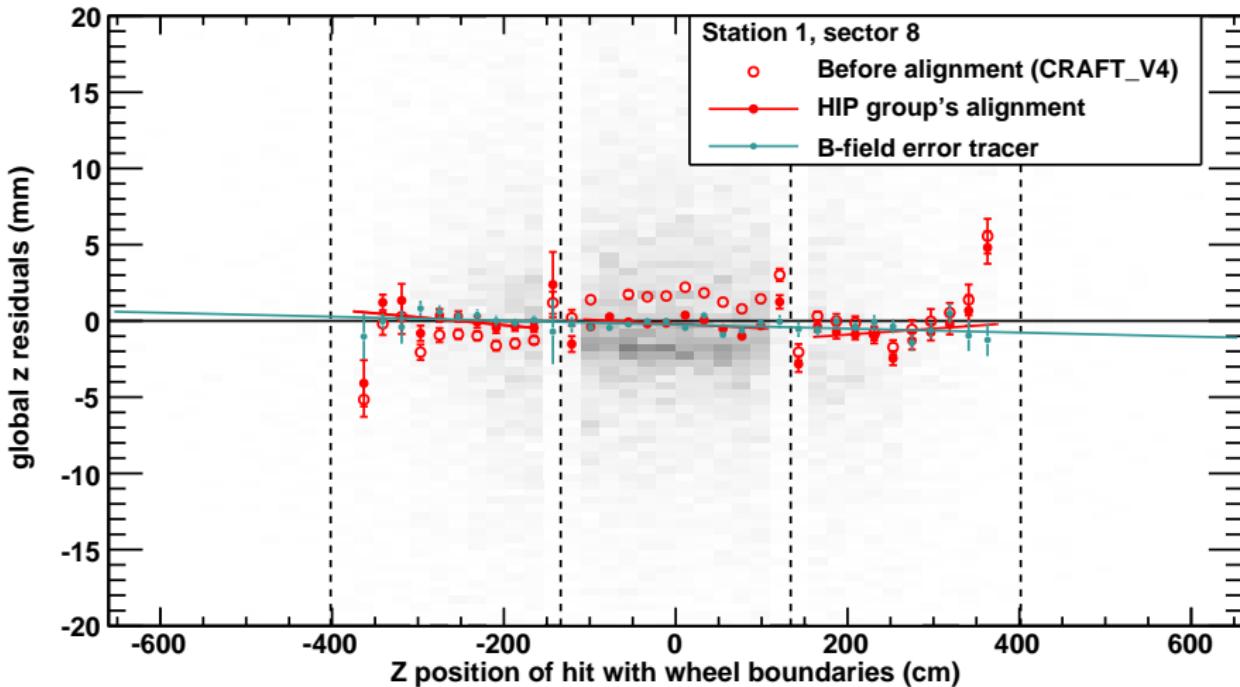
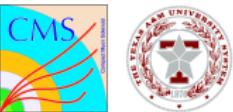
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Track-based validation plots

Jim Pivarski 97/152



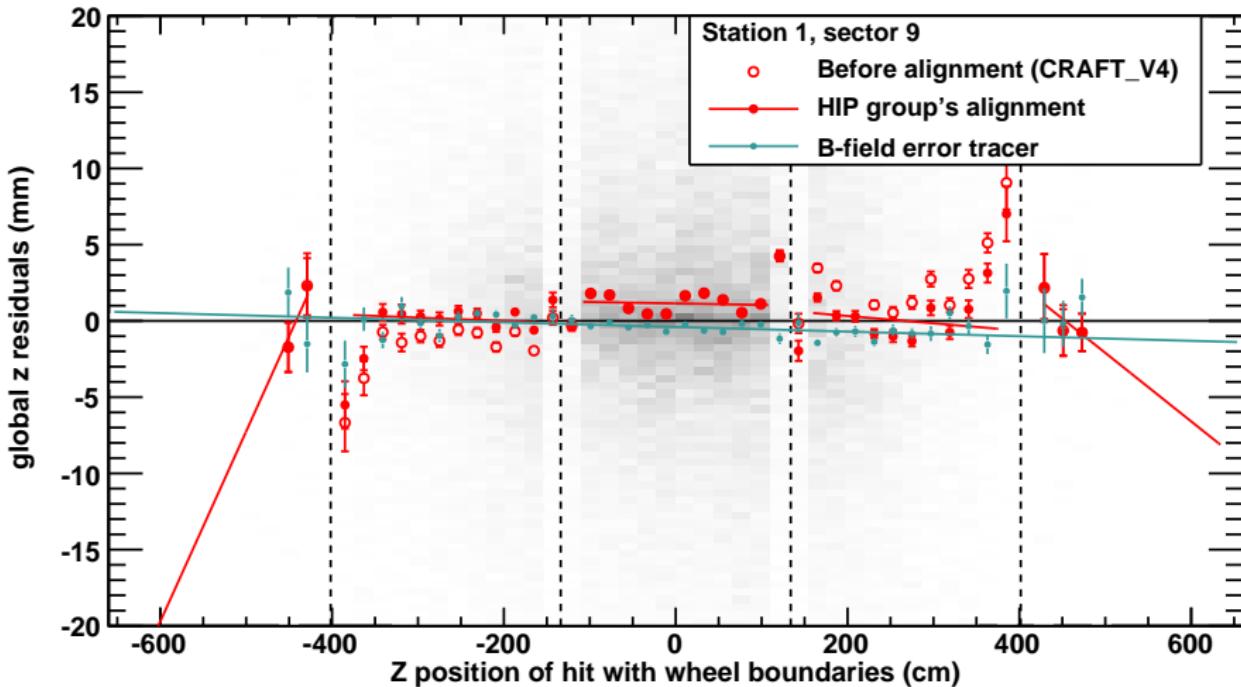
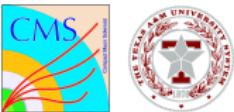
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Track-based validation plots

Jim Pivarski 98/152



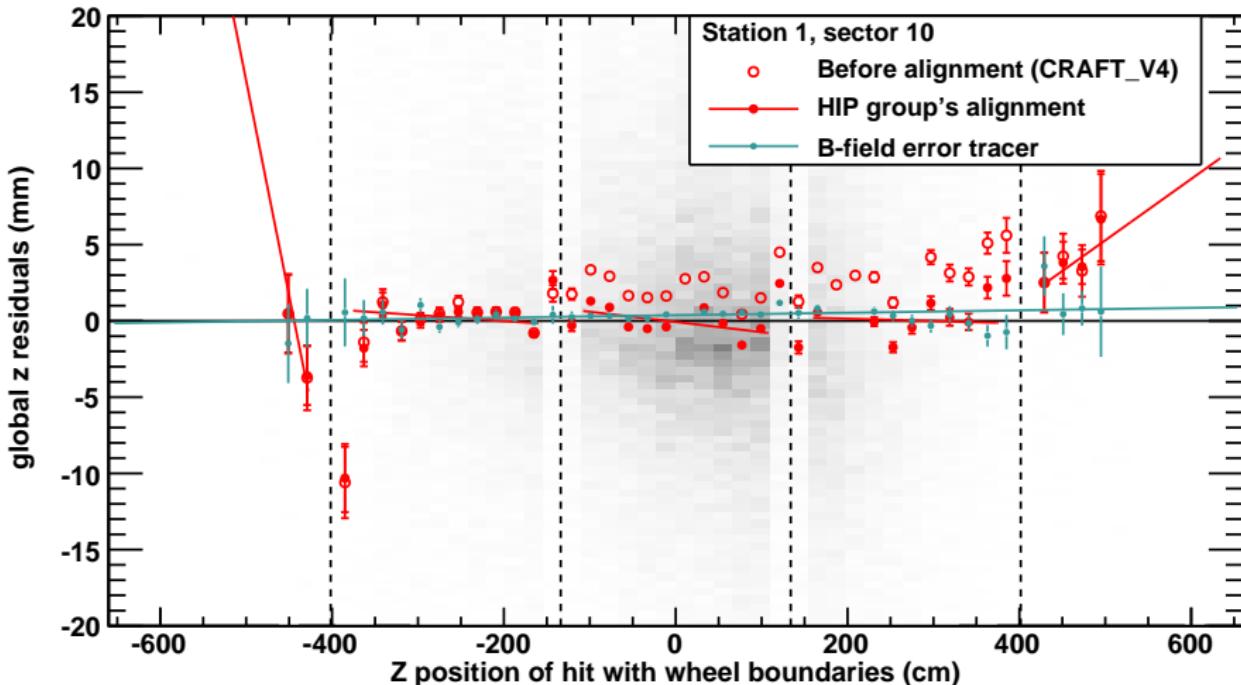
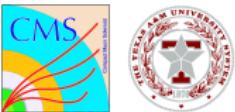
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Track-based validation plots

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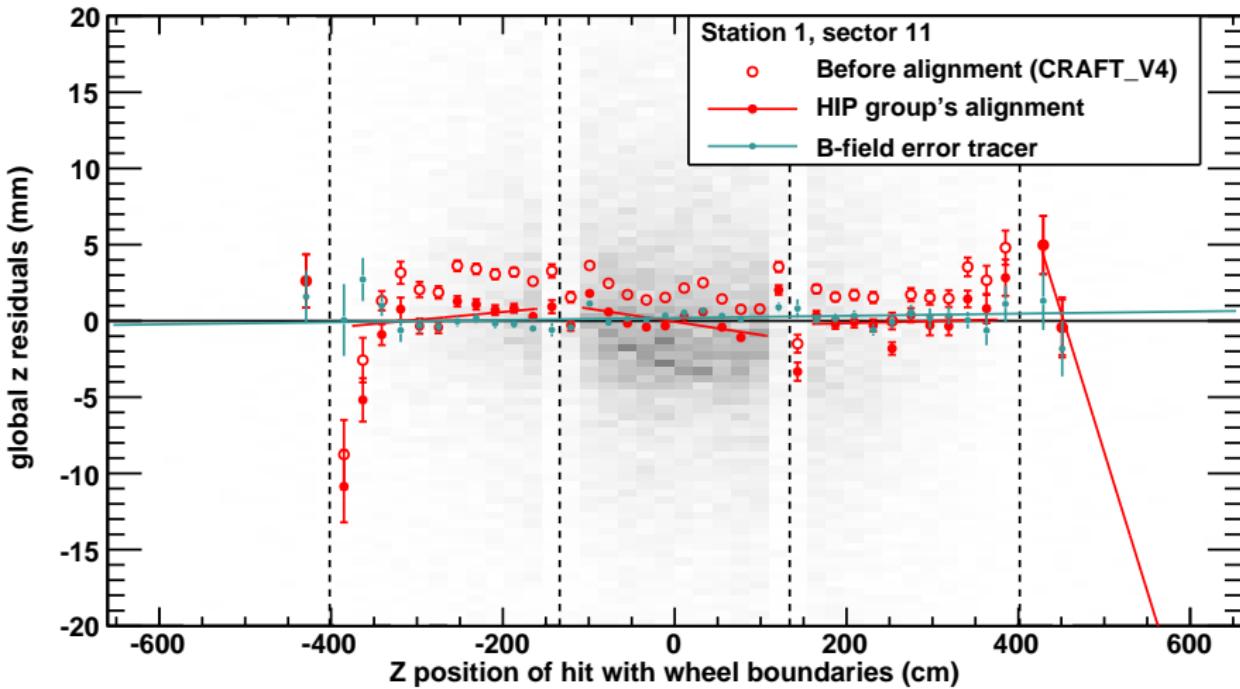
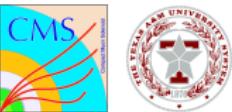
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Track-based validation plots

