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Acoustic vortex beam scattering measurements and a review of modulated radiation pressure for levitation experiments[1] PHILIP MARSTON, VIKTOR BOLLEN[2], Washington State Univ — An acoustic vortex beam has a null on the axis of propagation and an angular phase ramp proportional to the order of the beam. The beam carries orbital angular momentum [1]. The phase ramp facilitates high-resolution imaging and acoustical alignment. First order vortex beams were generated in water and spheres were raster scanned in the beams. Forward scattering [2] and backscattering [3] were investigated with array-based signal detection and processing. Three types of helicity-projection processing reveal phase evolution and regularities in such measurements. This is supported by theoretical Fermat phase spirals. In other work some noteworthy experimental and theoretical aspects and early modulated acoustic radiation pressure experiments for studying modes of acoustically levitation of drops [4] (and subsequently bubbles) have been reviewed [5]. The review was needed to correct analytical errors in recent work by others. [1] B. T. Hefner & P. L. Marston, J. Acoust. Soc. Am. 106, 3313 (1999). [2] V. Bollen, et al., Proc. Meet. on Acoustics, 19, 070075 (2013). [3] V. Bollen & P. Marston, J. Acoust. Soc. Am. 148(2), EL135 (2020). [4] P. Marston & R. E. Apfel, Bull. Am. Phys. Soc. 22, DFD-1283 (1977). [5] P. Marston, J. Quant. Spectrosc. & Radiat. Transf. 254, 107226 (2020).

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