The Loop Width Distribution - Are We Hitting Rock Bottom?

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We analyze Hi-C and AIA images in order to investigate absolute limits for the finest loop strands. We develop a model of the occurrence-size distribution function of coronal loop widths, characterized by the lower limit of widths w_min, the peak (or most frequent) width w_p, the peak occurrence number n_p, and a power law slope a. Our data analysis includes automated tracing of curvi-linear features with the OCCULT- 2 code, automated sampling of the cross-sectional widths of coronal loops, and fitting of the theoretical size distribution to the observed distribution. With Monte-Carlo simulations and variable pixel sizes x we derive a first diagnostic criterion to discriminate whether the loop widths are unresolved ($w_p/x \approx 2.5 \pm 0.2$), or fully resolved (if $w_p/x > 2.7$). For images with resolved loop widths we can apply a second diagnostic criterion that predicts the lower limit of loop widths as a function of the spatial resolution. We find that the loop widths are marginally resolved in AIA images, but are fully resolved in Hi-C images, where our model predicts a most frequent (peak) value at $w_p \approx 550$ km, in agreement with recent results of Brooks et al. This result agrees with the statistics of photospheric granulation sizes and thus supports coronal heating mechanisms operating on the macroscopic scale of photospheric magneto-convection, rather than nano flare bridging models on unresolved microscopic scales.