Jim Pivarski 100/152



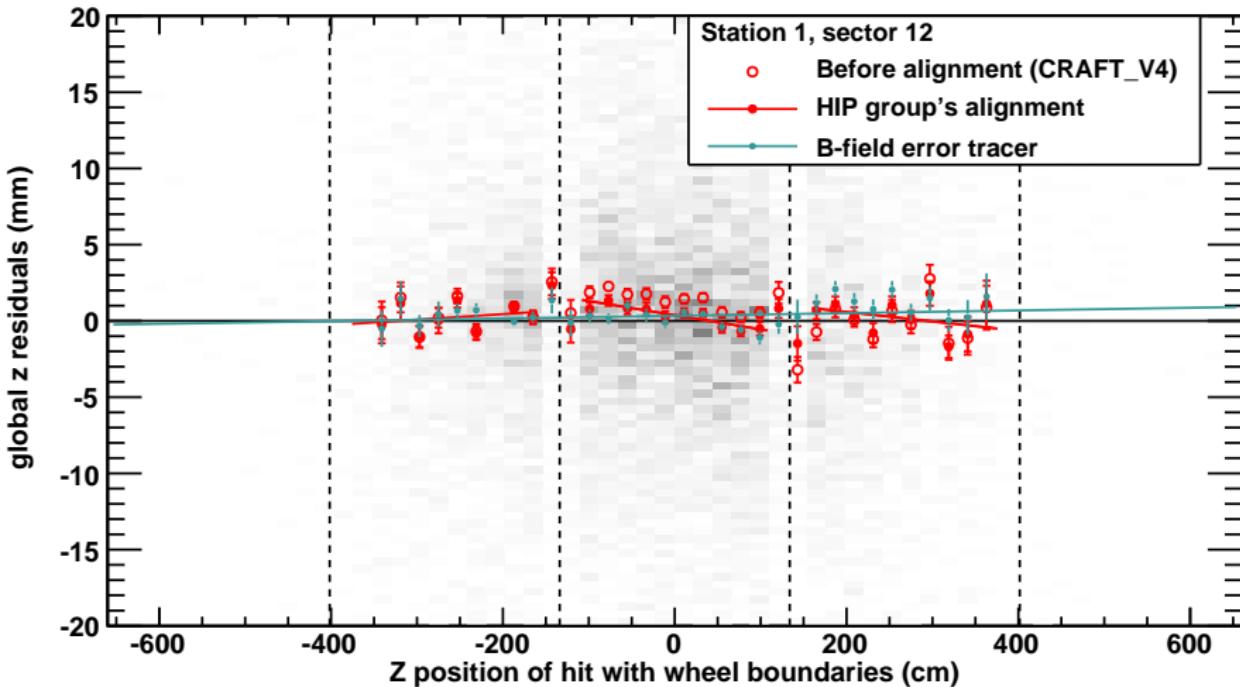
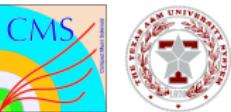
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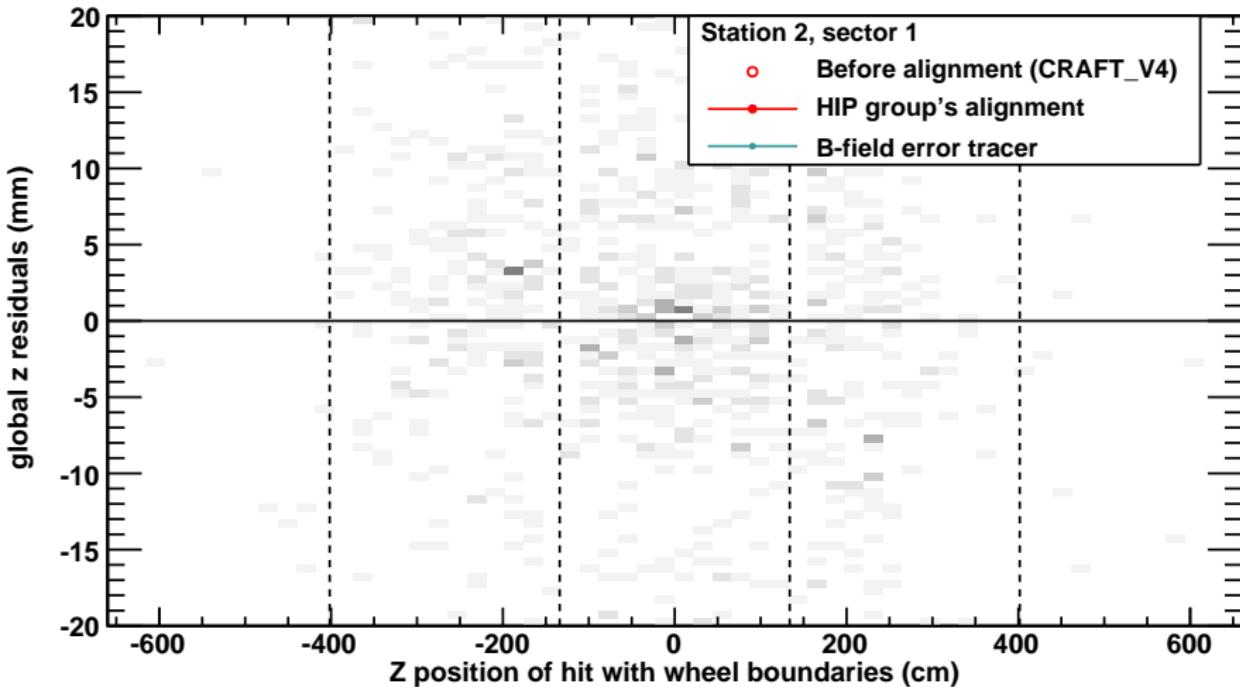
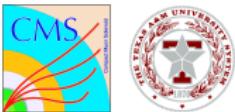
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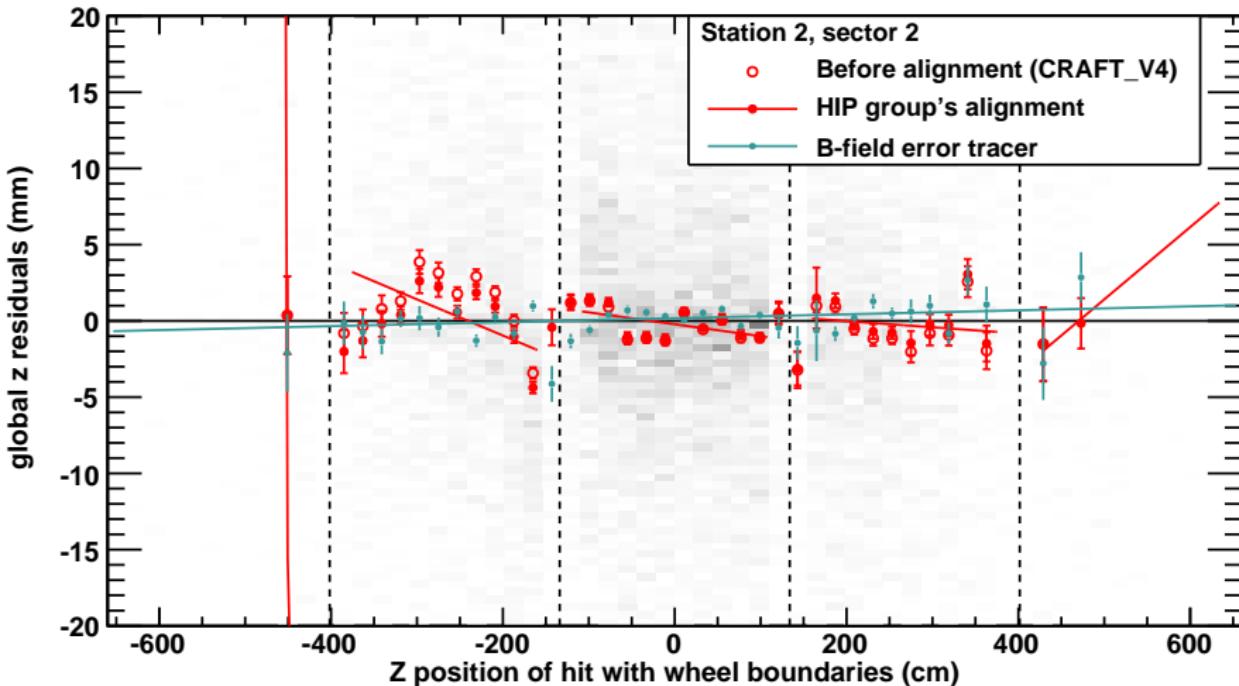
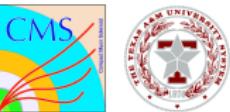
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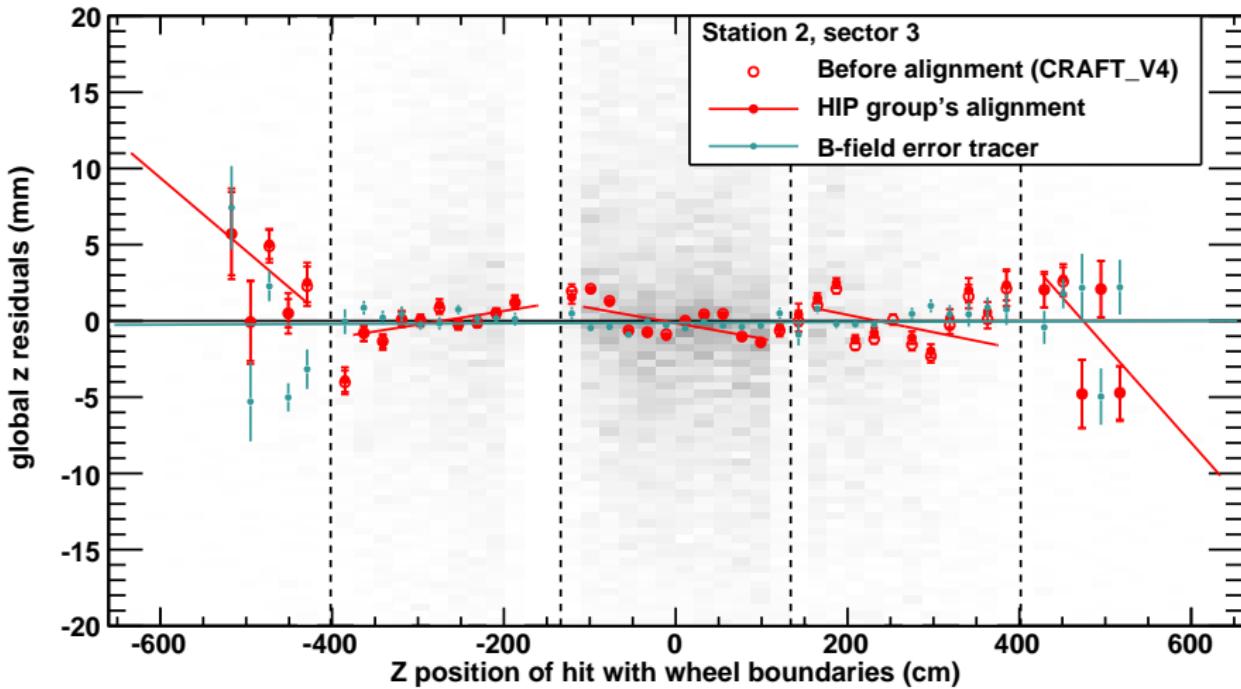
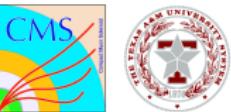
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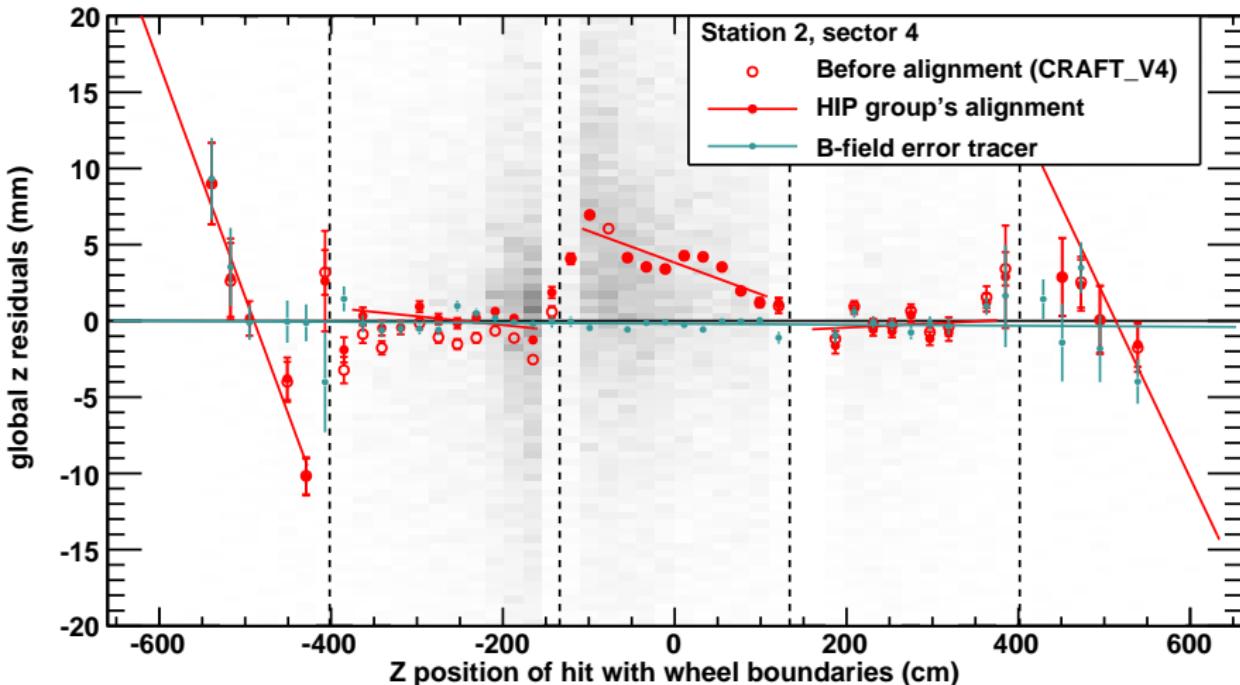
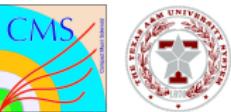
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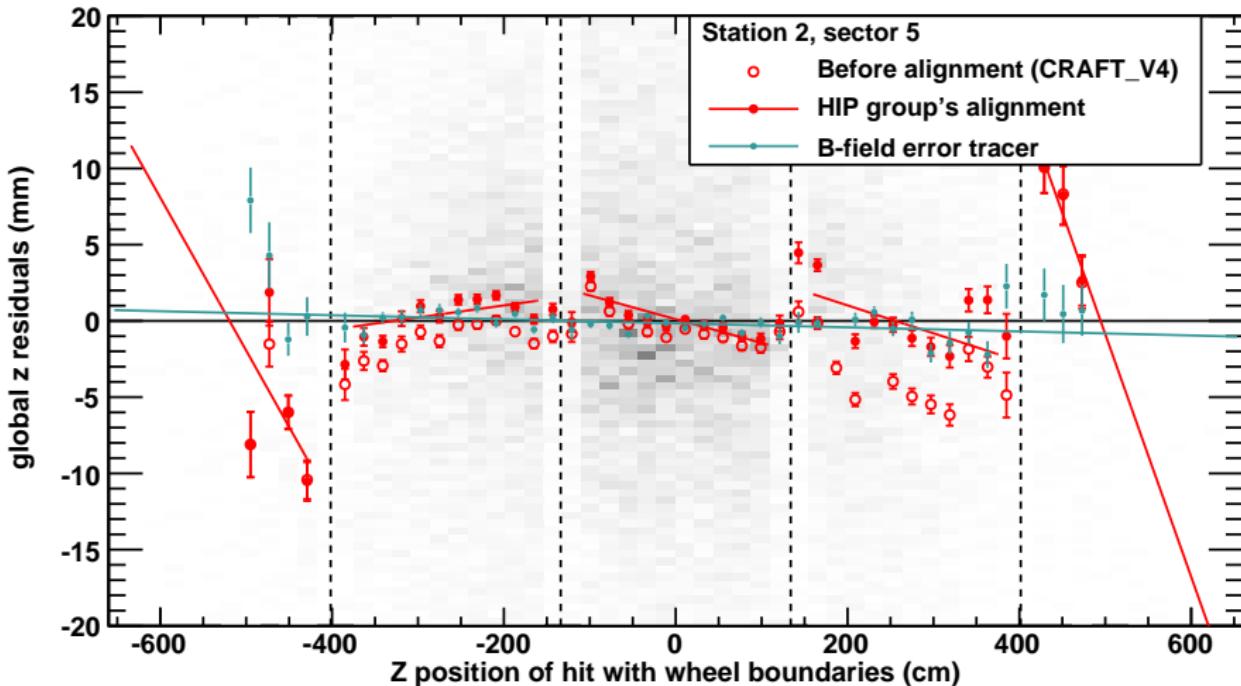
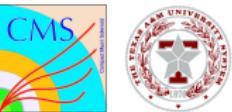
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Track-based validation plots

Jim Pivarski 106/152



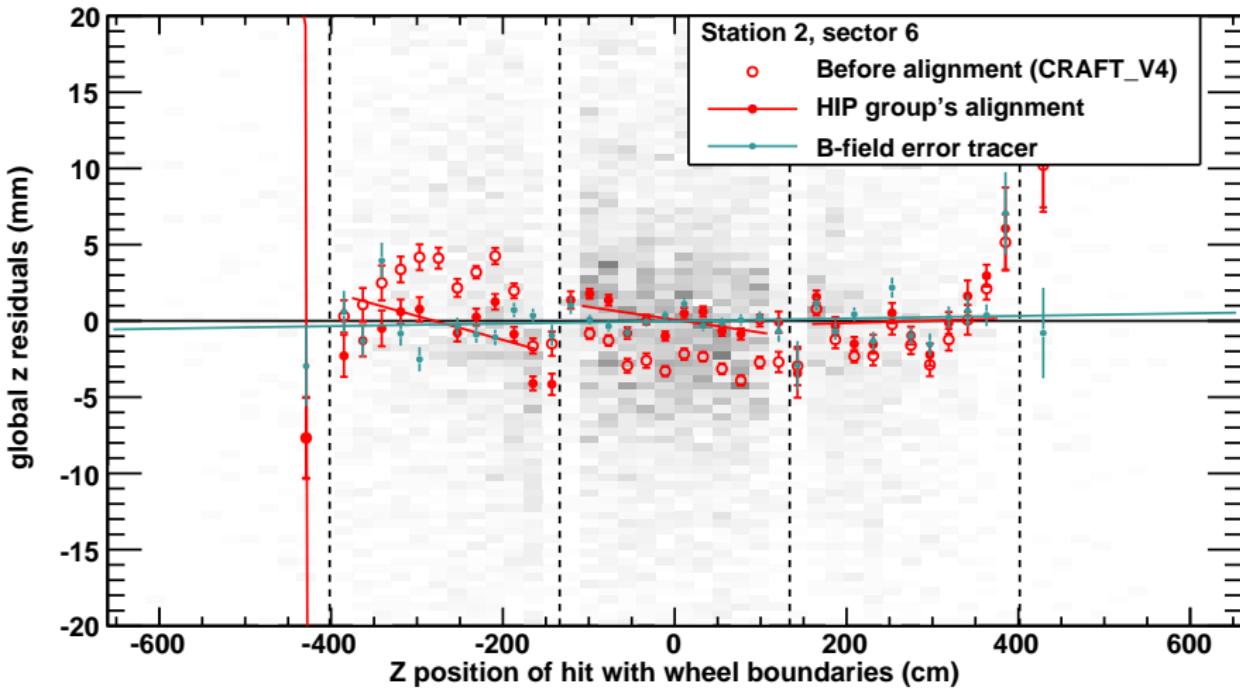
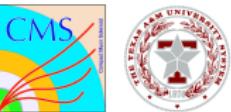
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Track-based validation plots

Jim Pivarski 107/152



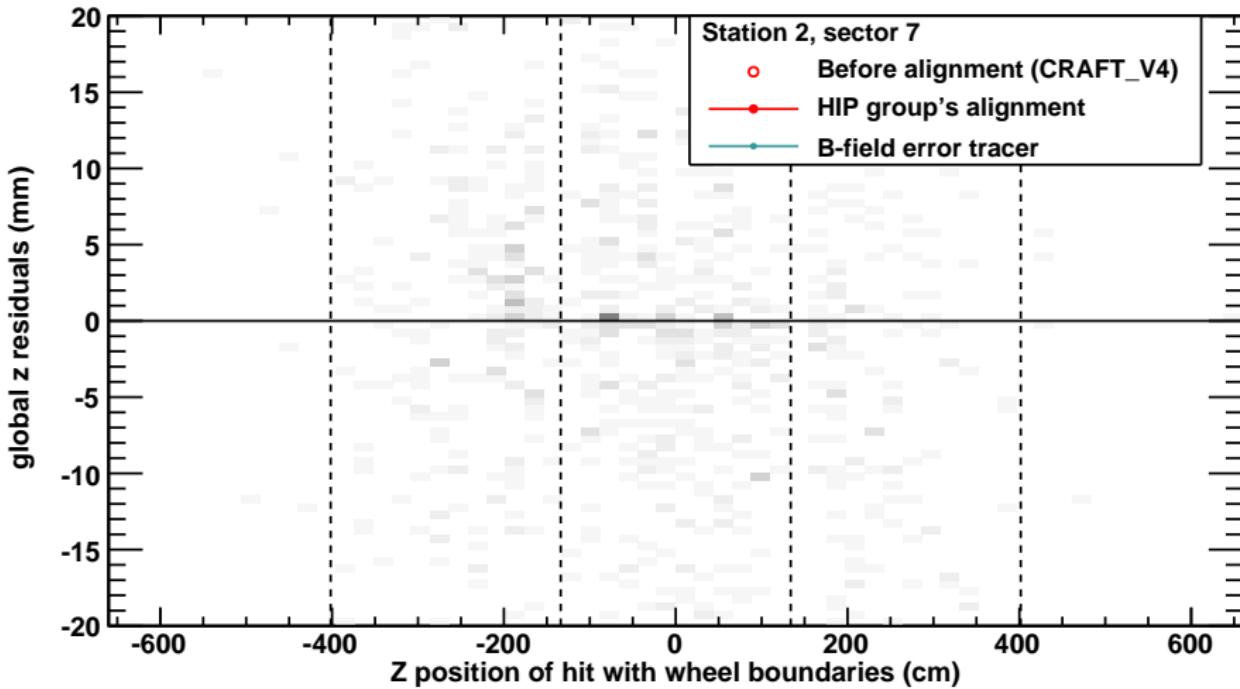
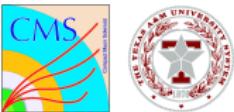
grey background is the raw 2-D residuals distribution

linear fits are only a guide for the eye: not used in alignment!

systematic errors due to \vec{B} -field mismodelling are a small fraction of the “error tracer”

Track-based validation plots

Jim Pivarski 108/152



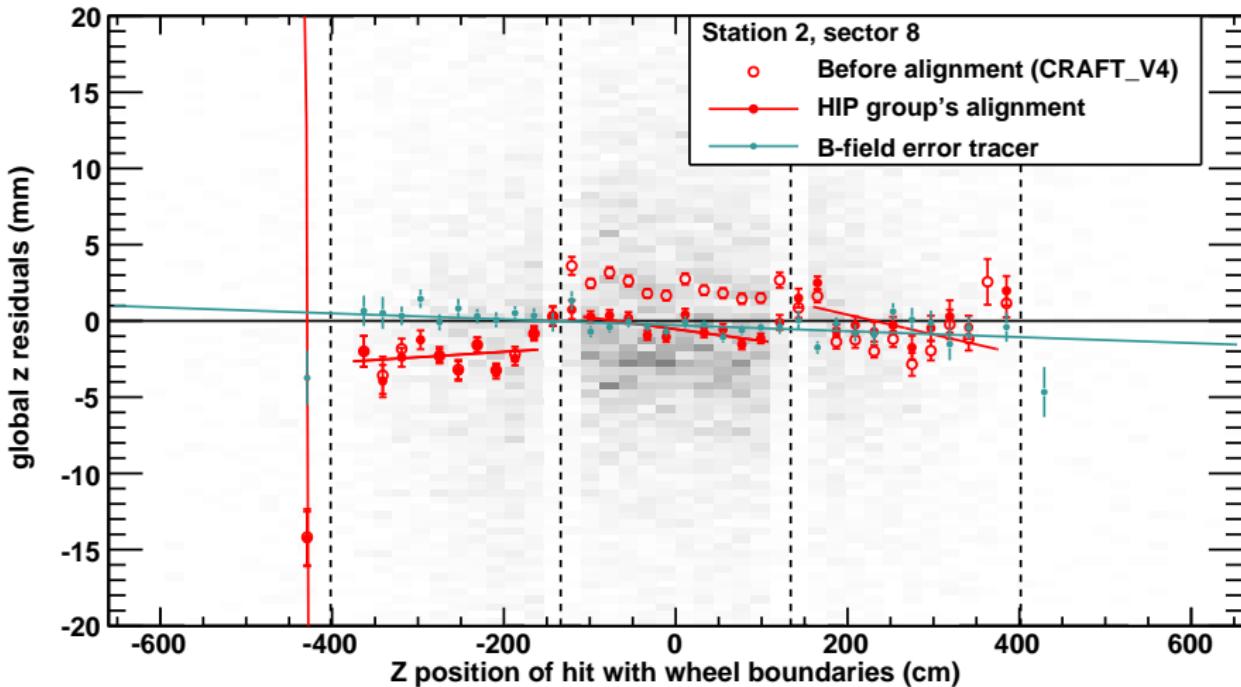
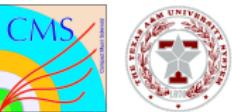
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Track-based validation plots

