Lightwhiskers: Branched Flow of Light

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Just recently discovered, branched flow of light (bfol) describes light beams propagating in intricate and random treetop-like patterns instead of rectilinearly. Building up on current publications, we sought to construct an adaptable experimental setup, reliably reproducing bfol, as well as means to efficiently but significantly assess the phenomenon. Succeeding, the bfol's evolvement should be investigated and methods for controlled influence developed to enable exciting potential applications. In creating bfol we used a soap membrane as a medium for the laser to travel trough. Incorporating that, we meticulously improved our experimental setup over many, differently conceptualized, prototypes. Throughout many subsequent experiments, we crystallized 8 characteristics which decisively describe a bfol and also developed visual recognition programs besides a qualitative and quantitative thickness gauge in order to evaluate them numerically. Using these characteristics, we identified and extensively characterized three steps through which bfol arises. To influence bfol, we developed upon our core idea to control the soap membrane's thickness landscape with 5 own interdisciplinary approaches. While all were tested systematically, two failed, whereas the two most successful evoked intriguing patterns on the membrane which could not only influence bfol but also curve the laser beam. All effects and relevant parameters were classified amply. The project ultimately succeeded in providing functional tools for the research area. According to our research, it is even the first to depict the bfol's evolvement and to develop practical methods of influence which motivate us to pursue our research ideas in tsunami research, cancer detection and communication.

Awards Won:
Fourth Award of $500