upon. We have shown that their results disagree with our simulations which supported the existing well-established and validated theory.

4 Appendix

![Expected Number of Clusters - CDT 1.5](image1)

![Expected Number of Clusters - CDT 2](image2)

![Expected Number of Clusters - CDT 2.5](image3)

![Expected Number of Clusters - CDT 3](image4)

Figure 3: Comparison of Monte Carlo and theoretical expected number of clusters in 1D (in the legend # denotes the word number). At low CDTs our results match those of BP, however at high CDTs the average number of clusters that they find is slightly inflated but the theoretical number of clusters they find matches our calculations.
| FWHM | Cluster Defining Threshold |
|------|--------------------------|
|      | 1.5 | 2.0 | 2.5 | 3.0 |
| 5    | 168.75 ± 0.07(172.14)    | 69.79 ± 0.05(71.75)    | 22.42 ± 0.03(23.29)    | 5.59 ± 0.01(5.89)    |
| 10   | 85.66 ± 0.05(86.10)      | 35.62 ± 0.04(35.89)    | 11.52 ± 0.02(11.65)    | 2.92 ± 0.01(2.95)    |
| 15   | 57.30 ± 0.04(57.42)      | 23.84 ± 0.03(23.93)    | 7.73 ± 0.02(7.77)      | 1.95 ± 0.01(1.96)    |
| 20   | 43.02 ± 0.04(43.08)      | 17.92 ± 0.03(17.96)    | 5.81 ± 0.01(5.83)      | 1.47 ± 0.01(1.47)    |
| 25   | 34.42 ± 0.03(34.48)      | 14.36 ± 0.02(14.37)    | 4.65 ± 0.01(4.66)      | 1.17 ± 0.01(1.18)    |

(a) 1D simulations versus expected Euler characteristic.

| FWHM | Cluster Defining Threshold |
|------|--------------------------|
|      | 1.5 | 2.0 | 2.5 | 3.0 |
| 5    | 218.59 ± 0.07(222.99)    | 118.05 ± 0.06(122.73) | 46.59 ± 0.04(49.51)    | 13.72 ± 0.02(14.96)  |
| 10   | 57.34 ± 0.03(57.95)      | 31.11 ± 0.03(31.60)   | 12.42 ± 0.02(12.67)    | 3.70 ± 0.01(3.82)    |
| 15   | 26.54 ± 0.02(26.75)      | 14.29 ± 0.02(14.45)   | 5.69 ± 0.01(5.77)      | 1.71 ± 0.01(1.73)    |
| 20   | 15.48 ± 0.02(15.61)      | 8.28 ± 0.02(8.36)     | 3.29 ± 0.01(3.32)      | 0.98 ± 0.01(0.99)    |
| 25   | 10.29 ± 0.01(10.36)      | 5.46 ± 0.01(5.50)     | 2.15 ± 0.01(2.17)      | 0.64 ± 0.00(0.65)    |

(b) 2D simulations versus expected Euler characteristic.

| FWHM | Cluster Defining Threshold |
|------|--------------------------|
|      | 1.5 | 2.0 | 2.5 | 3.0 |
| 5    | 336.36 ± 0.10(353.79)    | 288.06 ± 0.10(315.00) | 151.90 ± 0.07(171.14)  | 55.17 ± 0.05(64.35)  |
| 10   | 55.97 ± 0.04(56.19)      | 44.81 ± 0.03(45.77)   | 23.25 ± 0.03(23.93)    | 8.46 ± 0.02(8.80)    |
| 15   | 20.59 ± 0.02(20.57)      | 15.47 ± 0.02(15.61)   | 7.77 ± 0.02(7.89)      | 2.79 ± 0.01(2.84)    |
| 20   | 10.52 ± 0.02(10.49)      | 7.47 ± 0.01(7.52)     | 3.66 ± 0.01(3.69)      | 1.29 ± 0.01(1.31)    |
| 25   | 6.41 ± 0.01(6.39)        | 4.35 ± 0.01(4.36)     | 2.08 ± 0.01(2.08)      | 0.73 ± 0.01(0.72)    |

(c) 3D simulations versus expected Euler characteristic.

Figure 4: Comparing the average number of clusters above a threshold with the expected Euler characteristic. For each table each entry is of the form \( A ± s(EEC) \) where \( A \) is the average number of clusters above the threshold, \( ± s \) provides a 95% confidence interval for this average and EEC is the expected Euler characteristic provided by theory. This shows that the EEC provides a good approximation of the expected number of clusters above the threshold.

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