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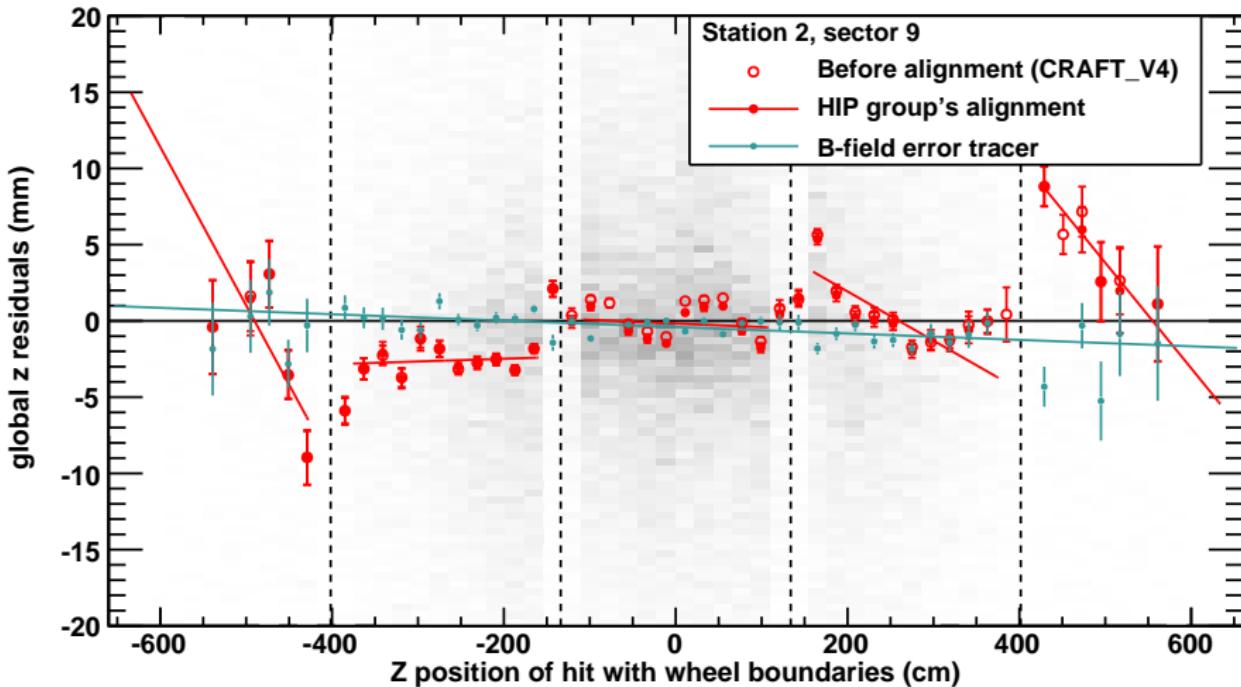
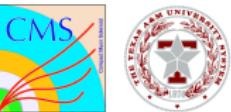
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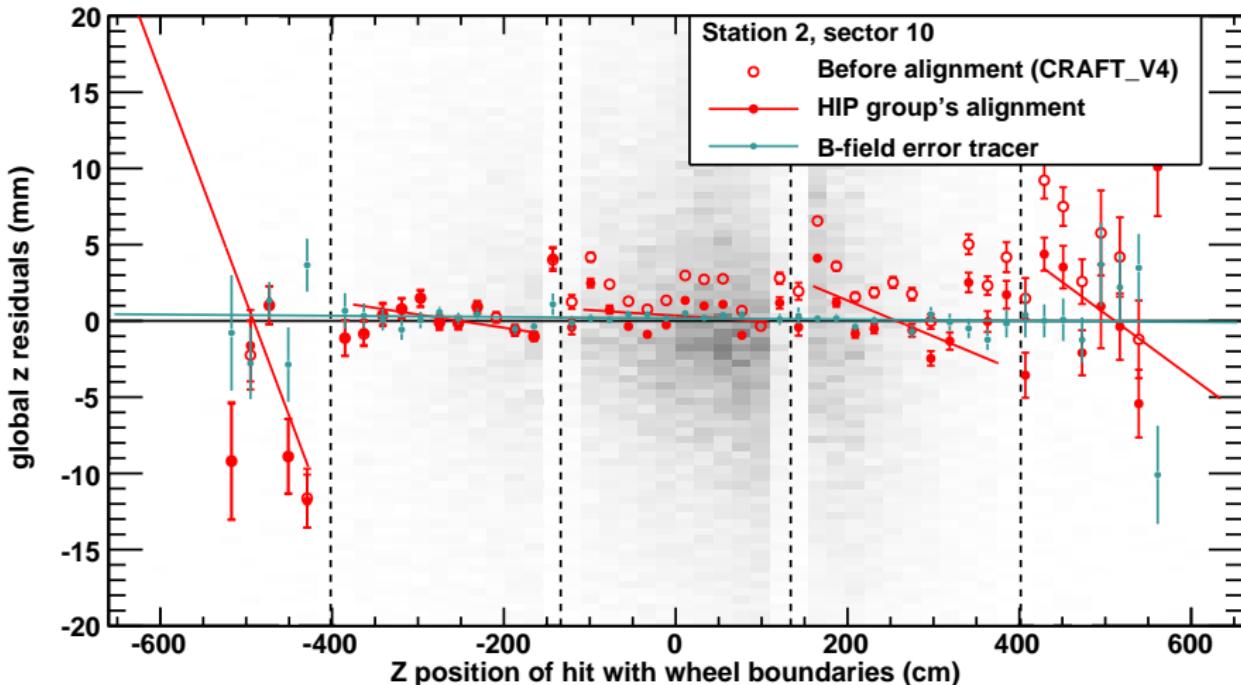
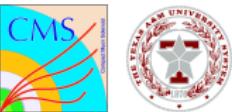
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Track-based validation plots

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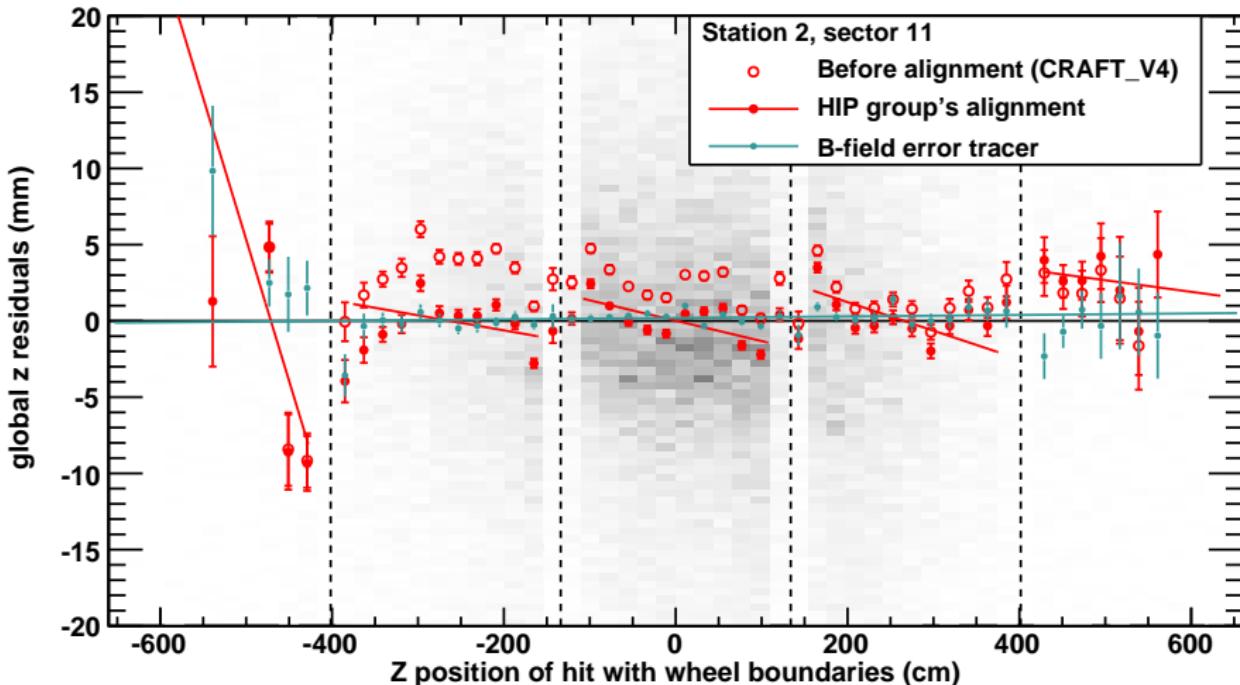
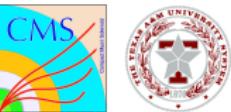
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Track-based validation plots

Jim Pivarski 112/152



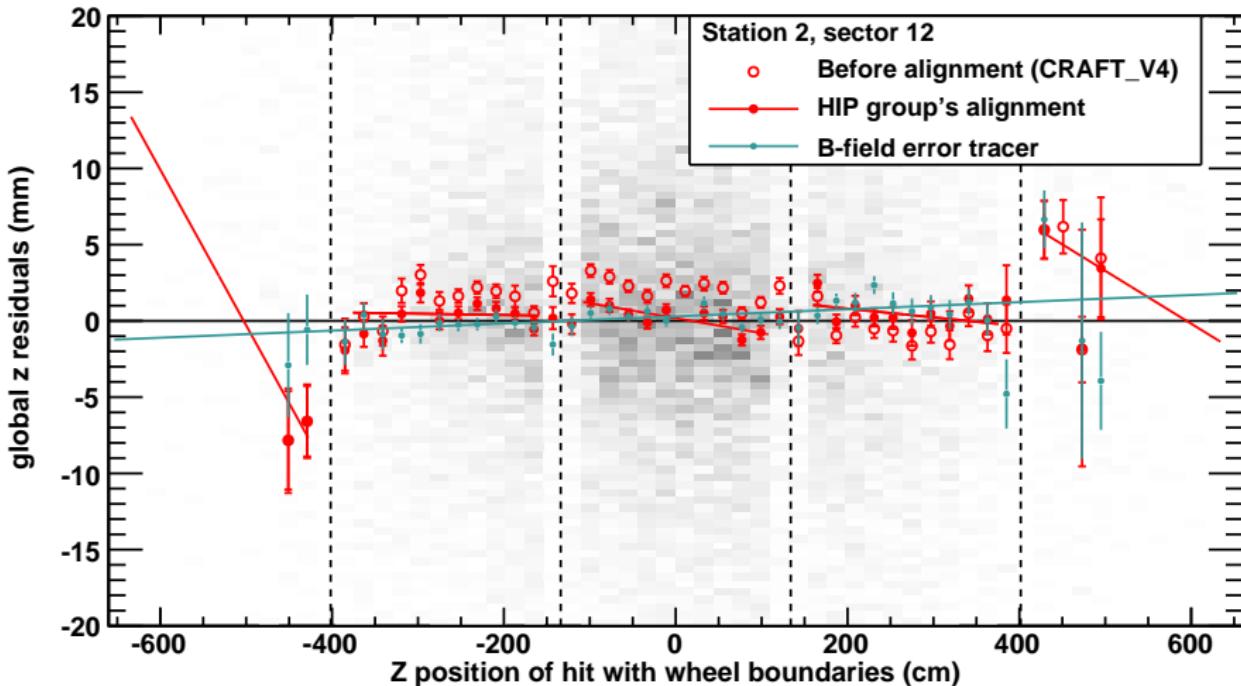
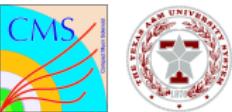
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Track-based validation plots

