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Whispering Gallery Modes Used to Determine the Changing Size of Levitated Aerosol Droplets in a Fluctuating Optical Trap ANGELA LUDVIGSEN, LOWELL MCCANN, University of Wisconsin - River Falls — A laser can be used as an optical trap to catch and hold small, transparent objects. Observations of optically trapped aqueous aerosol droplets have demonstrated that the droplet moves between two or more stable positions dependent upon the power of the trapping laser. It is hypothesized that this movement coincides with a resonance between the trapping light and the droplet's surface, called a Whispering Gallery Mode. When this resonance occurs, forces acting on the droplet cause it to move. To investigate this behavior, Raman scattered light from the droplet as well as the droplet's position are measured. The Raman spectrum exhibits a series of peaks resulting from the droplet's spherical shape, referred to as Cavity Enhanced Raman Spectroscopy. The location and spacing of these peaks are known to be related to the diameter and the optical properties of the droplet. From this spectrum, the magnitude of the electric and magnetic fields of the scattered light are calculated. This allows for a precise measurement of the droplet's radius at the moment that the droplet moves between stable positions. After determining the droplet's radius from the spectrum, the effect of varying the intensity of the trapping laser beam on the droplet radius can be investigated.

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