Supplemental Material A
Consideration of 2-term to 5-term fits in terms of fit order and weighting dependence

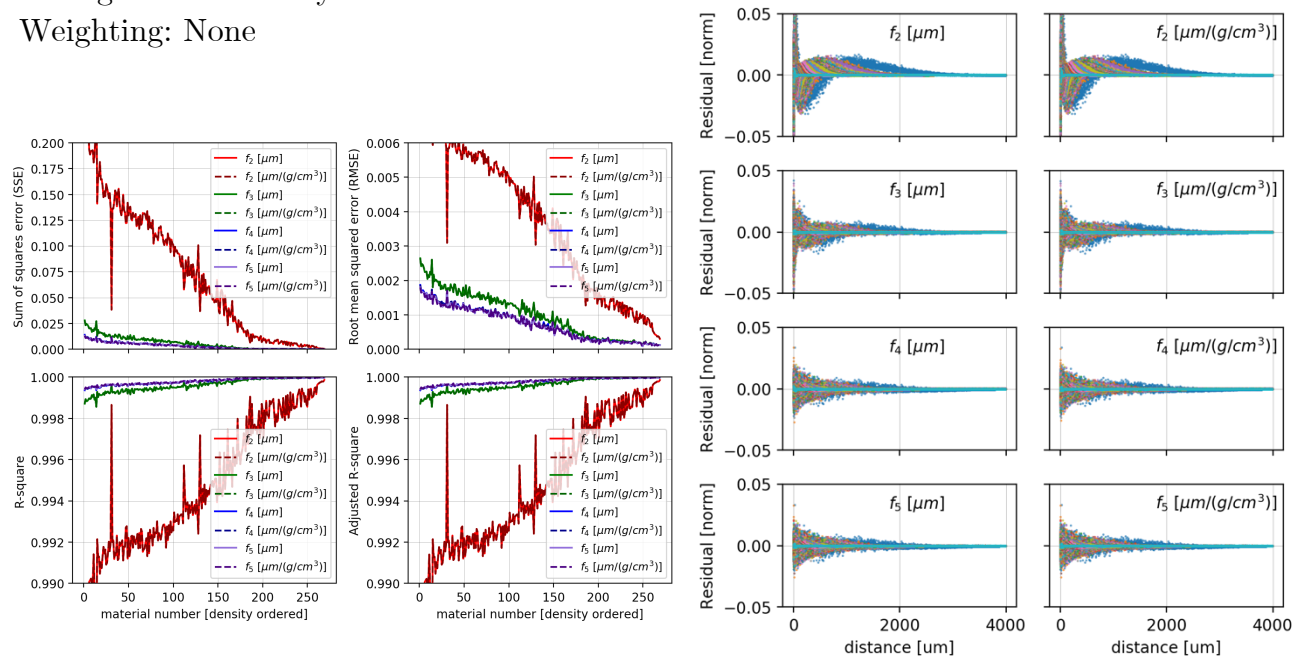Fit algorithm: Density Ordered
Weighting: None