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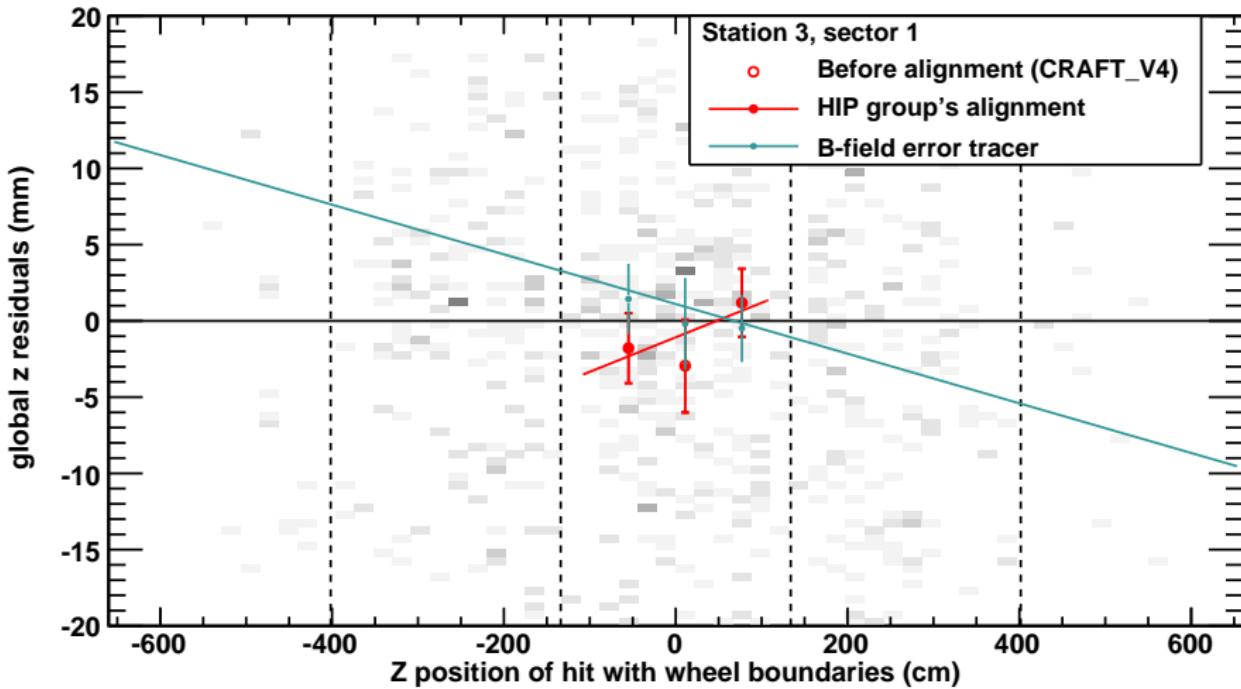
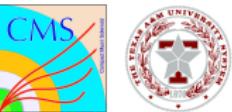
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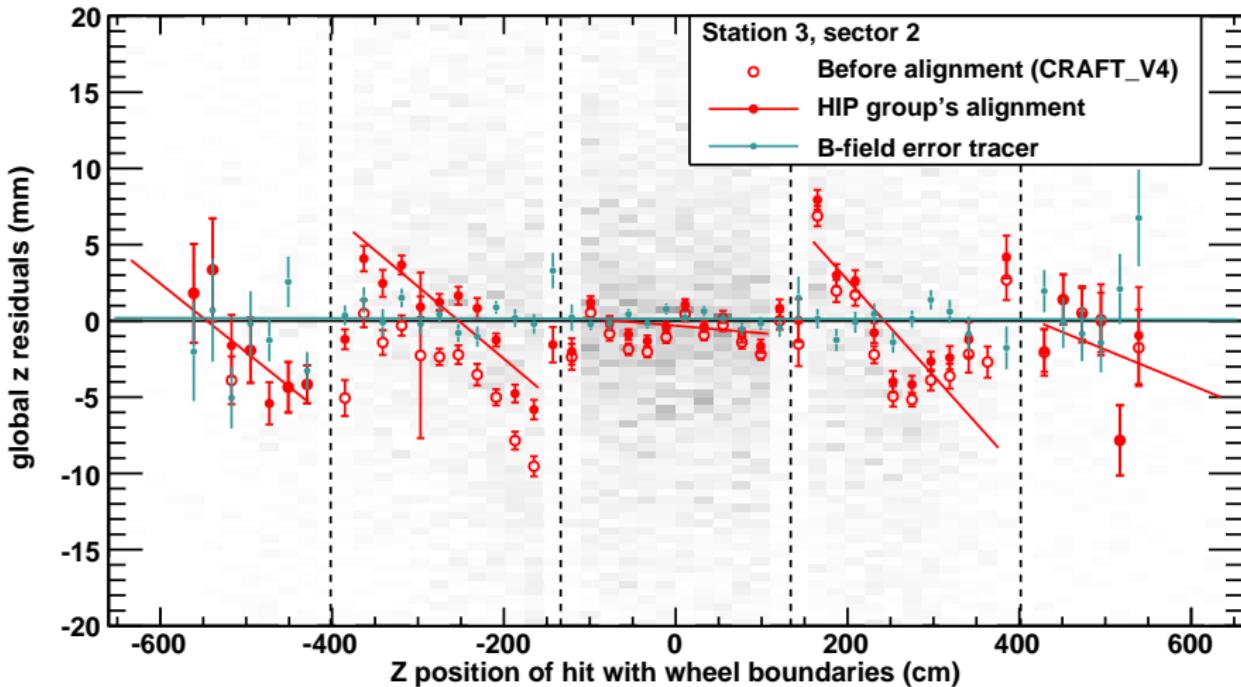
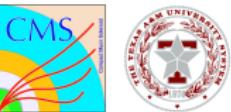
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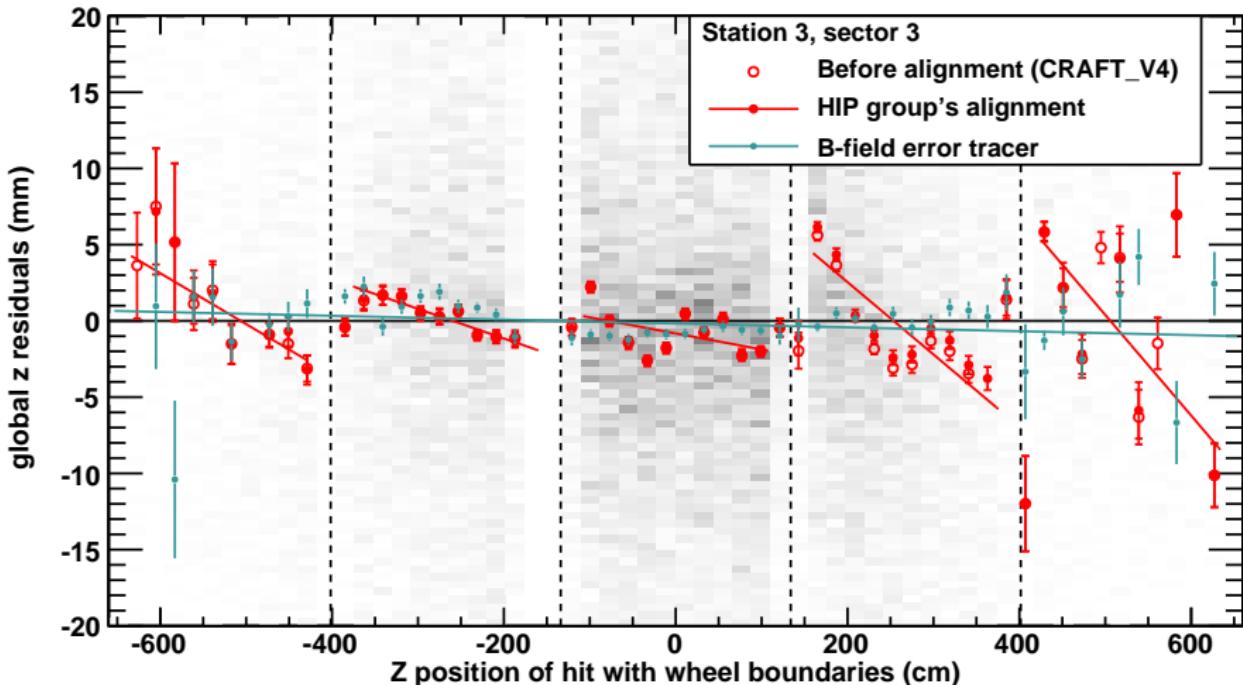
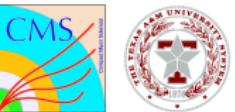
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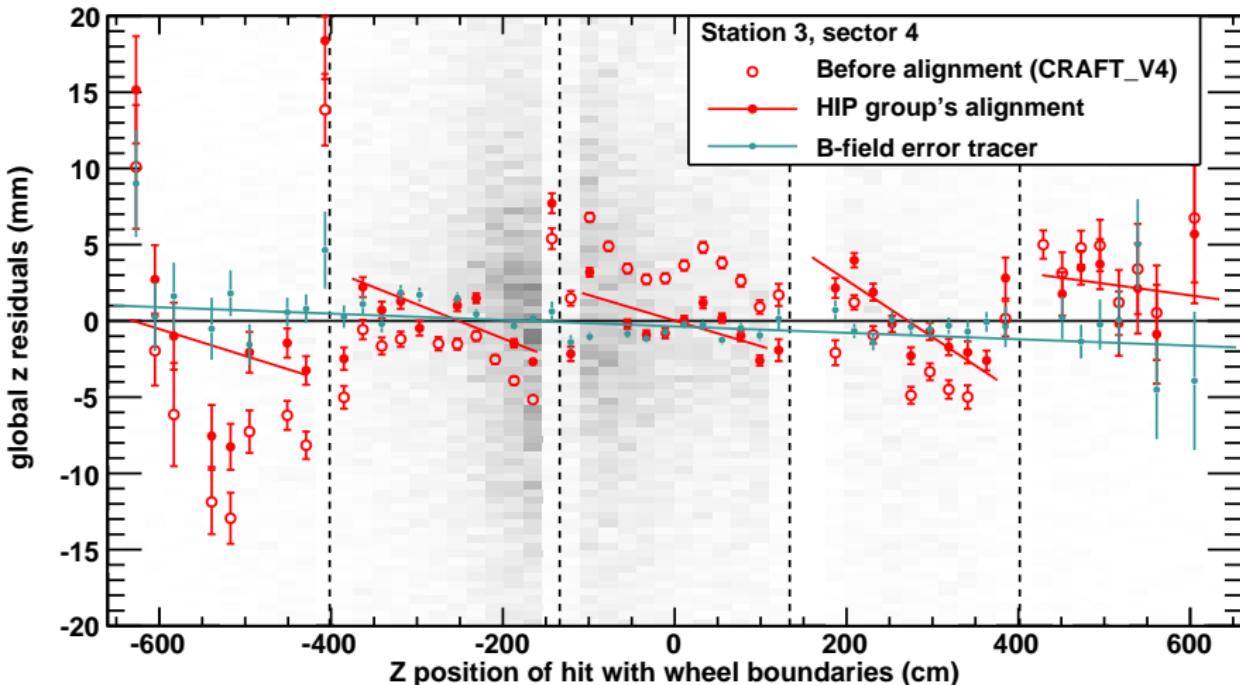
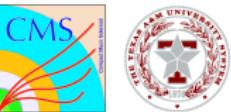
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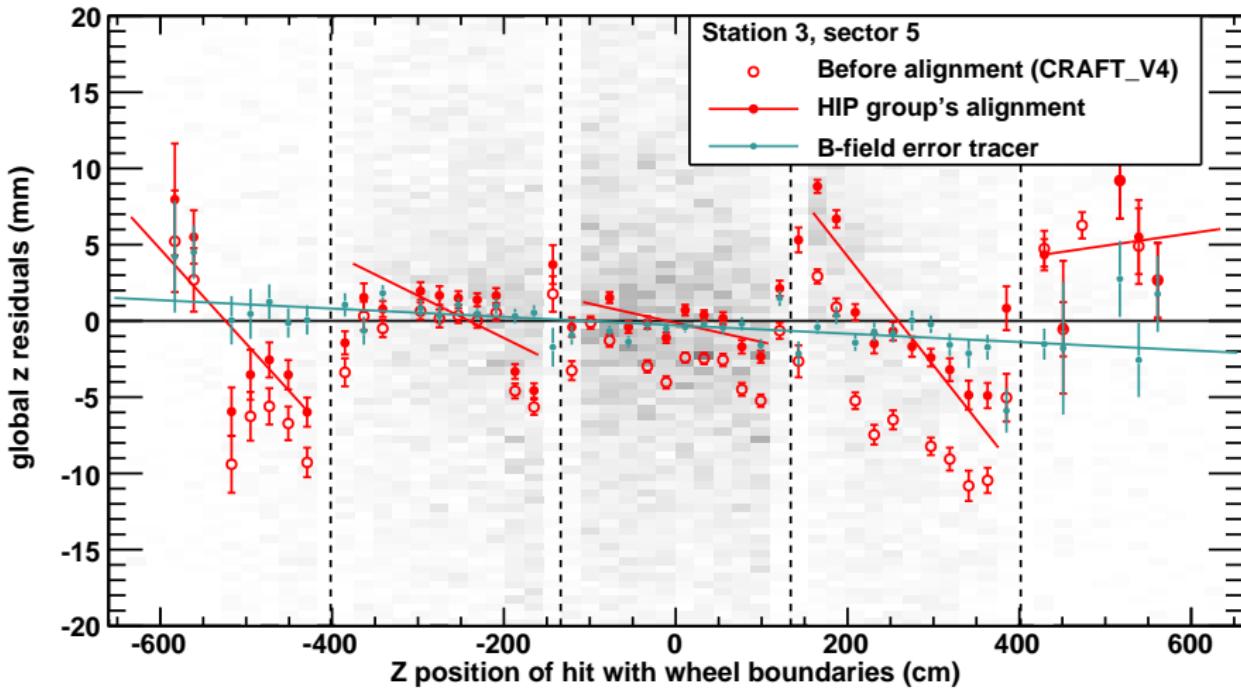
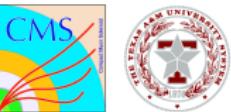
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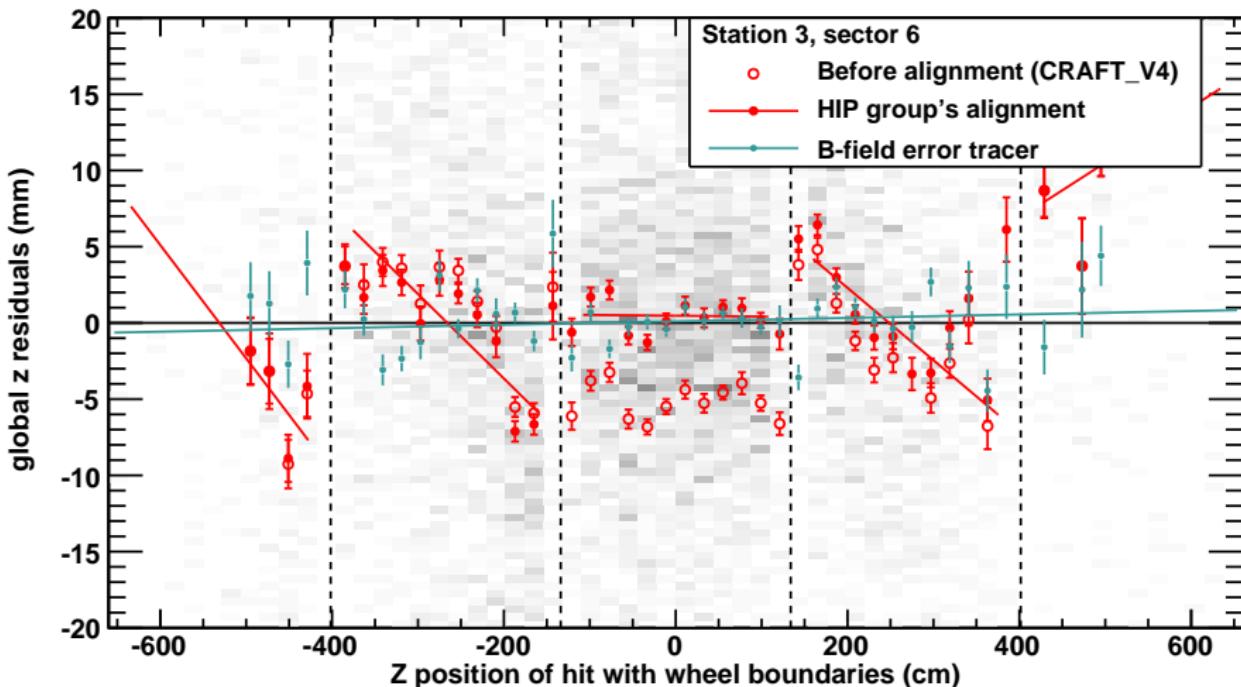
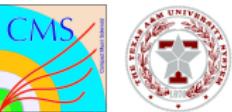
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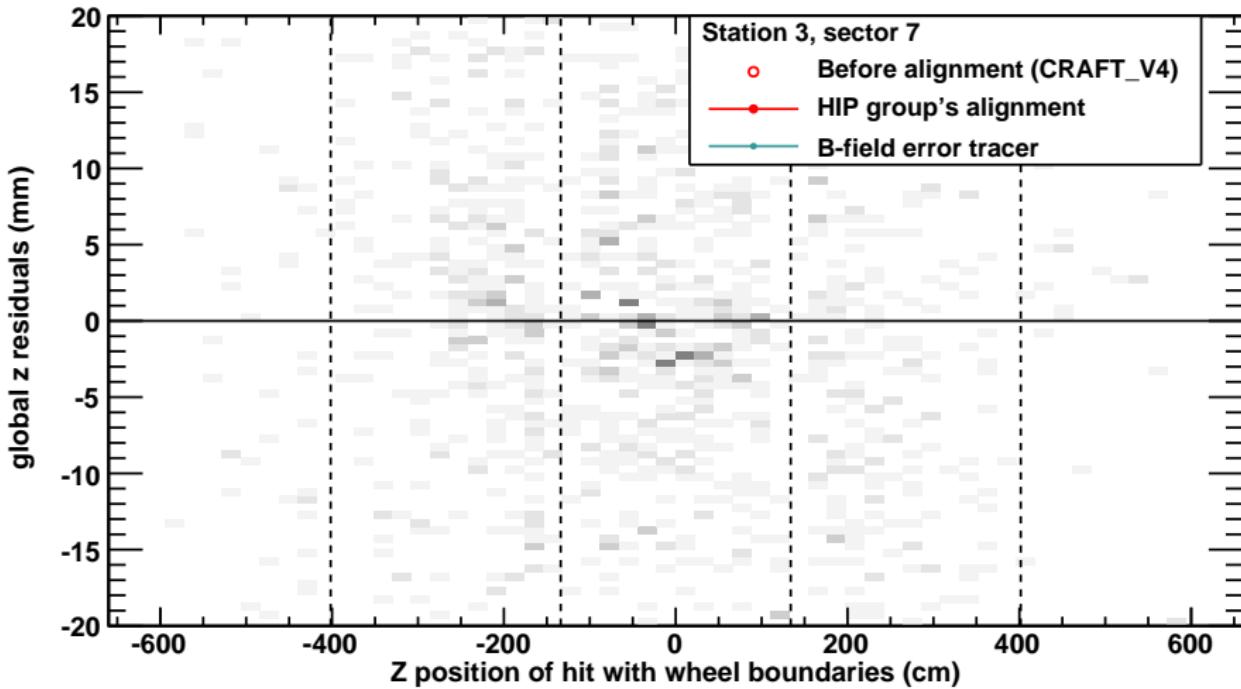
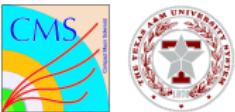
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Track-based validation plots

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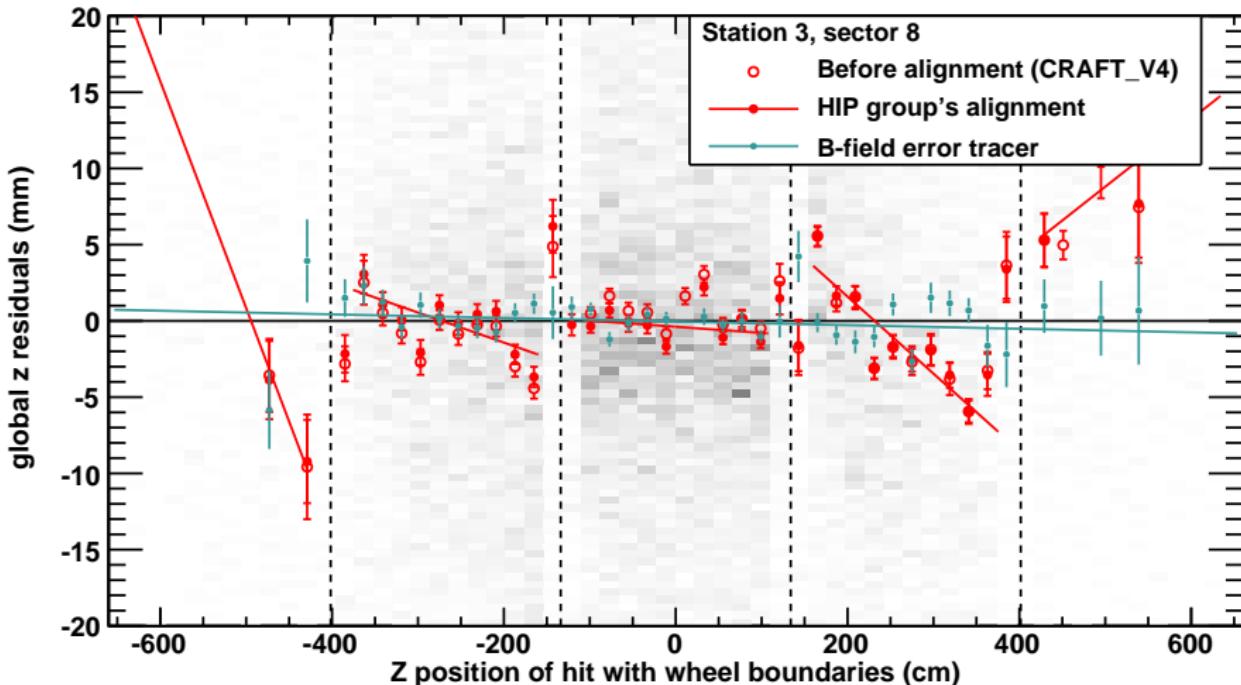
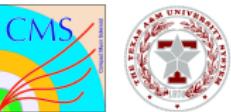
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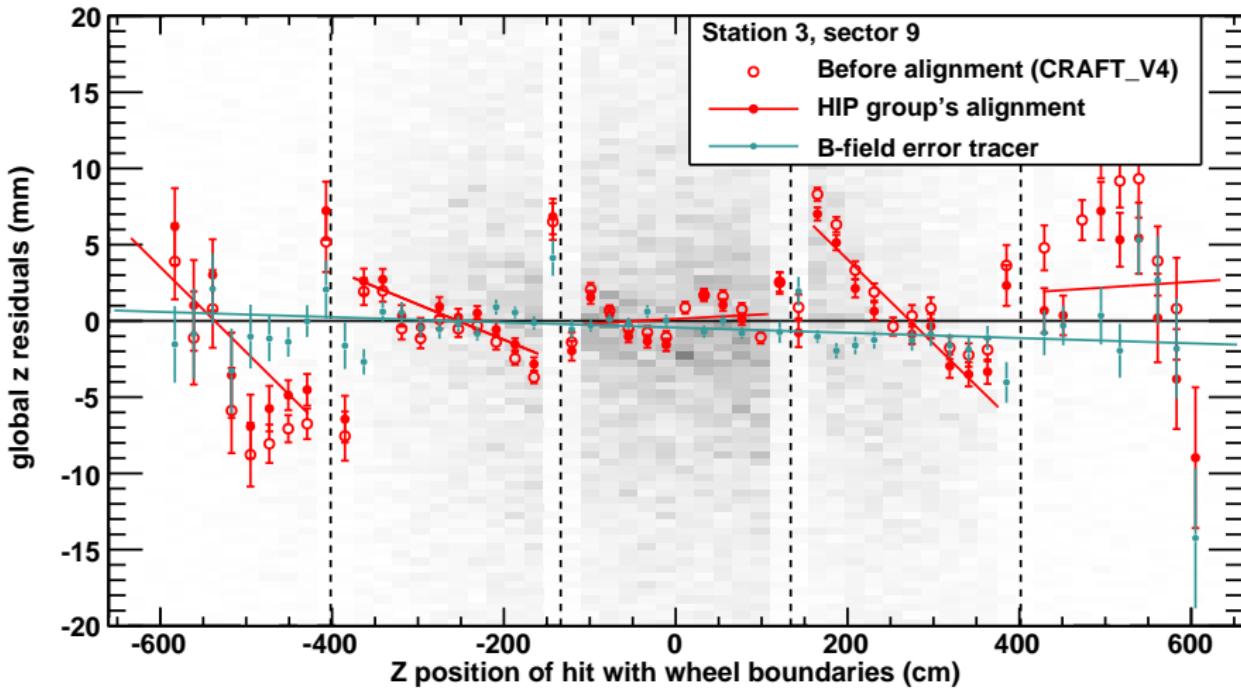
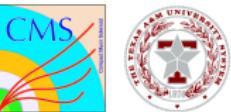
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Track-based validation plots

Jim Pivarski 122/152



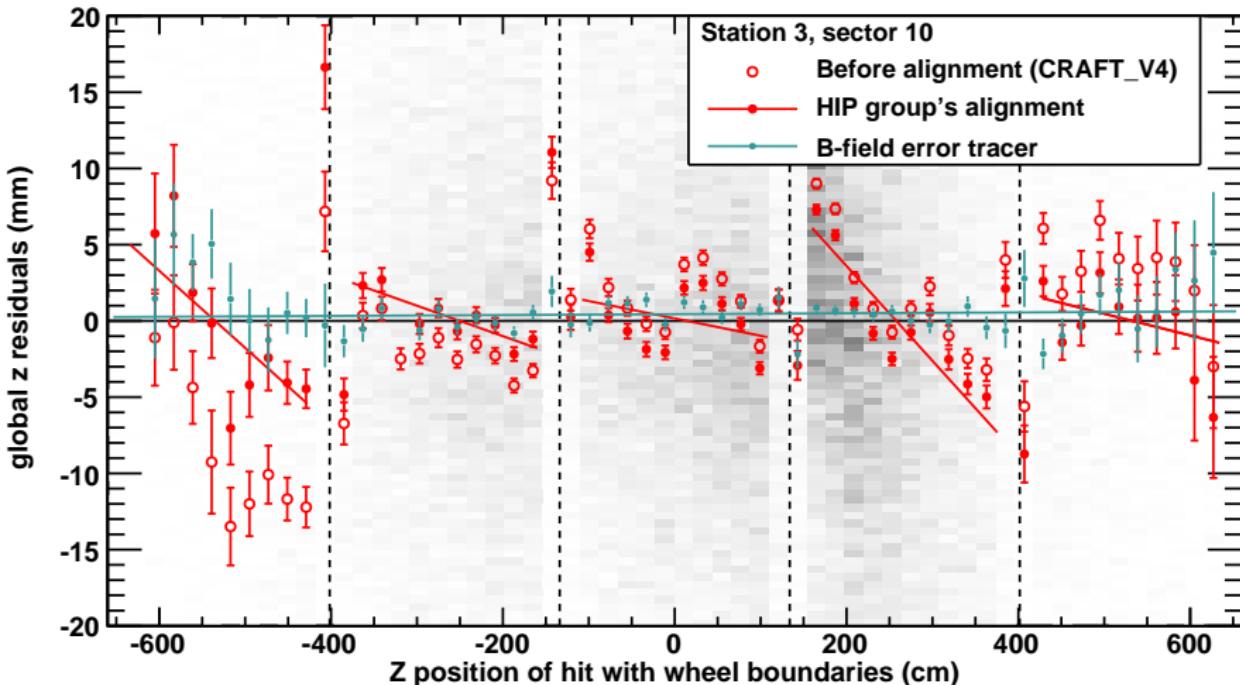
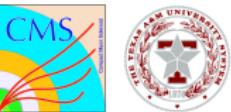
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Jim Pivarski 123/152



