The flattened nth order cross-cumulant can be described by the following equation:

as shown in the tutorial step *Linearization*.

Since neither nor vary with the order of the cumulant *n*, combining several cumulants allowed us to determine the molecular density , the spatial distribution of molecular brightness and the on-time ratio map of fluorophores each with its own level of accuracy ( having the highest) as described in S. Geissbuehler et al. 2012.

The nth order linearized cumulants are proportional to which has been shown in the tutorial step *Linearization* to be a polynomial of order *n*, thus having *n* roots for . In other words, after brightness linearization, introduces artifacts in the resulting image due to its zeros. However, using the on-ratio map , we can easily determine where will drop towards zero and fill these locations with the (n-1)th order linearized cumulants (instead of the actual nth order one). Indeed, according to Figure 1, zeros always correspond to high values.

Correction for this artefact is introduced in equation (2) to yield the bSOFI image that can be roughly approximated by:

Equation (2):