

Abstract Submitted
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Acoustical vortices on a Chip for 3D single particle manipulation and vorticity control.¹ ANTOINE RIAUD, CNRS Nord pas de Calais, JEAN-LOUIS THOMAS, OLIVIER BOU MATAR, CNRS Paris, MICHAEL BAUDOIN, CNRS Nord pas de Calais — Surface acoustic waves offer most of the basic functions required for on-chip actuation of fluids at small scales: efficient flow mixing, integrated pumping, particles separation, droplet displacement, atomization, division and fusion. Nevertheless some more advanced functions such as 3D particles manipulation and vorticity control require the introduction of some specific kind of waves called acoustic vortices. These helical waves propagate spinning around a phase singularity called the dark core. On the one hand, the beam angular momentum can be transferred to the fluid and create point-wise vorticity for confined mixing, and on the other the dark core can trap individual particles in an acoustic well for single object manipulation. In this presentation, I will show how acoustical vortices on-a-chip can be synthesized with a programmable electronics and an array of transducers ². I will then highlight how some of their specificities ³ can be used for acoustical tweezing and twisting.

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²A. Riaud, J.-L. Thomas, E. Charron, A. Bussonniere, O. Bou Matar, M. Baudoin Phys. Rev. Applied 4, 034004 (2015)

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