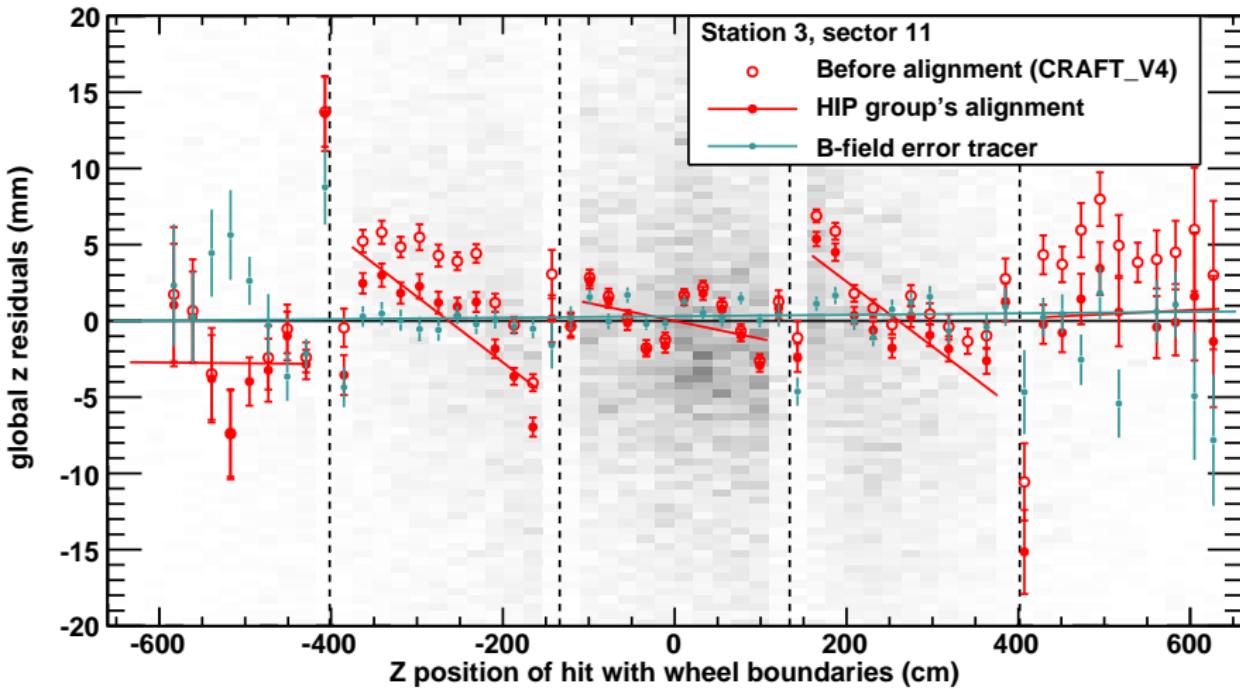
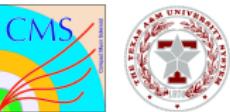
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Track-based validation plots

Jim Pivarski 124/152



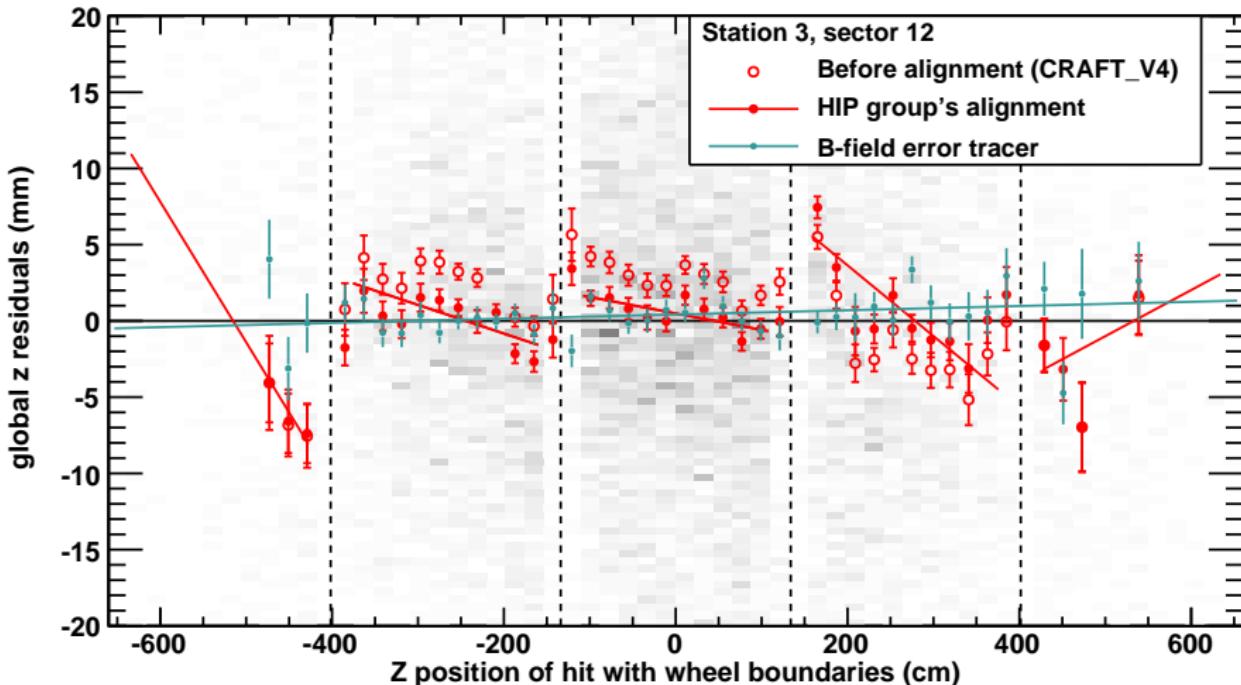
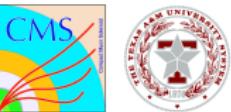
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Track-based validation plots

Jim Pivarski 125/152



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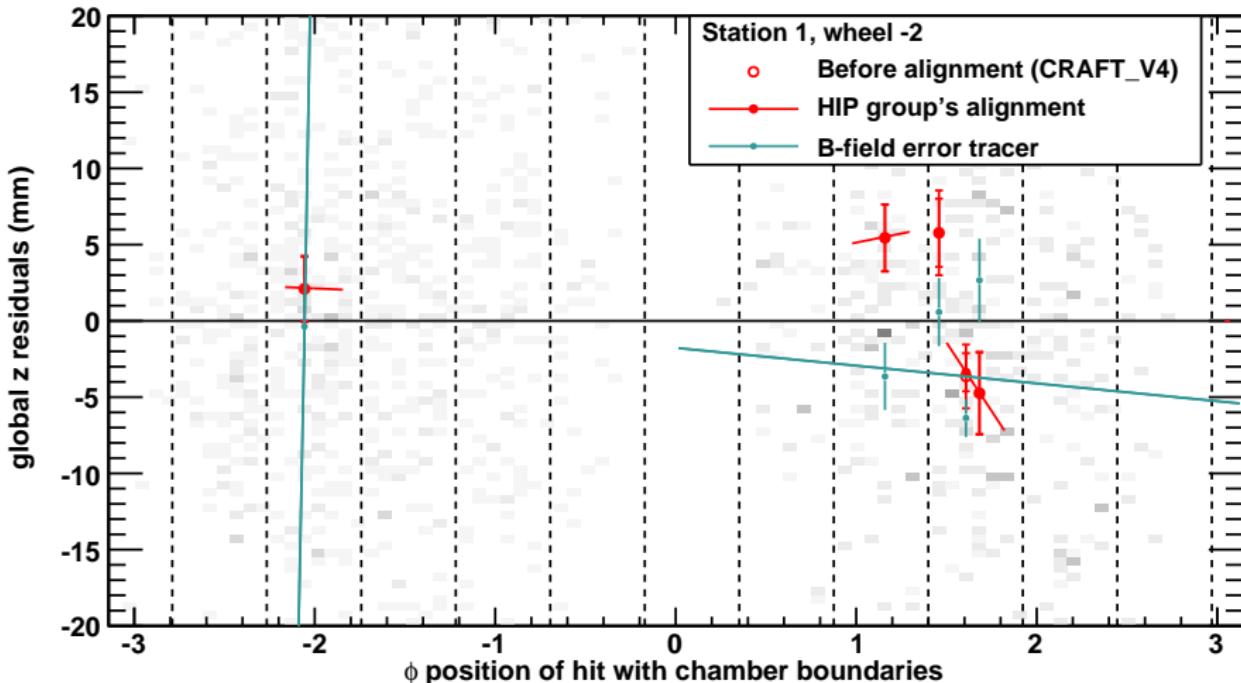
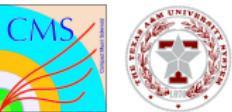
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z residuals versus ϕ