Fig. 1 The goodness of fit metrics and residuals for the fit algorithm conducted in density order without weights. This is the superior fit published with this publication. This document shows that the utilization of weighting and reverse density order fitting do not serve to improve the fit quality.
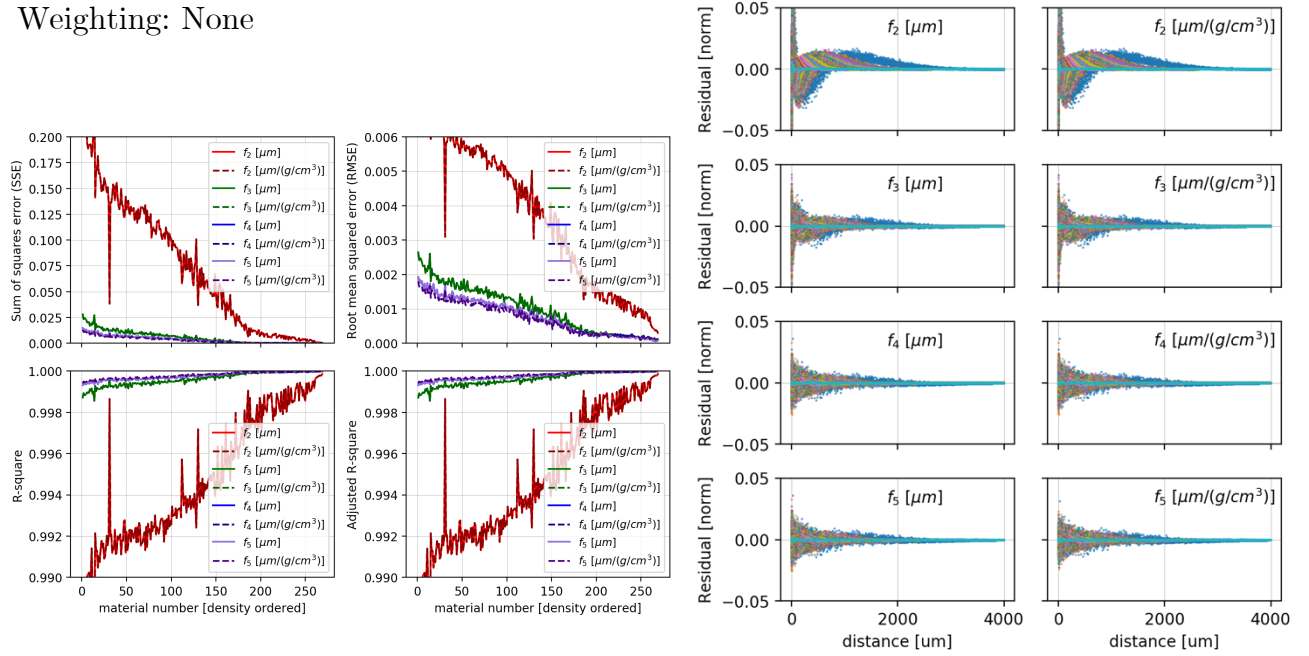
Fig. 2 The goodness of fit metrics and residuals for the fit algorithm conducted in opposite density order without weights. This fit is shown to be approximately equivalent to the density-ordered fitting algorithm. This shows that the improvement in fit quality with increasing density is intrinsic to the fundamental processes at play and not a relic of the fitting algorithm employed.

Fit algorithm: Density Ordered
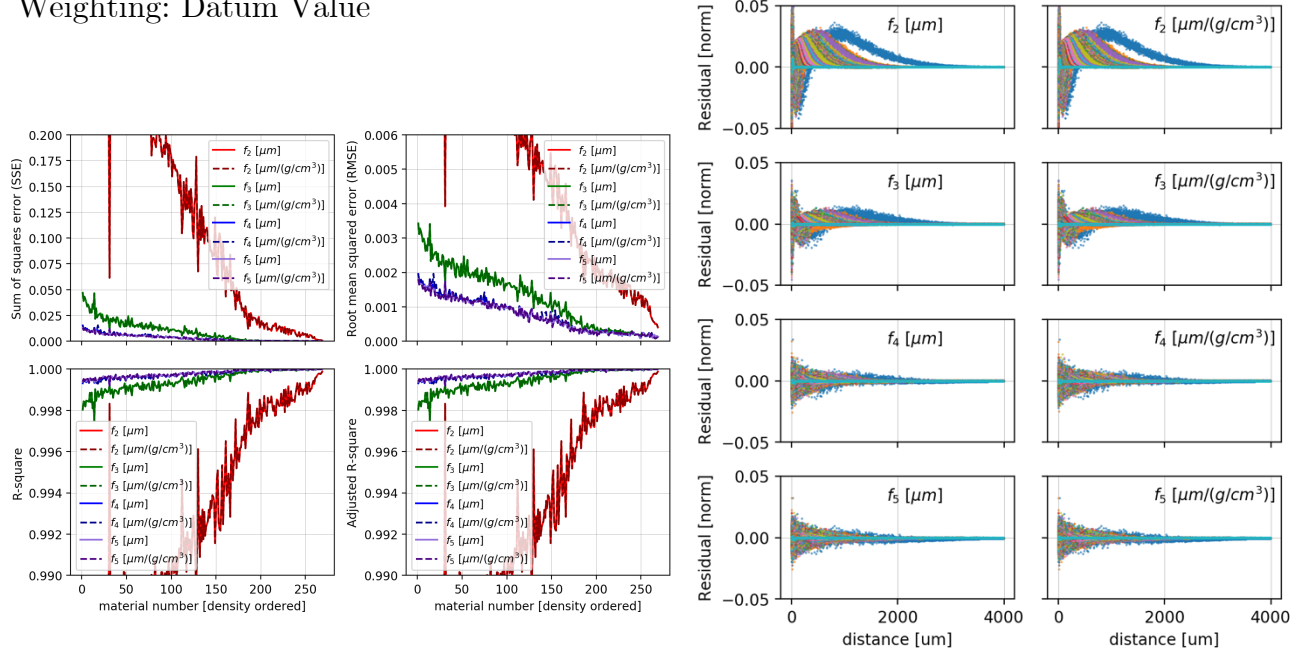Weighting: Datum Value

