

S1 Appendix. Custom MATLAB Code to Determine Uniformity Regions. 315

To quantify the illumination profile uniformity, we have defined uniformity regions as 316
the largest area enclosed, that yield a normalized intensity deviation under 1% or 0.5%. 317
We calculated the radii of the regions with a custom MATLAB algorithm. The 318
algorithm initializes the ROI with a circular region (radius of 25 pixels) and compares 319
the mean values of the current ROI to the annulus (with a thickness of 10 pixels) just 320
outside of the initial region. If the average absolute brightness deviation of the annulus, 321
compared to the previous ROI, is within the specified range (1 or 0.5%) the algorithm 322
continues to evaluate the absolute brightness deviation in the next annulus with the 323
same thickness, just outside of the previous annular ROI. The algorithm iterates until 324
the specified annular ring indicates that the uniformity level has decreased below the 325
specified range or the radii hits the corner of the FOV. The uniformity regions for all 326
sources are illustrated in Fig.4 and the calculated radii of 1% and 0.5% uniformity 327
regions are given in Table 2 in the manuscript. We also applied Gaussian filter ($\sigma = 5$) 328
to remove the small artefacts on the sample, such as dust particles, etc. 329