Track-based validation plots

Jim Pivarski 127/152



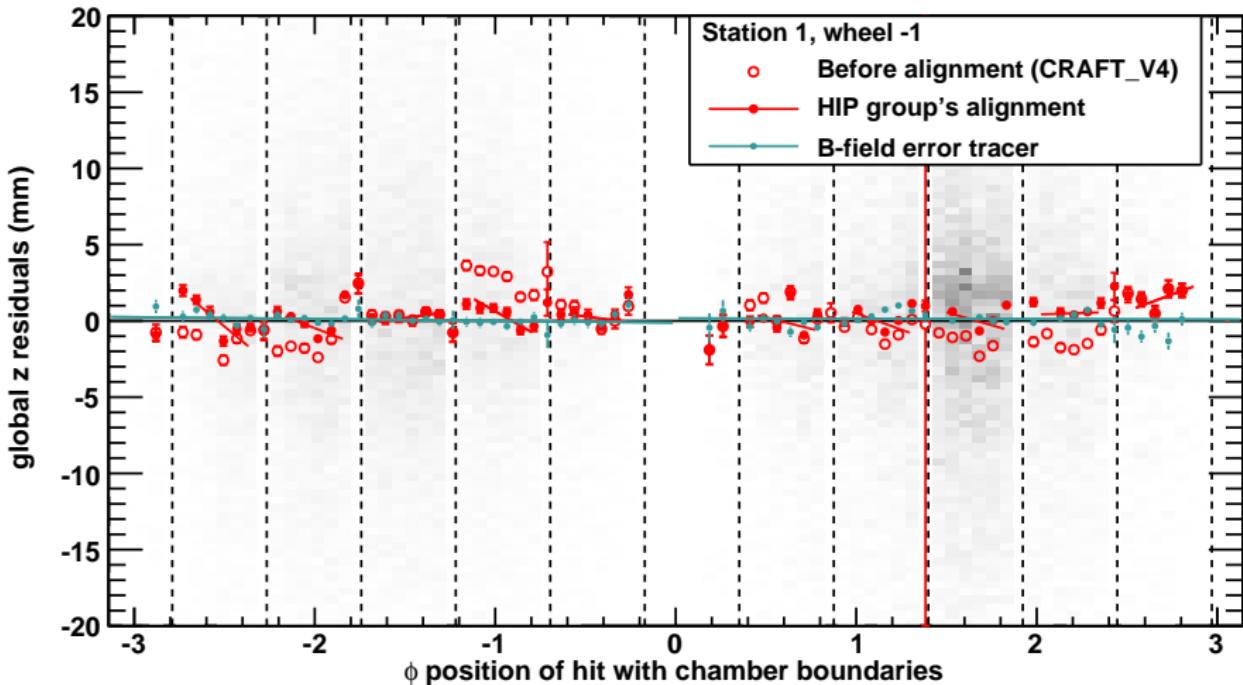
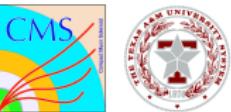
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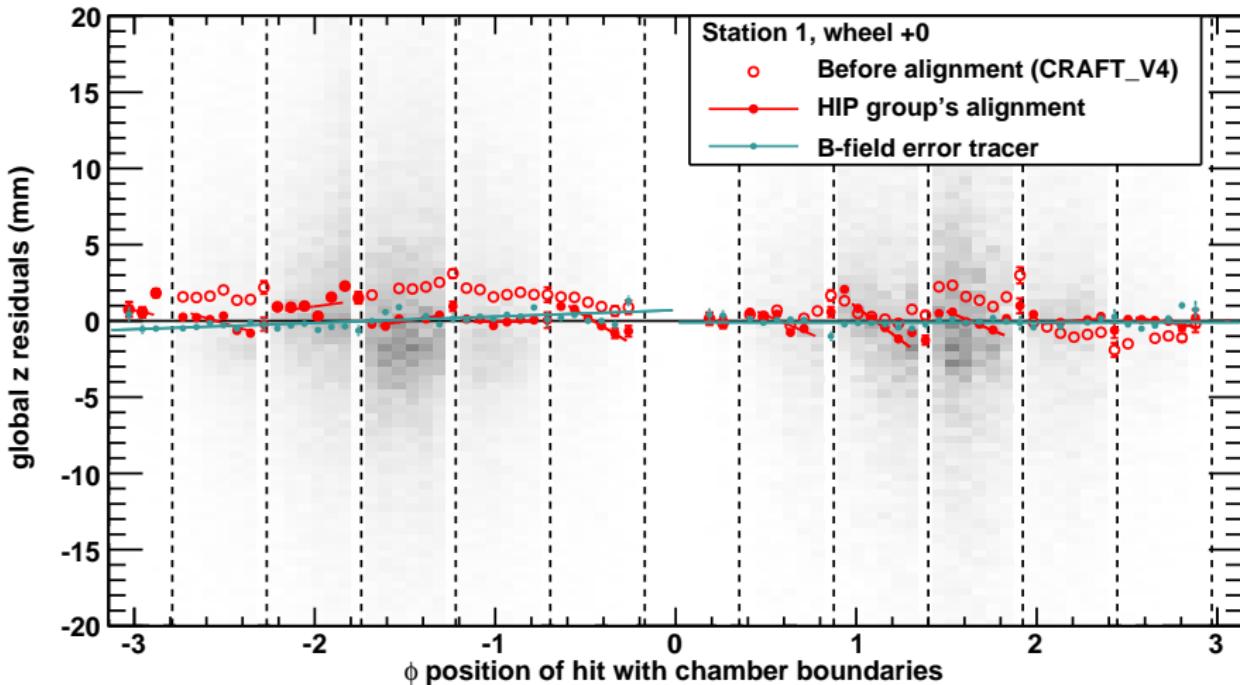
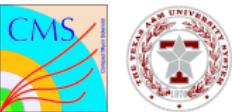
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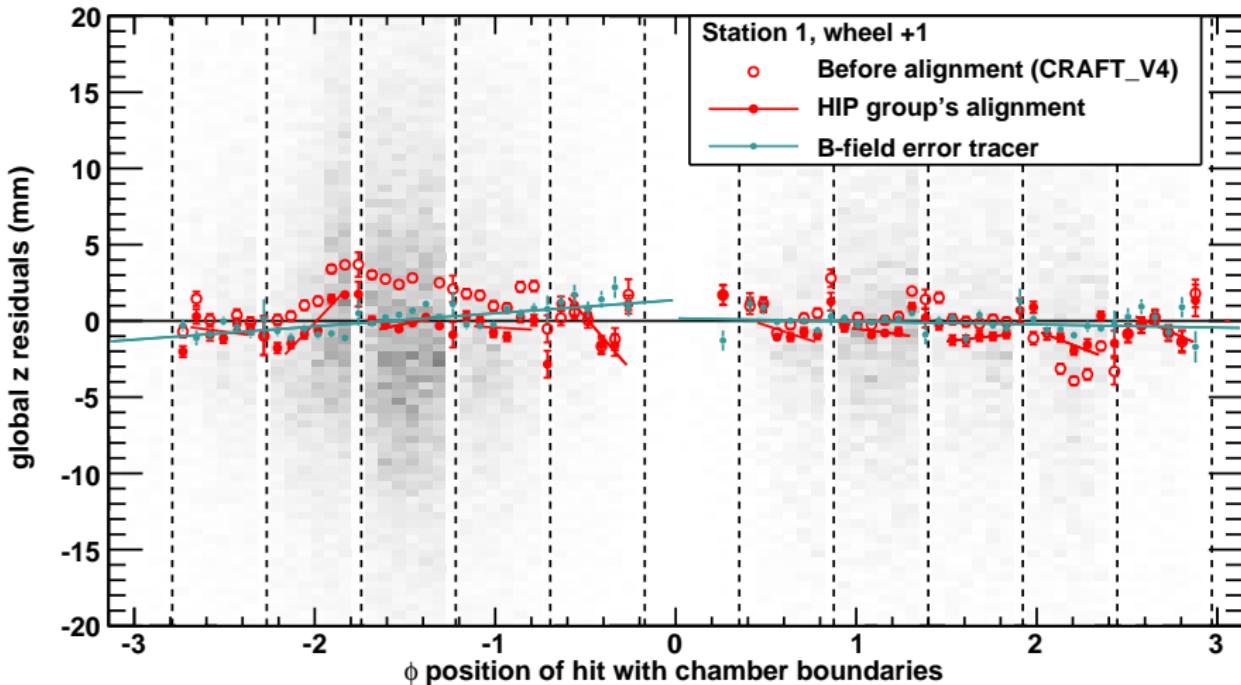
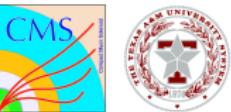
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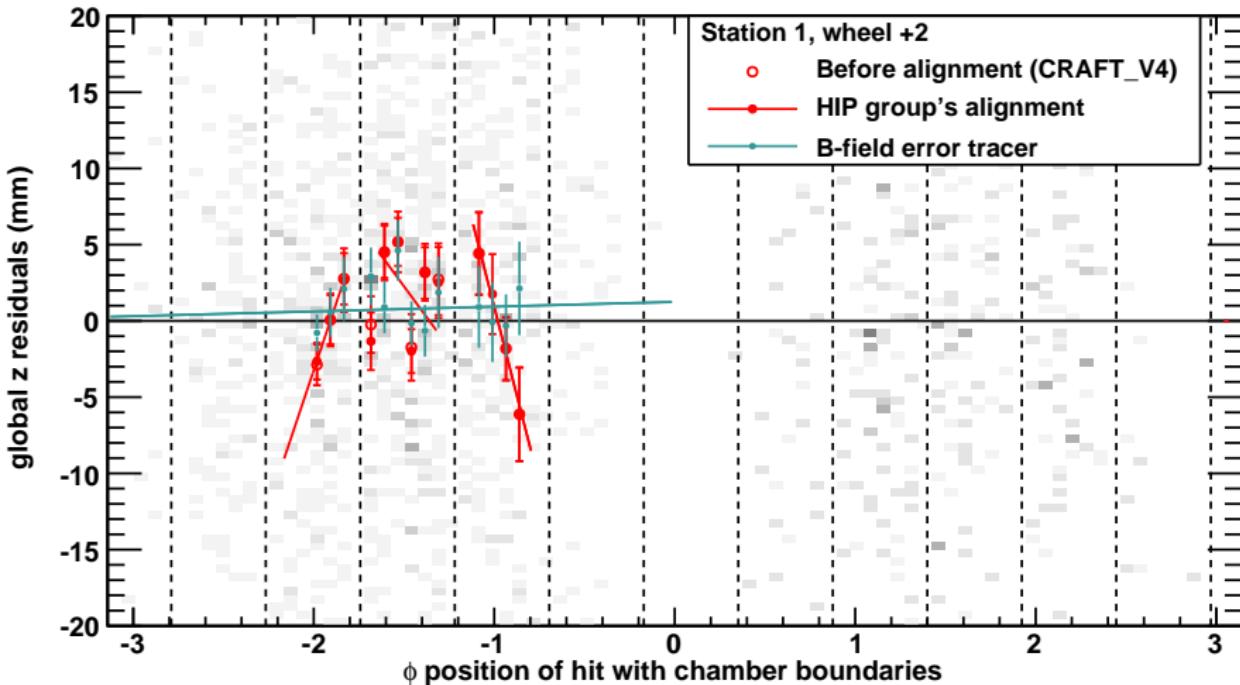
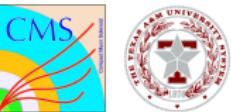
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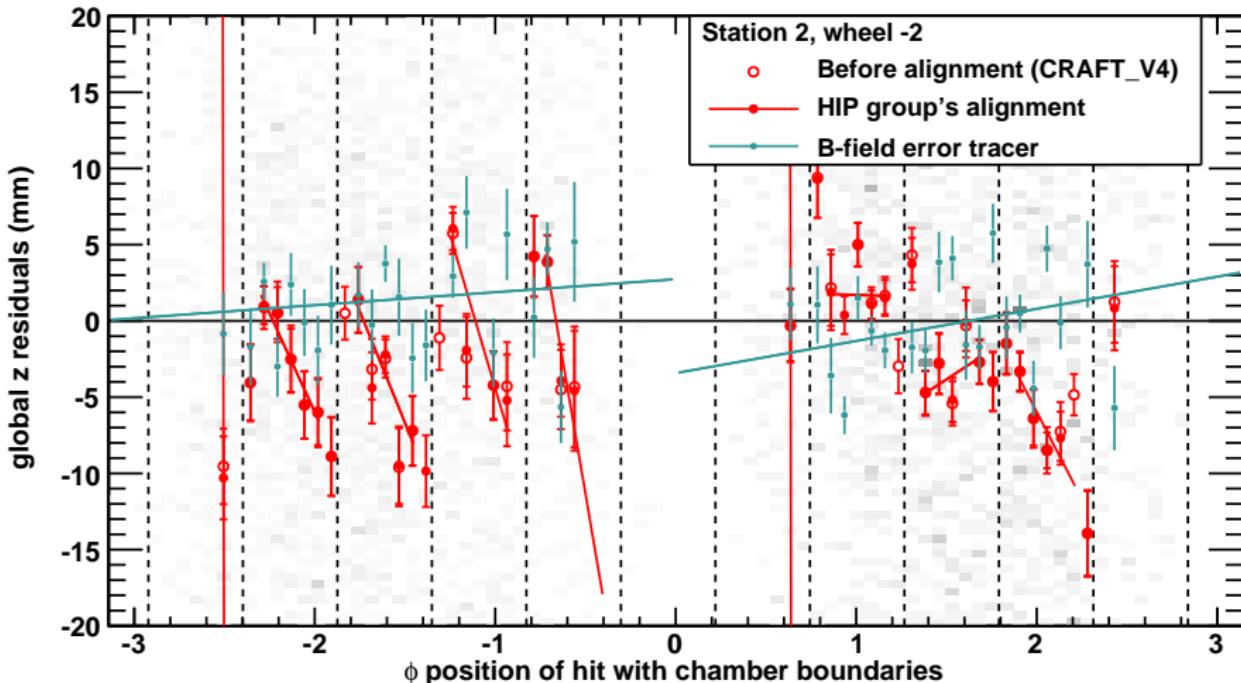
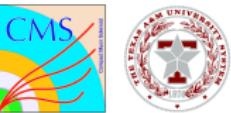
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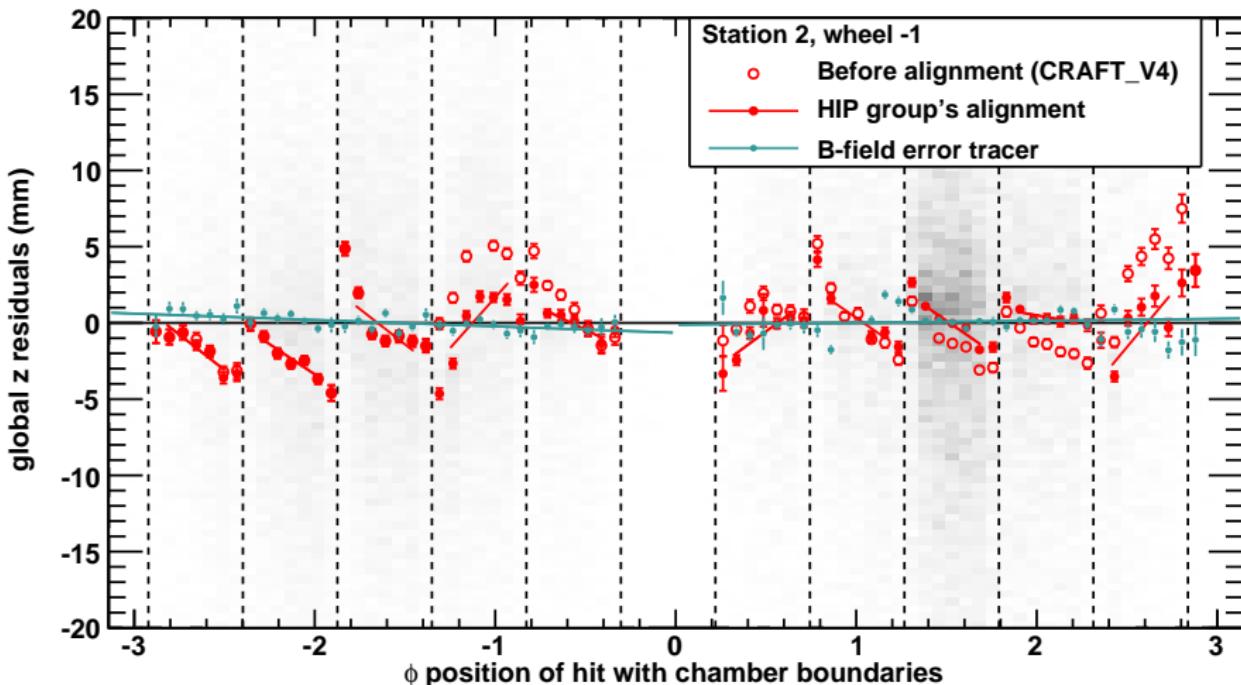
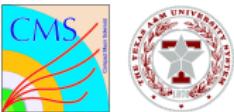
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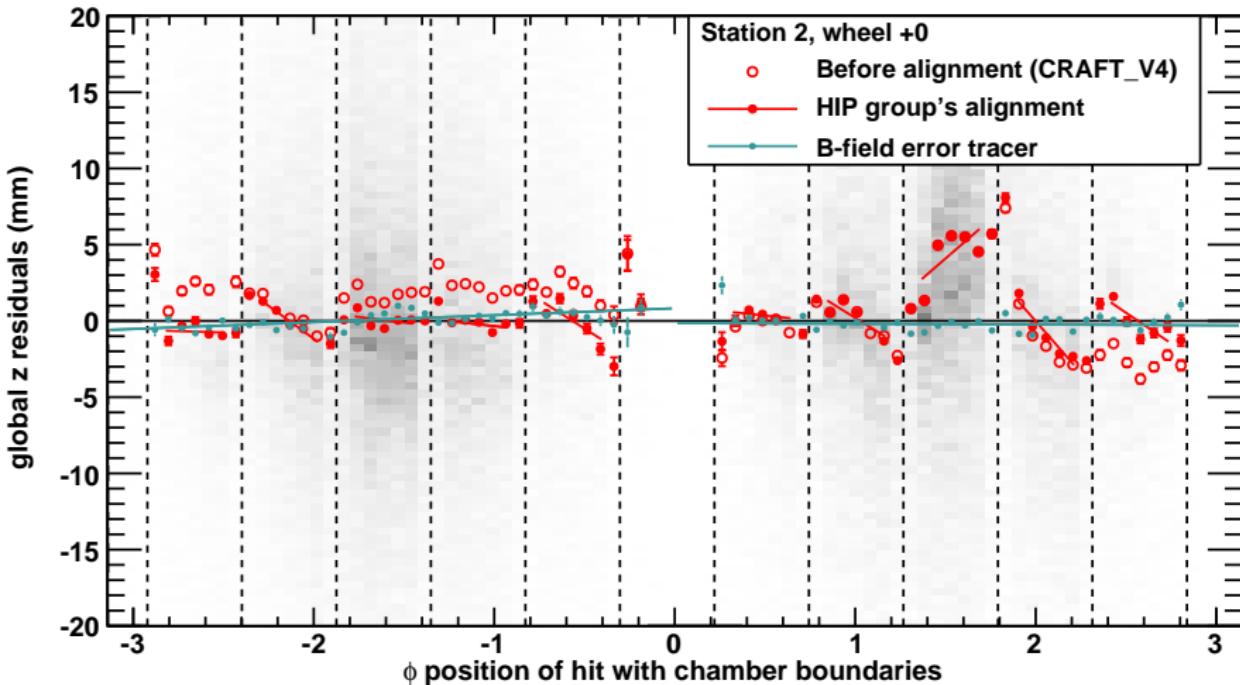
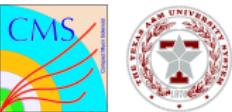
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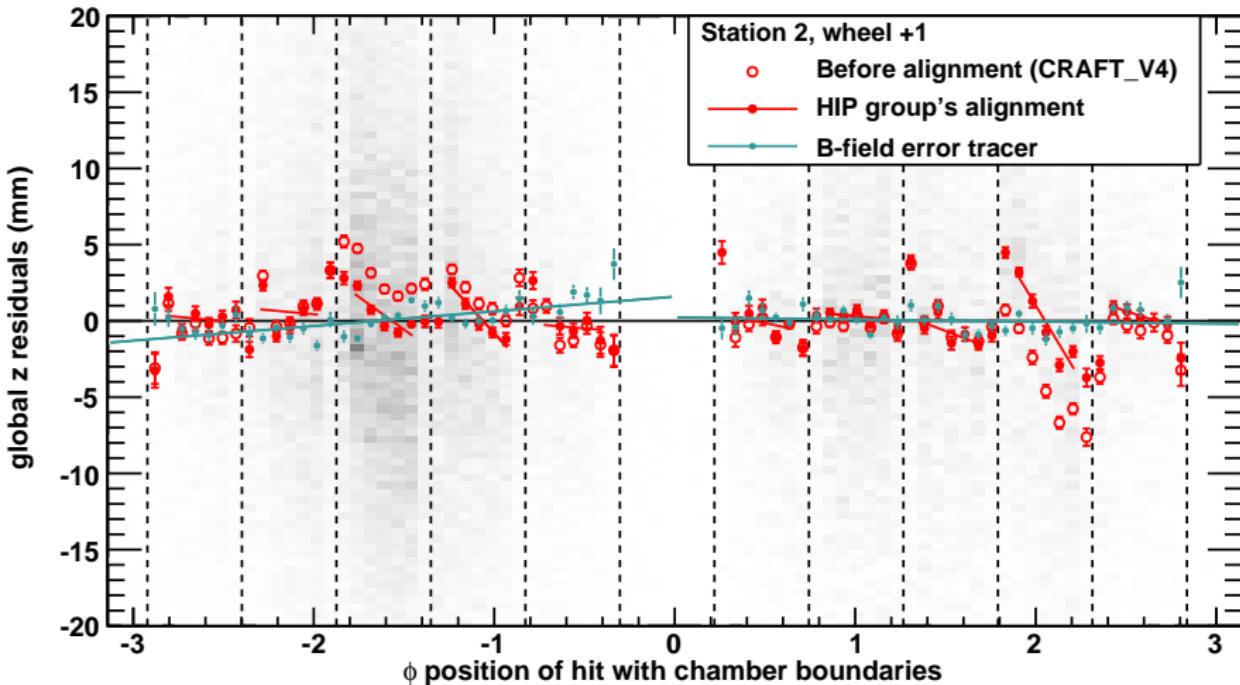
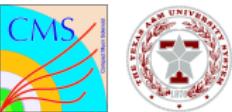
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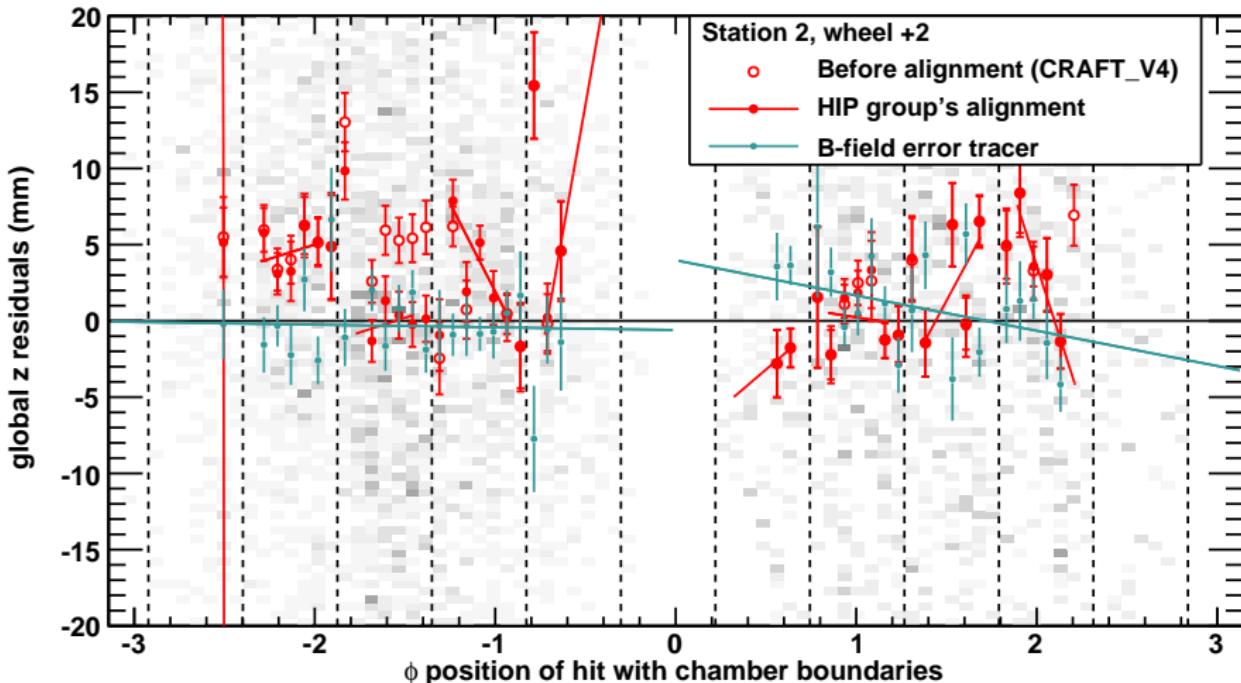
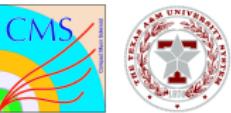
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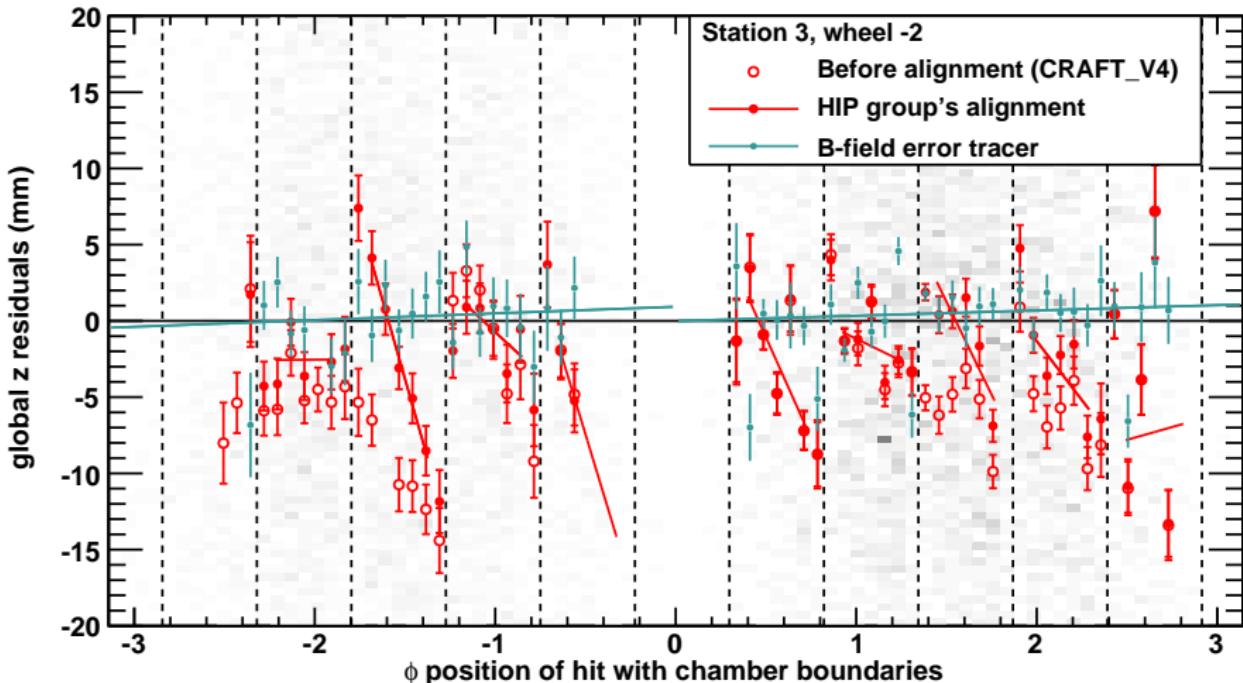
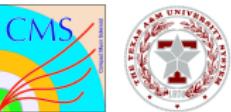
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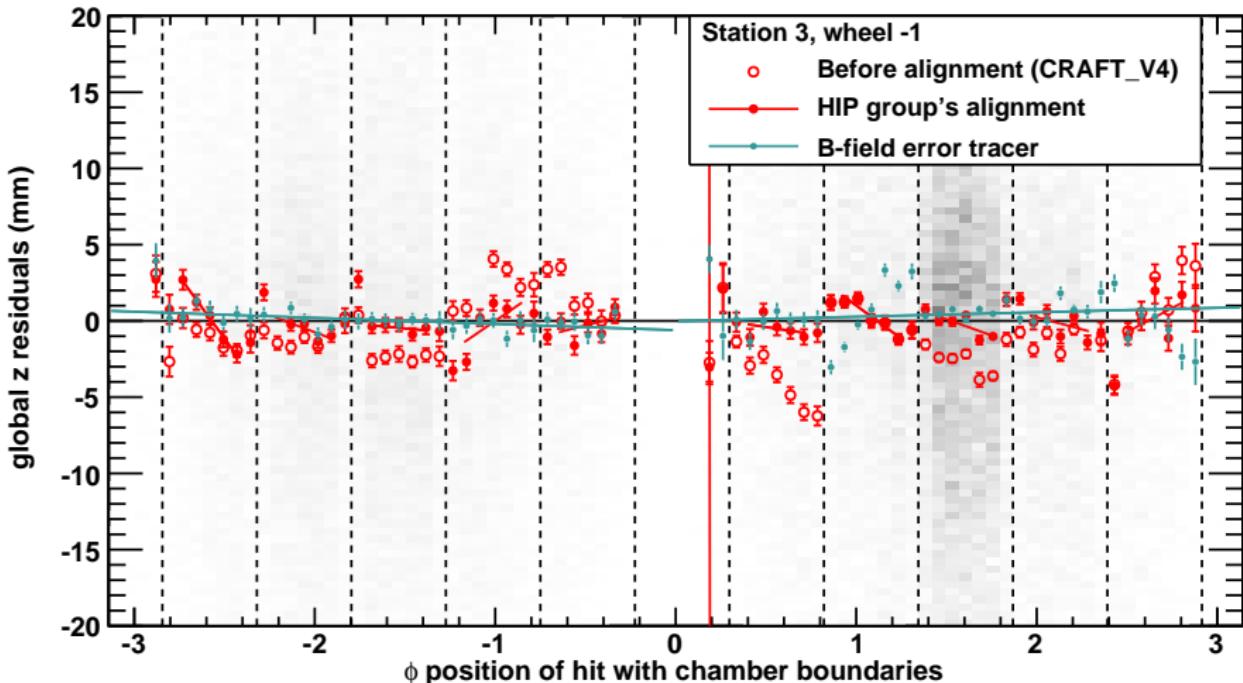
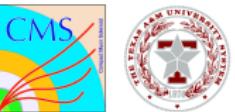
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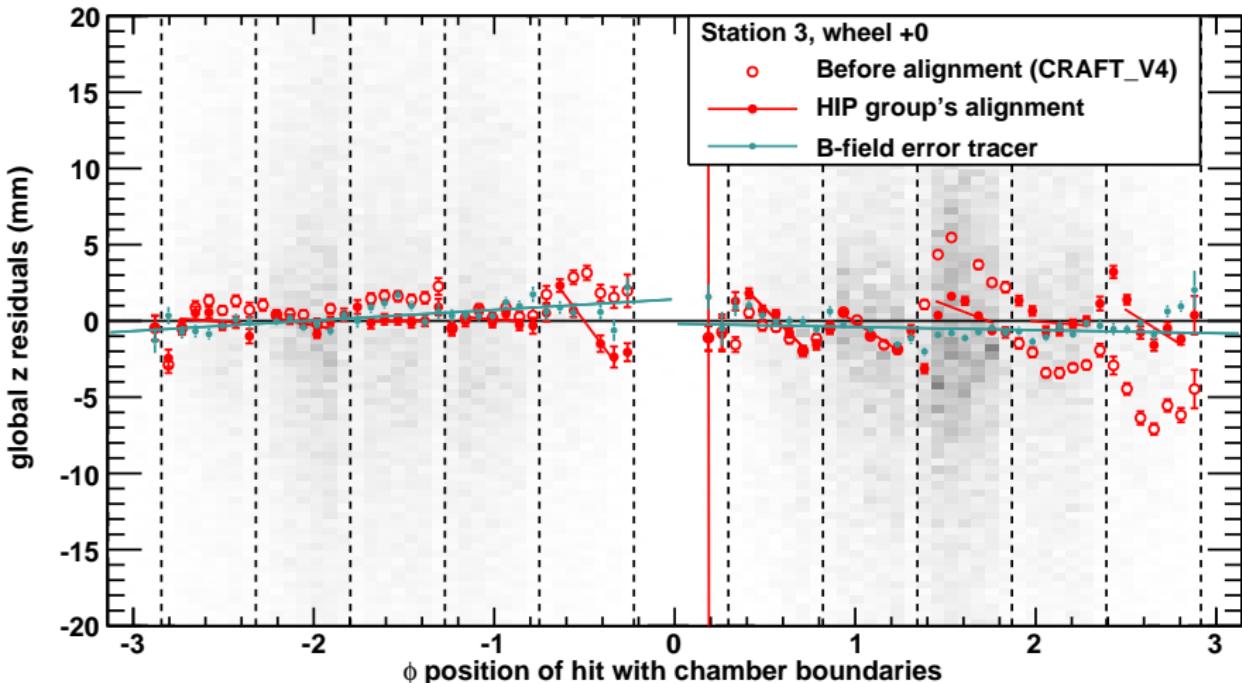
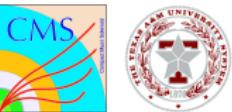
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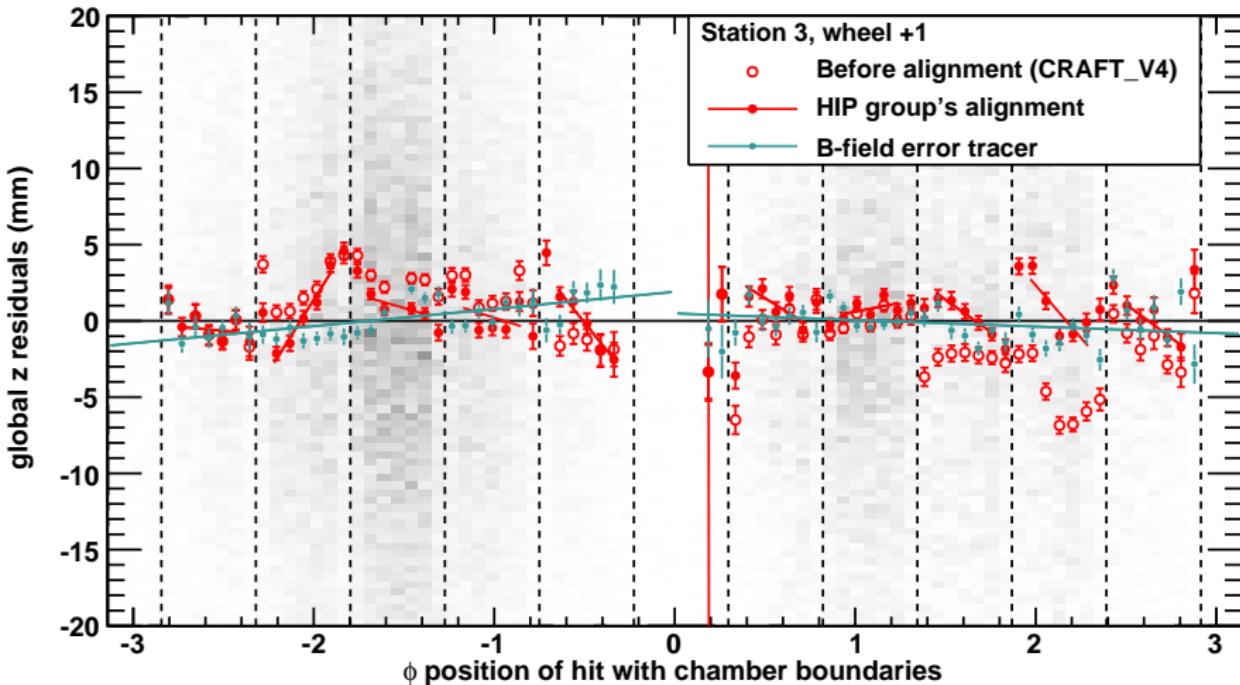
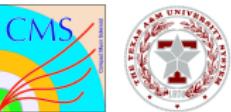
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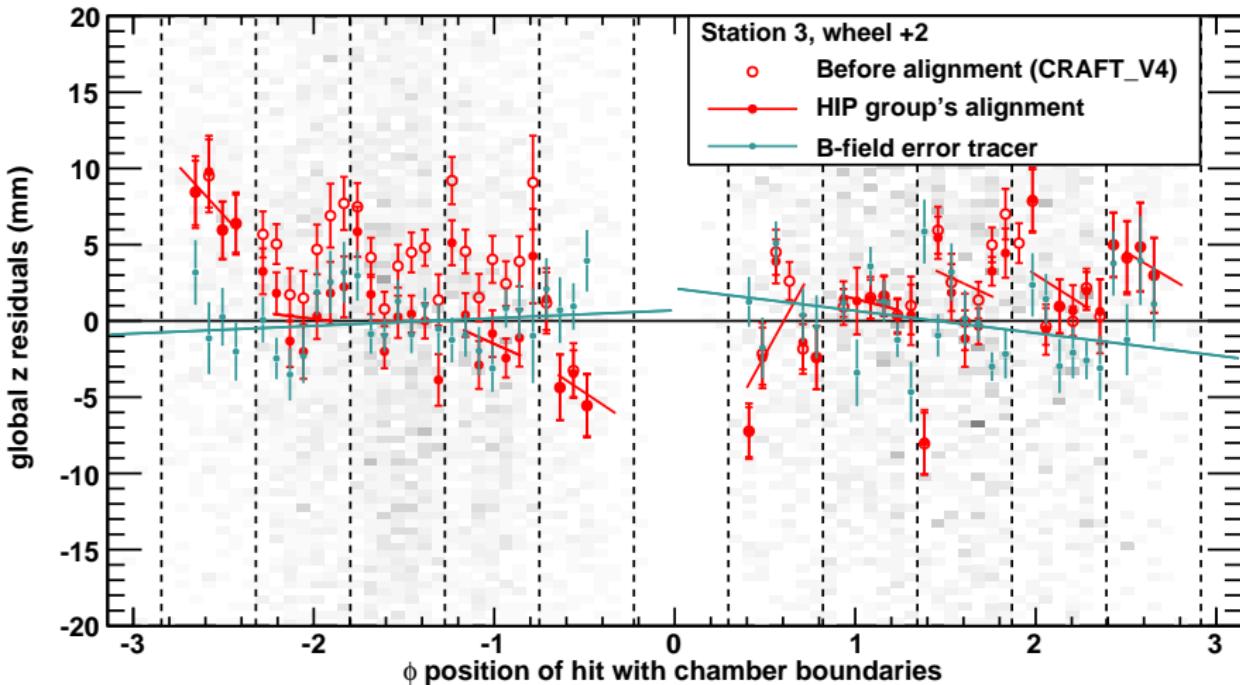
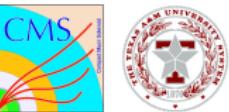
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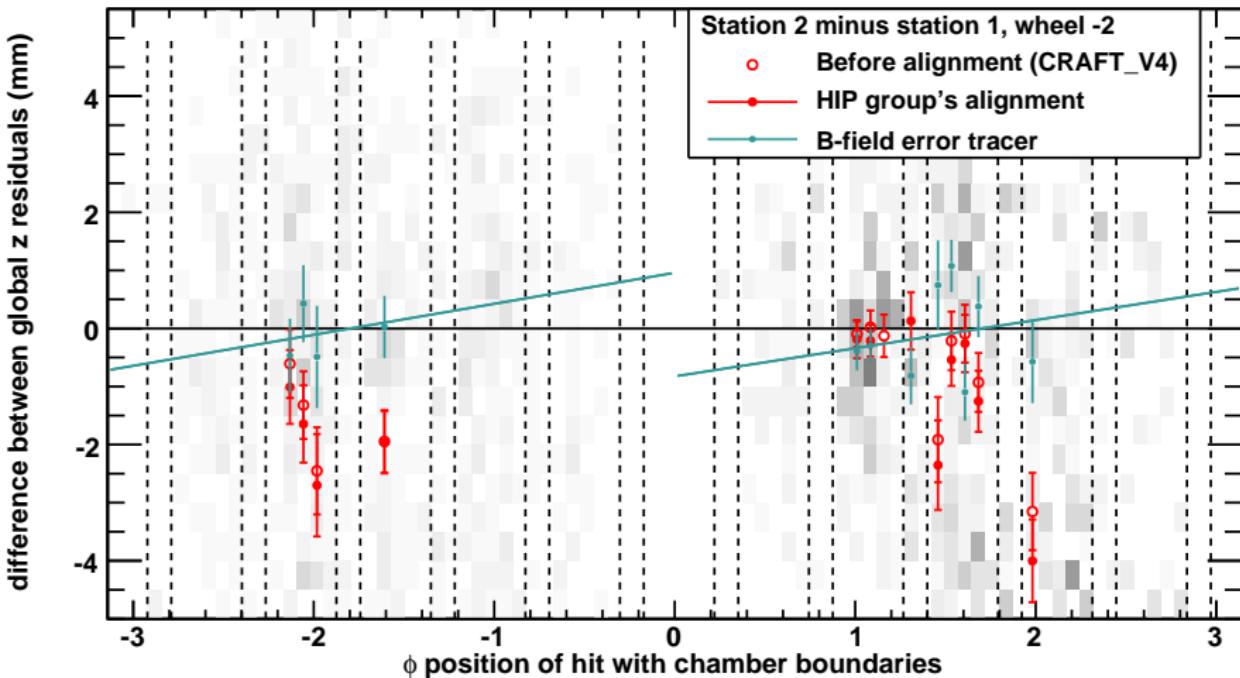
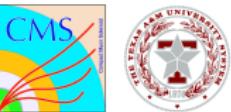
systematic errors due to \vec{B} -field mismodelling are a small fraction of the “error tracer”