Fig. 3 The goodness of fit metrics and residuals for the fit algorithm conducted in density order with errors weighted by the data values. This weighting encourages accurate fitting at high-count low-depth regions of the PIP, at the expense of low-count high-depth regions. This fit is shown to be inferior to that conducted without weighting.

Fit algorithm: Density Ordered
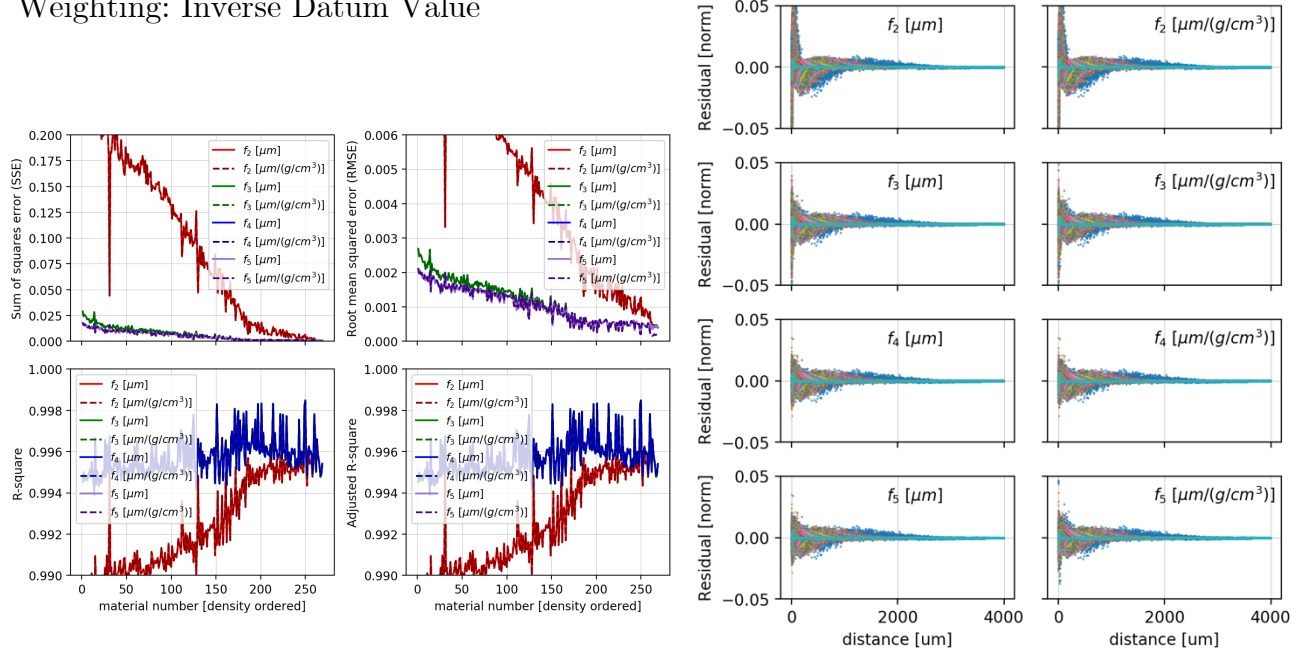Weighting: Inverse Datum Value

Fig. 4 The goodness of fit metrics and residuals for the fit algorithm conducted in density order with errors weighted by the reciprocal of the data values. This weighting encourages accurate fitting at low-count high-depth regions of the PIP, at the expense of high-count low-depth regions. This fit is shown to be inferior to that conducted without weighting.