Generalized Lorenz–Mie theories and mechanical effects of laser light: a celebration of Arthur Ashkin's pioneering work in optical levitation and manipulation

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The generalized Lorenz–Mie theory (GLMT, more generally GLMTs) [1] had initially been developed to address issues in optical particle characterization, more particularly in optical particle sizing, in order to simultaneously measure velocities and sizes of individual particles embedded in flows, with applications to spray combustion or plasma spraying, among others. This line of research, however, has had two opportunities to meet with another line of research, namely the one by Arthur Ashkin dealing with optical levitation, trapping, and manipulation of macroscopic particles. The first opportunity has been that the GLMT (more generally the GLMTs) is able to deal with mechanical effects of light and indeed bridges the gap between the Rayleigh and ray-optics regimes to which the theoretical part of Ashkin's work was limited. The second opportunity has been that optical levitation experiments promoted by Ashkin have been used to experimentally test the validity of the GLMT.

In this talk, as a celebration of Arthur Ashkin's pioneering work concerning the mechanical effects of laser light, I shall offer a review and overview of the research devoted to the GLMTs and mechanical effects of laser light, both in Rouen where the GLMT had been developed, and all over the world.

Reference

[1] Gouesbet, G., and G. Gréhan, 2017: *Generalized Lorenz–Mie Theories*. Springer, Belrin.

Mode of presentation: Invited