z differences versus ϕ

Track-based validation plots

Jim Pivarski 143/152



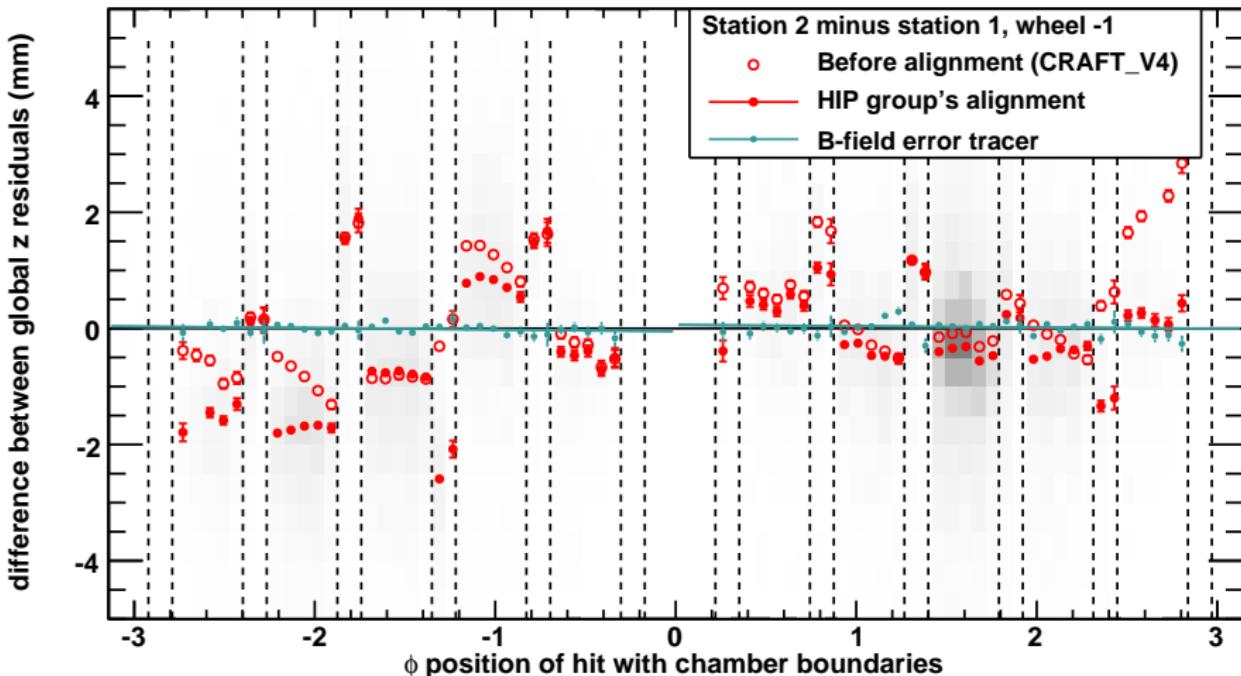
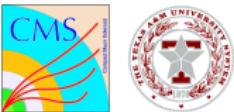
grey background is the raw 2-D residuals distribution

linear fits are only a guide for the eye: not used in alignment!

systematic errors due to \vec{B} -field mismodelling are a small fraction of the “error tracer”

Track-based validation plots

Jim Pivarski 144/152



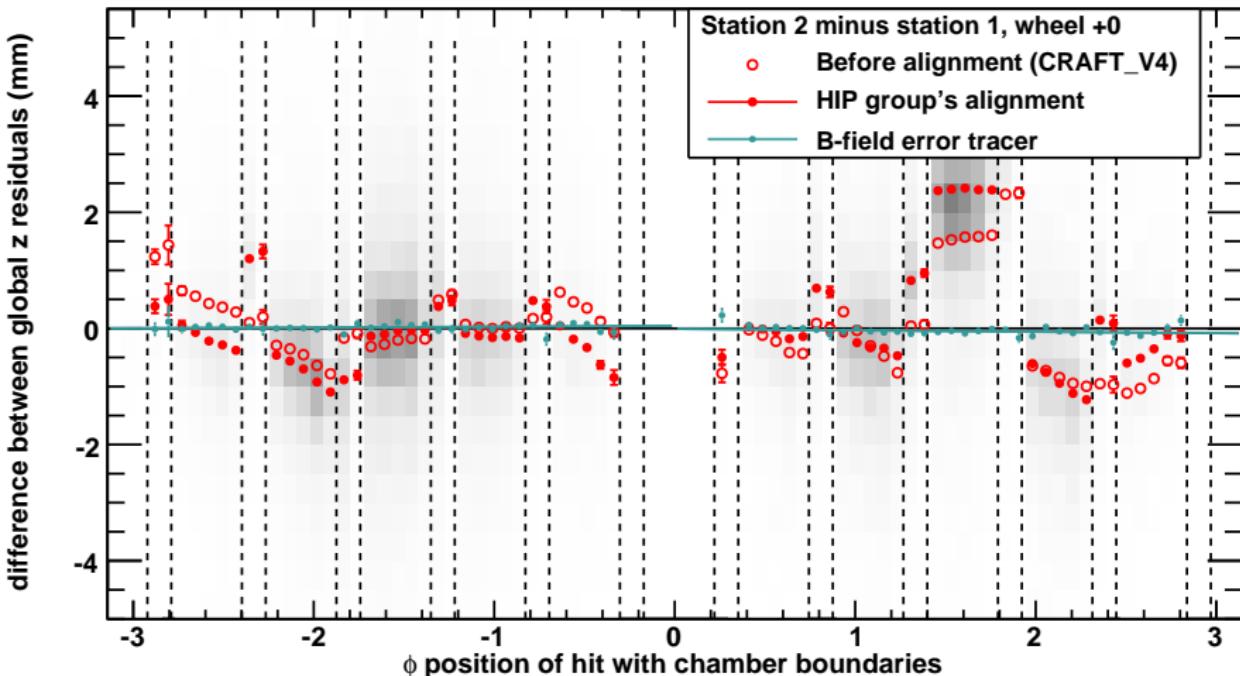
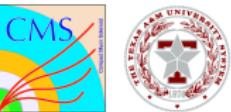
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Track-based validation plots

Jim Pivarski 145/152



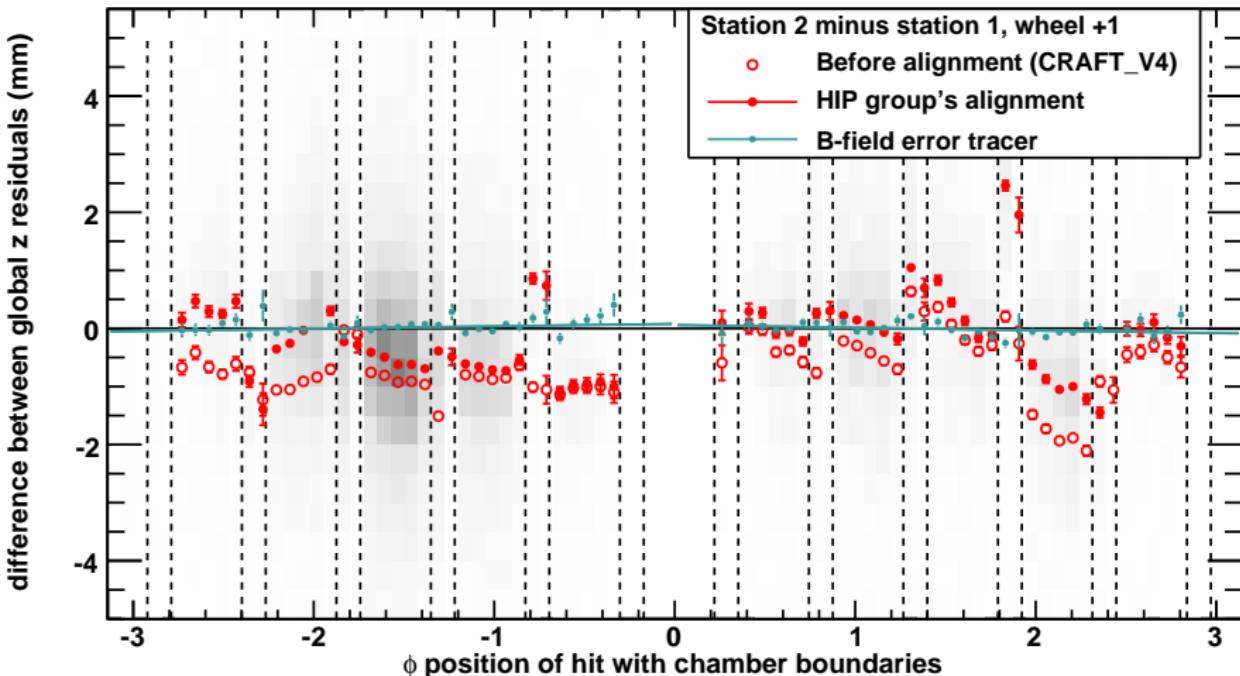
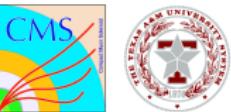
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Track-based validation plots

Jim Pivarski 146/152



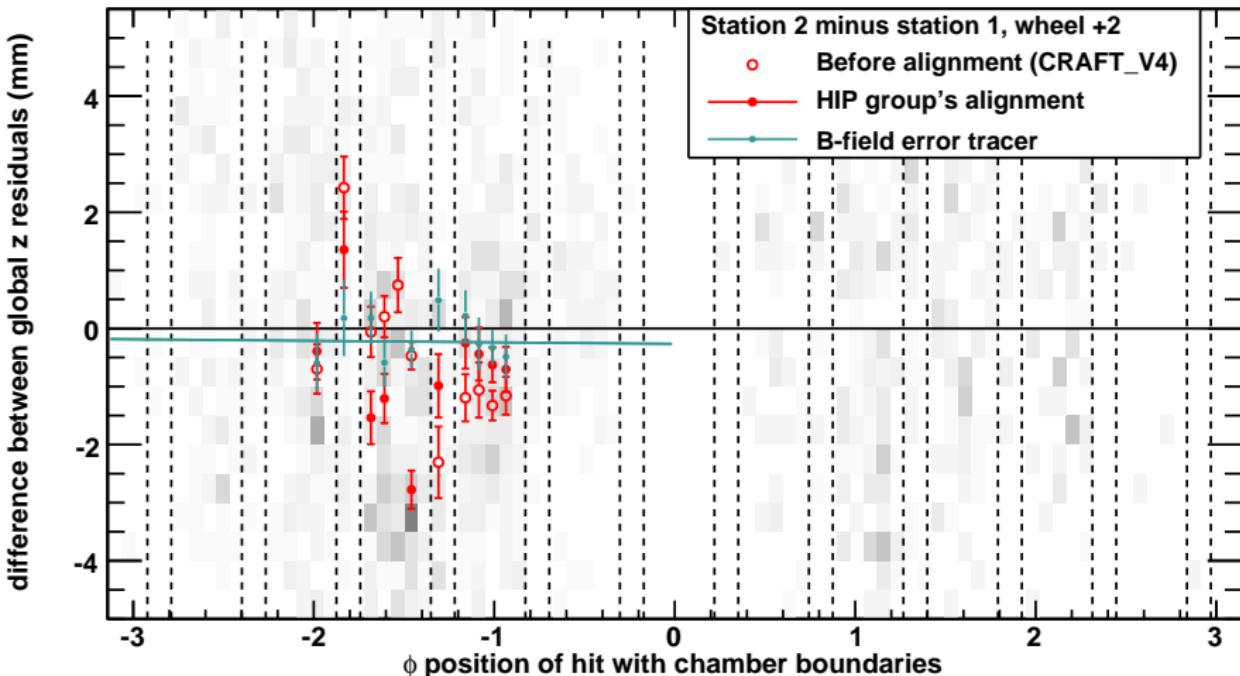
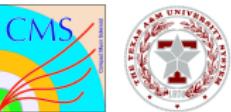
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Track-based validation plots

Jim Pivarski 147/152



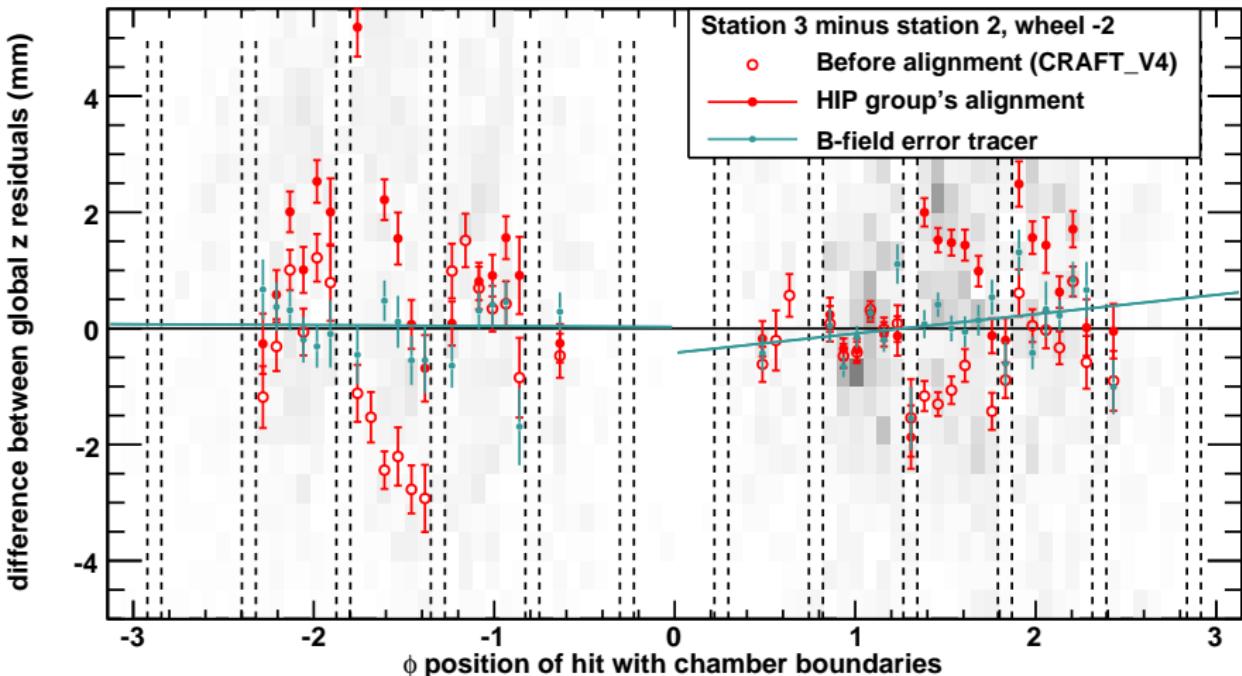
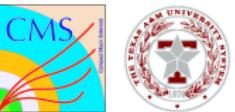
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Track-based validation plots

Jim Pivarski 148/152



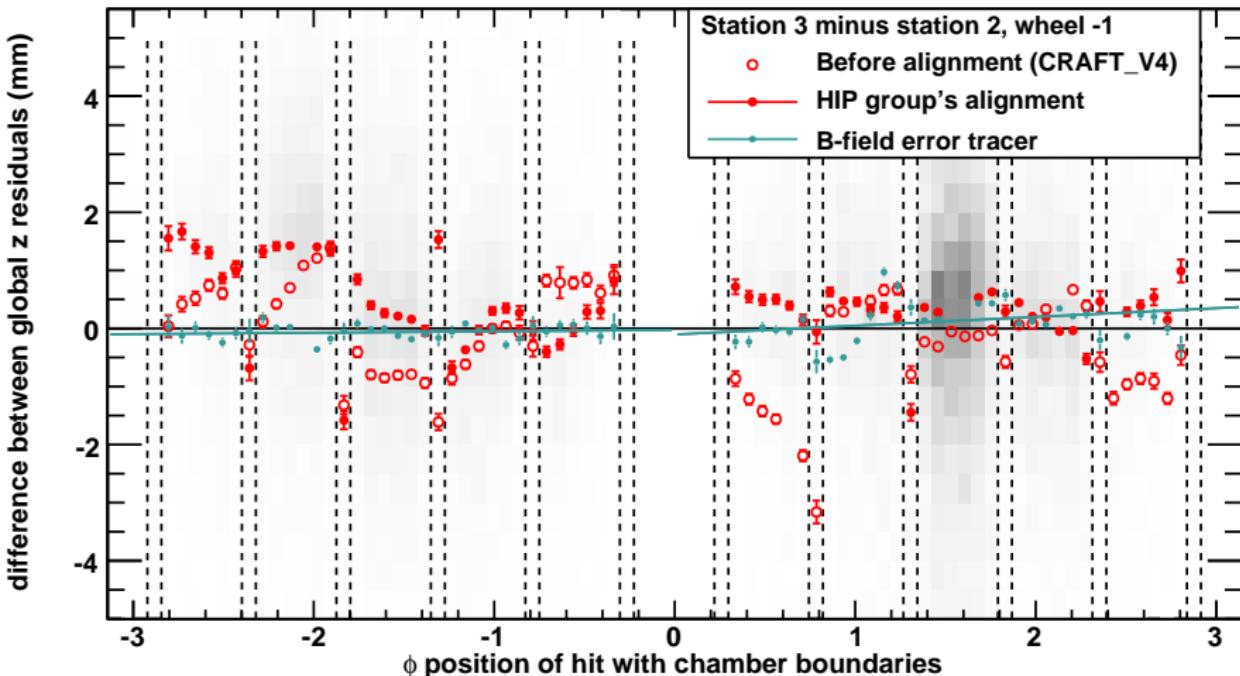
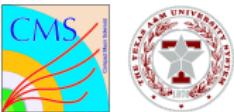
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Track-based validation plots

Jim Pivarski 149/152



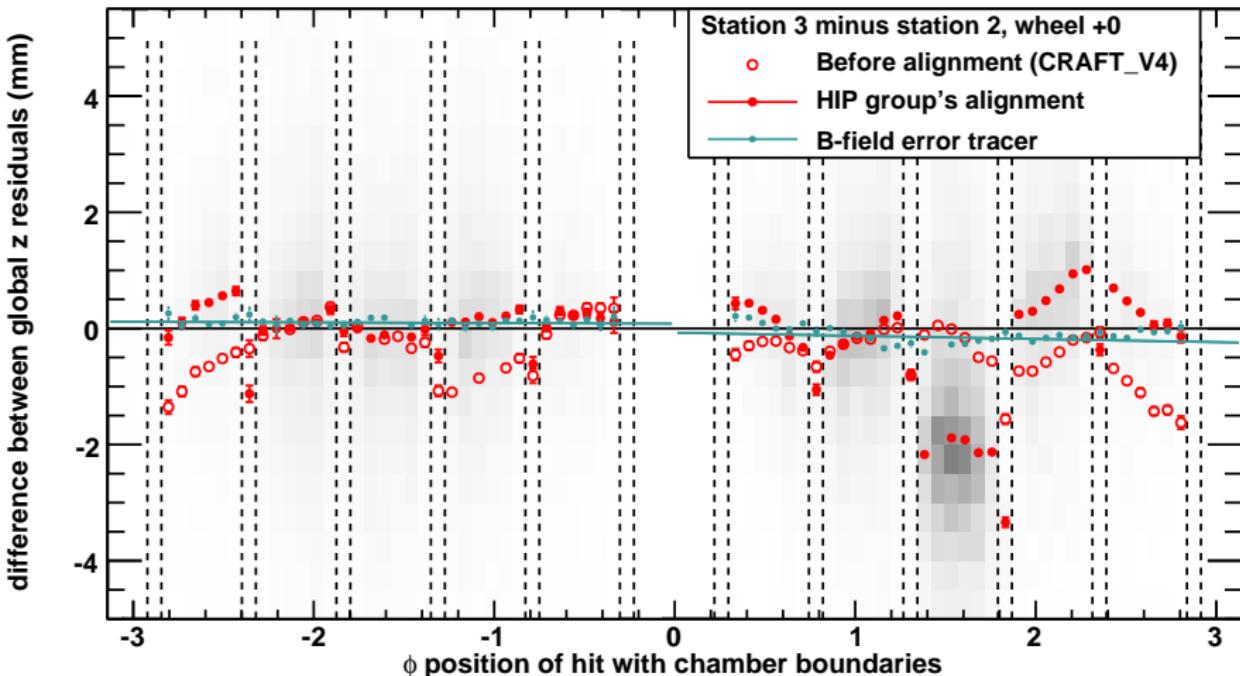
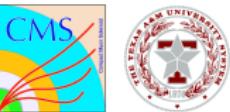
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Track-based validation plots

Jim Pivarski 150/152



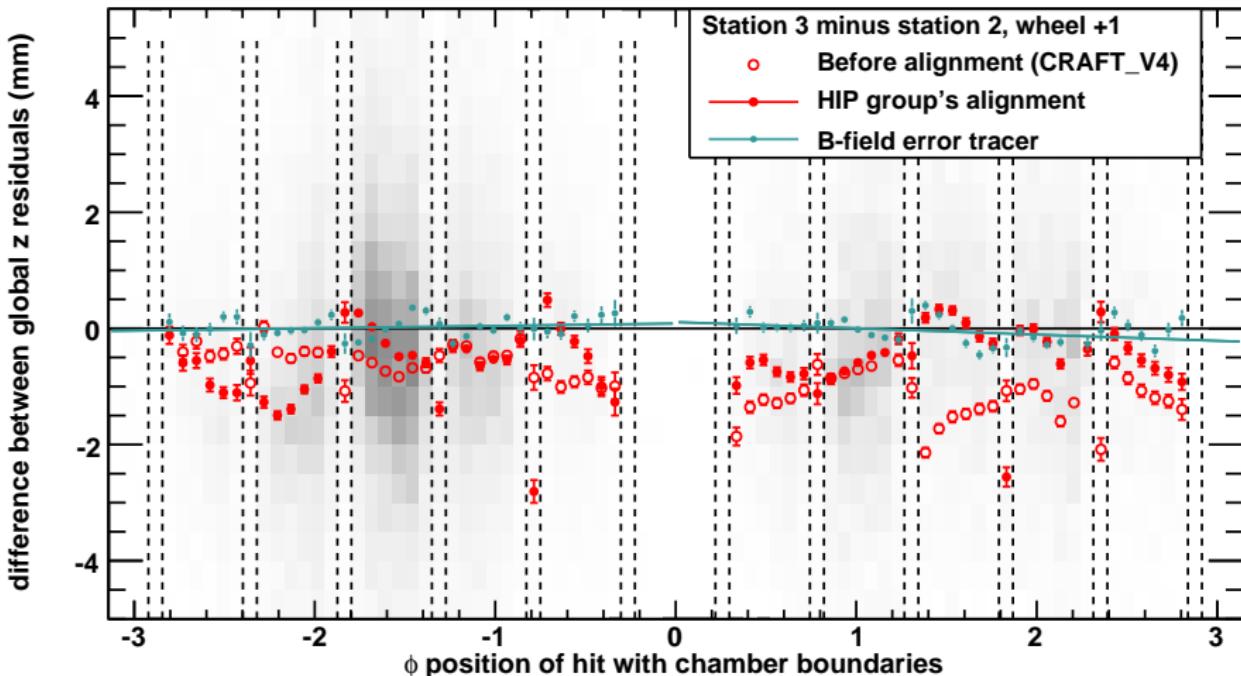
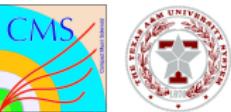
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Track-based validation plots

Jim Pivarski 151/152



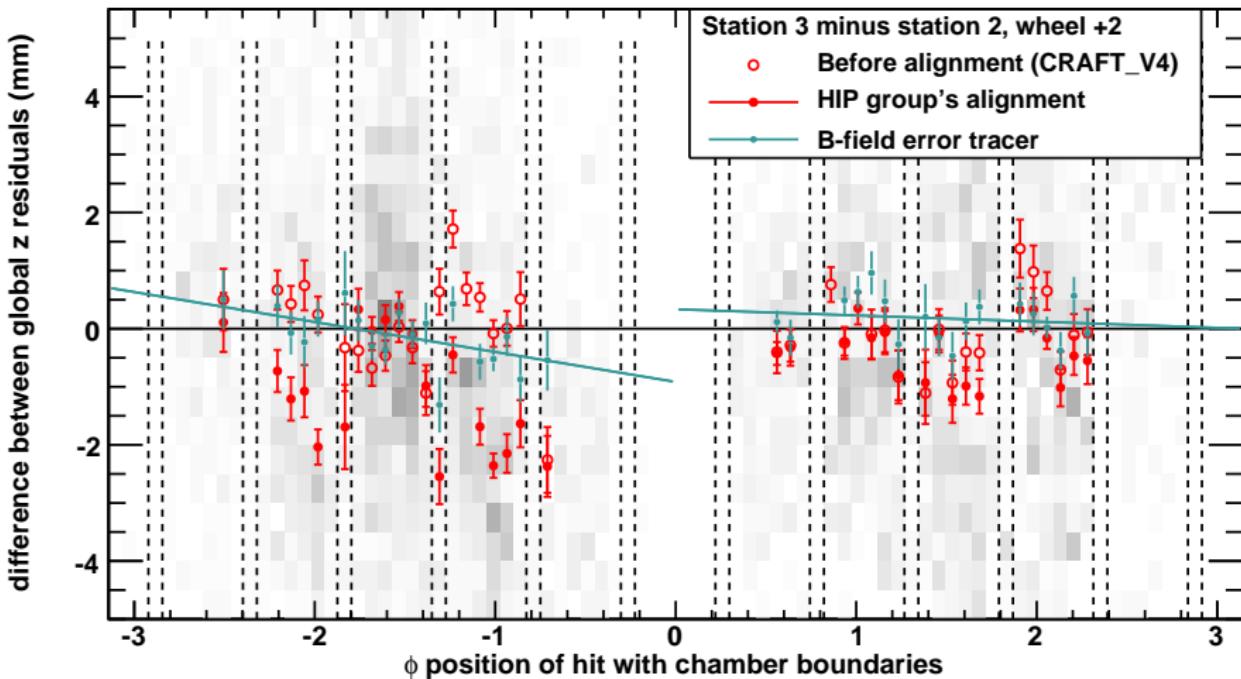
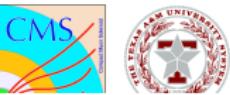
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Jim Pivarski 152/152



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